Establishing a Model for Describing Secondary Enrollment Trends in Business Education

Dissertation

Presented in Partial Fulfillment of the Requirements for The Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

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Abstract

Determining the status of business education in the state of Ohio is necessitated by non-quantifiable research statements that claim there has been a decline in business education enrollment on a national level. In addition, the valuable nature of business education is argued by many scholars and written about in numerous scholarly articles, yet business education finds itself on the sidelines of secondary (high school) curriculum. As no quantifiable research exists, this research study was designed to describe enrollment trends in business education in the state of Ohio for the school year ending 2006 through the school year ending 2012.

Using publicly available data from the State of Ohio Department of Education gained through the Education Management Information System (EMIS), enrollment data was collected for all public schools in the state of Ohio for the school years described. Enrollment numbers were broken down by course codes (a total of 15), as prescribed by EMIS. Enrollment numbers were further broken down by race, gender and secondary grade level. Using JobsOhio’s geographic division of the state of Ohio based on Ohio’s diverse job markets, additional statistical evaluation about enrollment trends was conducted to draw conclusions about enrollment on a statewide basis. Using statistical
analysis, determinations about statistically significant trends in enrollment (or lack of the same) were reached.

For the seven (7) year period evaluated, very few statistically significant trends in enrollment were found. Courses with increasing or decreasing enrollment were identified, but in most cases, with slight or no statistical significance. Because of this lack of significance, further longitudinal studies related to trends in enrollment are recommended.

Overall enrollment in business education courses is low compared to that of elective counterparts, namely noted by the increasing enrollment in Advanced Placement courses. Advocacy for business education is something that each and every business teacher training program must implement as part of their curriculum. Business educators must be more than classroom educators; they must be marketing personnel for their curriculum.

Finally, maintaining business education curriculum that demonstrates rigor and relevance for all students is critical to the improvement of enrollment numbers in business education.
Dedication

I would like to dedicate this dissertation to my family and friends who support all of my endeavors no matter how crazy they may sound. To my son, Tyler, whom I hope finds a love for learning along his own educational path. To my high school business teacher, Mrs. Bev Riley, from whom I gained my love for business education and who taught me that being a college prep student and taking business classes was not just the right thing to do, it was also the smart thing to do. Finally, to my grandfather, who in his years on earth taught me many things, including the importance of education and hard work, to never take life for granted, and to always appreciate all that you have been given, no matter how big or small.
Acknowledgements

While completing a Ph.D. may appear to be an individual endeavor, without the assistance and support of many individuals, this process would not have been completed. I am fortunate to be supported by individuals who believed in me, even when I did not.

First, I would like to thank my family and friends. While my educational endeavors may be never ending, this Ph.D. process seemed extremely long, beginning in the fall of 2006. Without the support of my family and friends, and the encouragement to finish this dissertation, I might have been “ABD” all my life.

Second, I would like to thank my advisor, Dr. Christopher J. Zirkle. I will always appreciate Dr. Zirkle’s suggestion to pursue this degree while on a visit to the high school where I was employed. This sparked an interest in an achievement I never dreamed of. Without Dr. Zirkle’s patience, guidance, mentoring, encouragement and belief in me, this document would not be possible. His gentle reminders that I needed to find a topic and worry about changing the world later, were hard to swallow at times, but necessary. Dr. Zirkle never failed to have time for me and always gave guidance and feedback that has proven to be invaluable.
I owe much gratitude to my committee members, especially, Dr. James G. Pinchak. Dr. Pinchak went out of his way to meet me at off-campus locations and truly challenged my thinking at times when I needed it most. Dr. Pinchak never let me take for granted what I thought I knew and encouraged me to be a better scholar. His ideas and suggestions are what led to the data analysis completed through the work on this dissertation. I truly believe without his time and patience, I would not have redirected my intentions for this project and likely would not have finished. Secondly, I am grateful to my third committee member, Dr. Susie Whittington. Dr. Whittington graciously agreed to be a part of my committee and in her initial meeting with me gave suggestions about my work that were vital to its completion. Dr. Whittington’s technical writing expertise in the initial meeting helped me to form a writing that was much more succinct and helped this wordy individual become less biased in writing.

Throughout this process and my entire post-secondary education, I am indebted to The Ohio State University and its faculty. I have earned all of my educational degrees from this amazing university and am proud to be an Ohio State graduate, three times. Throughout the Ph.D. process, many OSU faculty members had a huge impact on my success, including those already mentioned. In addition, educators, including Dr. Robert R. Hite and Dr. Joe Gliem, believed in my ability and potential when others might have had less faith. From Dr. Hite, I learned many aspects of teacher education, and maybe more importantly, I learned and recognized some of the best qualities held by outstanding college professors. From Dr. Gliem, I learned that perseverance through statistics was required to get to this point; a lesson hard learned for this sometimes statistically
challenged student. I am grateful to all of my OSU professors, but especially Dr. Hite and Dr. Gliem.

I would like to thank Sherry P. Minton, an invaluable mentor and friend. Sherry not only served as a supervisor in my teaching career for 19 years, but became a friend and sounding board during my Ph.D. work as well. I appreciate her assistance in proofreading parts of this document and suggestions she made along the way to help make this a better research project. I truly feel that without her mentorship and friendship over the years, I would not be where I am today.

I would like to thank Sheila Milligan and the Ohio Department of Education for their work in filtering the data requested for this project. Ms. Milligan was quick to respond to questions and requests for data when needed. I am grateful for her time and the work of the Ohio Department of Education.

Without the assistance of the Statistical Consulting Service at The Ohio State University, I would not have been successful in evaluating the large amount of data acquired for this project. I am grateful to two individuals specifically, Di Cao and Jingou Gao. I am grateful for both their patience and expertise.

Finally, I would like to thank South-Western City Schools and their support of teachers and their educational endeavors. I have been grateful for the experiences this district has given me and their support of business education in an ever changing, demanding curricular environment. I am grateful to my colleagues and friends who over the years have supported me directly or indirectly in the completion of this degree program.
I truly have many people to thank for my success. There are many friends, co-workers and colleagues who directly or indirectly kept me going in the right direction throughout this process. To all of you, I am grateful.
Vita

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Fields of Study

Major Field:  Education

Area of Specialization:  Workforce Development and Education

Cognate Areas of Study:  Career and Technical Education
Technologies of Instruction and Media
Research and Statistics
Business Education
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Chapter 1: Introduction

The demand for accountability in public education has become increasingly common from stakeholders in all areas of education, most notably through the enactment of various national and state laws over the past few decades. Legislative efforts over the years have demanded accountability in the form of various statistical measures to define what constitutes effective education. Accountability measures have the potential to affect public educational funding, teacher pay, strategic planning measures by school districts, curriculum planning and most commonly, student assessment.

Often these accountability measures and initiatives in educational reform are housed under an umbrella called Standards Based Reform (SBR). Hamilton, Stecher, Yuan, and RAND Education (2008) discuss SBR. Hamilton, et al., cite that although there is not one definition of this concept, the following features, among others, are common in all legislation affecting school reform: academic expectations for students, the use of assessments of student achievement to monitor performance, and accountability provisions that reward or sanction schools or students on the basis of measured performance.
Standards Based Reform is not a new concept, but it is one that has become more prevalent in educational policy discussion throughout the last few decades. “Although interest in measuring educational outcomes had been growing throughout the 1960s and 1970s, and several states began adopting elements of SBR in the 1970s, many researchers and historians view as a seminal event the publication of *A Nation at Risk* (National Commission on Excellence in Education) in 1983. That document, which used strong and colorful language to deplore the state of American education, led to policy debates about how to raise expectations for both student and teacher performance, and it emphasized the need to monitor student achievement in a systematic way”, (Wixson, Dutro, & Athan, as cited in Hamilton, Stecher, Yuan, and RAND Education, 2008, p. 18).

In addition to SBR, another accountability measure important to note is that of data based decision making, also referred to as data-driven decision making. School personnel at all levels are asked to provide data to support reasons for lesson planning, curriculum changes and overall curriculum planning. Marsh, Pane and Hamilton, 2006, p. 3, described data driven decision making (DDDM) as, “teachers, principals, and administrators systematically collecting and analyzing various types of data, including input, process, outcome and satisfaction data, to guide a range of decisions to help improve the success of students and schools. Achievement test data, in particular, plays a prominent role in federal and state accountability policies. Implicit in these policies and others is a belief that data are important sources of information to guide improvement at all levels of the education system and to hold individuals and groups accountable.” Stakeholders, from lawmakers to educators to parents to students to a variety of others,
want data that gives detailed answers regarding questions about achievement, demographics and enrollment, in an effort to provide an overall accountability for educational funding.

In an attempt to provide a greater level of organized accountability for data driven decision making in education in Ohio, the Educational Management Information System was established by Amended Substitute House Bill 140 in 1989, becoming effective in August of 1990. “Education Management Information System (EMIS) is a statewide data collection system for Ohio's primary and secondary education, including demographic, attendance, course information, financial data and test results” (The Ohio Department of Education [ODE], EMIS Basics, 2013). While EMIS has been in existence for a number of years, analyzed data related to various reporting areas in EMIS must be created by individuals with interest in the data. The data, available through the Ohio Department of Education, requires analysis for informed policy making and curriculum change.

Although EMIS data exists to meet a number of state mandates, the reported data has the ability to show enrollment trends in courses in secondary education. Research to find analytical data of this type yielded no results for actual reported data on enrollment trends for business education. In management, it is generally considered that if something is not measured, it cannot be managed. Therefore, with no identifiable analysis regarding enrollment trends in business education in Ohio, stakeholders in the business education arena cannot begin to manage the complexities of providing convincing arguments for enrollment; providing viable, meaningful curriculum that
benefits secondary students; or providing valid arguments to legislative and curriculum leaders on why business education should be a required curricular element for all high school students in their quest to become productive citizens of the state of Ohio.

**Background of the Problem**

In an era of politically mandated and publicly demanded educational reform, many high school course electives, specifically business education electives, have become a low priority for secondary schools and their stakeholders. “World events, legislation, and educational trends have also caused increases and decreases in high school business course offerings over the last 50 years” (Railsback & Hite). Specifically, Railsback & Hite (2008) cite *A Nation at Risk (1983)* and the *No Child Left Behind Act of 2001* (NCLB) as two detrimental causes of decreases in business education offerings because of their emphasis on basics, reading and mathematics. Additionally, increased participation in Advanced Placement course testing, as reported by the College Entrance Examination Board in 2012, suggests students are opting for courses to gain college credit, as opposed to taking electives (like business education courses) that would also fulfill graduation requirements (College Entrance Examination Board, 2012).

Cuts in secondary course electives also exist because of funding concerns. Courses needed for instruction in high-stakes testing in the four core academic areas (math, science, social studies and language arts) cause curriculum leaders to move from funding business education courses to funding academic courses related to the core academic areas. Specifically, in Ohio, a 2012 *Columbus Dispatch* article discusses the effects of school budget cuts in Ohio. Sewell (2012) shares, “The results of cuts for
many schools: more students per teacher, fewer electives in areas such as foreign languages and arts classes, and reduced support staff” (para. 4).

Alternatively, course offerings have been discontinued due to a shift in secondary course enrollment. This shift may be attributed to the requirement to complete a number of mandated course offerings, none of which include business education. The Ohio Core gives students the opportunity to gain knowledge in the four core areas with curriculum objectives that require students to learn about historical events, algebra and geometry, literature and writing (Ohio Department of Education, Ohio Core). Students enrolled in Ohio high schools beginning with the graduating class of 2014 are required to complete twenty courses designed to prepare students for their future. Based on the Ohio Core requirements, students may have time for five (5) elective courses (Ohio Department of Education, Ohio Core). This leaves little to no room for learning specific skills required for their future as a working adult. Instead, students are required to follow a curriculum path identical to that of their peers geared toward achievement on standardized tests and meeting prerequisites for college, regardless of any personal interests, individual aptitudes or the need to be a productive member of society.

In addition to requirements related to legislative mandates and standards like the Ohio Core, secondary curriculum and graduation requirements are often tailored to produce a student that meets college entrance requirements. Four-year colleges and universities in Ohio do not include successful completion of a business education course as a requirement for admission. Table 1.1 reflects no mention of business education for any public university as compiled from the 2011 – 2012 University System of Ohio’s
college resource planning guide (Ohio Public Universities Admissions Council, 2012), although it is worth noting that the University of Cincinnati mentions business education as an option for an elective. A review of the 2011-2012 Counselor’s Guide to Ohio’s Private Colleges and Universities, published by the Association of Independent Colleges and Universities of Ohio (2012), shows no recommendation for business education as a suggested course for college preparation. Therefore, students are not encouraged by post-secondary institutions to expose themselves to business education courses while completing their high school education.

Table 1.1: Ohio Public Universities – Admission Requirements; Core Curricular Requirements

<table>
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<tr>
<th>School</th>
<th>English</th>
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<th>Social Studies</th>
<th>Foreign Language</th>
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</table>

*In addition to core credits in English, Math, Science, Social Studies and Foreign Languages, the University of Cincinnati requires six (6) electives and notes “must include 1 unit in Business, Technology, Fine Arts or Foreign Language”.

**While The Ohio State University recommends the same number of units as the majority of public universities within Ohio, they recommend additional units in Math (4) Social Studies (3) and Foreign Language (3) for strong preparation.
Research into college admission requirements reveals prerequisites in English, math, science and social studies, and often, foreign language and fine arts. As mentioned above, beginning with the graduating class of 2014 (freshmen who entered high school in September 2010), all Ohio high schools must meet the Ohio Core requirements, of which five (5) courses can be electives (Ohio Department of Education, 2008). These electives can come from business education, but business education competes with courses in foreign language, fine arts, family and consumer sciences, technology, Junior Reserve Officer Training Corps (JROTC) programs, Advanced Placement courses and other elective courses offered in the four core areas of standardized achievement testing: English language arts, mathematics, science, or social studies courses (Ohio Department of Education, Ohio Core Outline). As Table 1.1 also shares, Ohio’s public universities, generally require a minimum of two years of foreign language. Some universities, including The Ohio State University, encourage three (3) units of foreign language for strong preparation. College requirements and the requirements for meeting the Ohio Core leave very little room for, nor encourage students to take, a business elective as it competes with other electives offered, especially those recommended by post-secondary institutions. “Few states presently mandate business courses as part of the curriculum. Today most business education courses are electives and must compete for enrollment with other electives such as art and music” (Rader and Meggison, 2007, p. 27). While some may argue that strides have been made with the requirement for financial literacy in Ohio, legislation for this addition to the curriculum suggests the course be taught within the social studies curriculum giving schools the option of simply adding the financial
literacy learning objectives into other required social studies courses (ODE, Financial Literacy, 2007).

Our educational system as a whole benefits from the curriculum offered in business and career technical education and numerous studies argue the need for quality business education programs at the secondary level. These studies range from specific curriculum focused discussions to broad, sweeping acknowledgments of the need for business education. For example, Davis, 2002, discusses the need for prospective employees to enter the workforce with specific knowledge of computer technologies. Alternatively, studies published by ACTE and others, offer statistical evidence of the benefit of business education/CTE as a whole. These studies show that participants in business education/CTE demonstrate increased academic success, increased earnings, improved employment opportunities, reduced drop-out rates and higher post-secondary success rates (ACTE, 2008).

Business education provides individuals with an opportunity to be a productive citizen of the United States by participating as a contributing member of the workforce. The operation of the workplace, as well as the role of the individual in that organization, is defined by the employer. Whether or not the job requires a college degree or GED, whether or not the individual is entering college or the workforce, every individual can benefit from having basic business knowledge. Each and every organization has some element of basic business operation as one part of its function. In addition, the operation of a family, in the sense of the family budget and managing family resources also has elements of business operations. Whether as a single person or a member of a family of
any size, each family leader can benefit from having basic business knowledge. Railsback & Hite (2008) conclude based on a 2007 report from Cornell University that fewer electives mean more dropouts, that “business courses that provide practical skills and knowledge may be the key to keeping students in school until they graduate and preparing them to be good citizens and skilled workers.”

**Statement of the Problem**

The researcher sought to answer the following questions with this study: What is the status of enrollment in business education in Ohio? More specifically, what are the enrollment trends in secondary business education courses in Ohio beginning with the 2005-2006 school year through the 2011-2012 school year? If, as the background of the study suggests, elective courses like business education courses are declining in enrollment and offerings, evaluation of the actual enrollment in business education courses in Ohio must be examined.

**Purpose and Objectives of the Study**

This study was designed to describe the status of enrollment in business education courses in Ohio using enrollment data collected by the Ohio Department of Education. Specifically, this study was designed to describe trends in enrollment in business education courses in Ohio beginning with the 2005-2006 school year through the 2011-2012 school year, using data on overall school enrollment, enrollment by course, enrollment by gender, enrollment by race and enrollment by secondary grade level. Related to gender, this study sought to examine whether any non-traditional enrollment trends exist in the course enrollment numbers for the 2011-2012.
All data examined in this study was reported by the individual school district to the Ohio Department of Education. Chapter 2 of the FY 2012 ODE EMIS Manual describes the requirements for student demographic data, and notes that this information requirement is based on the United States Department of Education data collection and reporting requirements. Specifically, related to race for purposes of this study, “Educational institutions and other recipients will be required to collect racial and ethnicity data using a two-part question. The first question is whether the respondent is Hispanic/Latino. The second question is whether the respondent is from one or more races using the following five racial groups: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander and White. Respondents will not be offered the choice of selective a ‘two or more races’ category” (ODE, EMIS, Chapter 2, 2012).

This study also sought to describe enrollment trends related to regional divisions in Ohio and to analyze if the enrollment trends are related to perceived local economic or industry needs. To analyze regional differences, the Jobs Ohio Network of defined economic development regions was used. The JobsOhio Network is made up of key business development organizations from six separate regions within the state of Ohio. The goals of the JobsOhio Network include business development and growth in Ohio’s key business industries. Figure 1 displays Ohio’s six economic development regions. Figure 1 shows the JobsOhio Network member organizations, including the Appalachian Business Council, Cincinnati USA Partnership, Columbus 2020!, Dayton Development Coalition, Regional Growth Partnership, and Team NEO (JobsOhio 2012).
Figure 1: JobsOhio Network. Physical Map of the JobsOhio Regions. Region 1 is distinguished by Columbus and the central Ohio counties darkened around it. Region 2 is identified by Cleveland and borders Toledo’s region, Region 4. Note the slight distinction between Region 2 (Cleveland) and Region 4 (Toledo) as Region 2 ends with the counties of Erie, Huron and Richland to the west. Region 3 is denoted by Nelsonville and has a slight color distinction as it ends to the north with the counties of Holmes, Guernsey, Carroll and Jefferson which are next to Region 2 (Cleveland). Region 4 is Toledo as noted and Region 5 is the region housing Dayton. Region 5 (Dayton) and Region 4 (Toledo) split with Mercer and Auglaize County both being a part of Region 5 with Dayton. Region 6 is easily distinguishable with the main city of Cincinnati. Please see Appendix K for listing of counties and their region (JobsOhio, 2012).
Using actual enrollment numbers and trends, results of this study are designed to give business educators and advocates for business education information to consider when developing or revising high school business curriculum or in promoting business education as an elective to secondary education students. As business education teachers and curriculum leaders advocate for keeping business education a viable option for high school students, knowledge of what courses are maintaining, increasing or showing a decline in enrollment can encourage curriculum leaders to evaluate offerings and consider ways to increase enrollment.

**Research Questions**

Accordingly, the research questions for this study were as follows:

1. Beginning with school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about individual enrollment in fifteen (15) different business education courses as determined by EMIS reporting in the state of Ohio?

2. Beginning with school year 2005-2006 through 2011-2012, what was the overall enrollment trend for the fifteen (15) different business education courses as determined by EMIS reporting in the state of Ohio?

3. Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about the number of males versus the number of females individually enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio?

Additionally, can any non-traditional enrollment trends be identified in
these fifteen (15) courses based on enrollment in each course during the
school year ended 2012?

the overall enrollment data reveal about the overall number of males
versus the overall number of females enrolled in fifteen (15) business
education courses as determined by EMIS reporting in the state of Ohio?

5. Beginning with the school year 2005-2006 through 2011-2012, what does
the overall enrollment data reveal about racial demographic differences in
students enrolled in fifteen (15) business education courses as determined
by EMIS reporting in the state of Ohio?

the overall enrollment data reveal about trends in enrollment by grade
level in the fifteen (15) different business education courses as determined
by EMIS reporting in the state of Ohio?

the overall enrollment data reveal about trends in enrollment by grade
level in the whole of the fifteen (15) different business courses as
determined by EMIS reporting in the state of Ohio?

8. Beginning with the school year 2005-2006 through 2011-2012, and using
the JobsOhio Network’s definition of the six economic development
regions in Ohio, what does the overall enrollment data reveal about
regional differences in individual student enrollment in fifteen (15)
business education courses as determined by EMIS reporting in the state of Ohio?

9. Beginning with the school year 2005-2006 through 2011-2012, and using the JobsOhio Network’s definition of the six economic development regions in Ohio, what does the overall enrollment data reveal about regional differences in the total number of students enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio?

10. What does the overall enrollment data reveal about correlations between the increased graduation requirements for the class of 2014 and these increased requirements’ effect on enrollment in fifteen (15) business education courses?

**Significance of the Study**

Examining enrollment trends using actual enrollment data is new to business and career technical education. Studies on enrollment data in this field and other related fields have not been found. The researcher designed this study to inform key stakeholders about enrollment trends in business education in Ohio. These key stakeholders include secondary classroom teachers, secondary administrators, curriculum directors, superintendents, legislators, university teacher educators and prospective business teachers. Having rigorous, valuable, worthwhile business courses at the secondary level is important to the success of local economies, yet, as of this study there is no aggregated data to determine the number of students actually enrolled in business
education courses in Ohio, and whether or not enrollment in these courses is increasing or declining. The data set used in this study allowed the researcher to evaluate trends beginning with the 2005-2006 school year and established a baseline from which future analyses may be conducted.

Related to each specific key stakeholder group, the researcher designed this study to contribute to the knowledge of curriculum leaders, administrators, superintendents and business educators when evaluating business education offerings and strategies for marketing business education courses. This study was designed to provide classroom business educators with an accurate look at the trends in the number of students enrolling in business education electives, allowing those key personnel to become better advocates for their courses and influential in school, district, or state curriculum planning. This study was designed to allow the researcher to provide university teacher educators and prospective business educators information on enrollment data relevant to teacher preparation in specific courses. As Zinser (2004) noted, “little has been written on how to prepare new teachers to teach career and employability skills”. Updating teacher preparation to match business course offerings, now and in the future, is critical to a prospective business educator success. Contributing to the legislative body of knowledge on course enrollment can influence course mandates and changes to curriculum mandates that can include business education in the required curricula.

Mahinda, 2006, shares, “Concepts of business are embedded in virtually every career. Since the American economy revolves around business and free enterprise, employees, then, affect the profit and/or loss of those businesses, small and large” (p. 15).
Knowing the enrollment trends in business education courses in Ohio is the basis for the design of this study. Using that knowledge to assess the state of business education in Ohio is a key to insuring Ohio’s investment in human capital is working to provide quality workers to enhance or improve Ohio’s economy. The idea that education “increases the productivity and efficiency of workers by increasing the level of cognitive stock of economically productive human capability” embodies the concepts of the Human Capital Theory (Olaniyan & Okemakind, 2008). Supporters of this theory conclude that formal public education is an investment in human capital: the idea of educating citizens to become productive, wage-earning members of society. Legislative efforts including the No Child Left Behind Act (NCLB), as well as the continued reauthorization of funding for career technical education through the Carl D. Perkins Career and Technical Education Act, emphasize the fundamental belief that students need to be equipped with the skills to enter college or become members of the workforce upon graduation. Business education courses, although not currently mandated by legislative efforts, provide the type of knowledge that is the basis for success in any workplace.

The findings of this study can serve to help future researchers in evaluating business education enrollment by establishing a baseline of enrollment data from which to build their study. Course enrollments for the school year ending 2006 through the school year ending 2012 are considered. Future educators can use this information to determine longitudinal trends in business education enrollment and evaluate future initiatives to increase enrollment on their effectiveness.
The methodology of this study can serve to help future researchers in determining enrollment trends in their fields of study. Using enrollment numbers in any set of courses, future researchers can studies to evaluate enrollment trends in any course area.

**Definition of Terms**

*Accounting (non CTE) (EMIS Course #030100):* Accounting is defined by EMIS as instruction focused on the management of a company’s financial resources including the accounting cycle, financial statements and interpretation and use of financial data. Content should be based on National Business Education Association (NBEA) content standards. Accounting that is defined as Accounting (non CTE) reflects an accounting course that is simply an elective, not funded by career technical monies, and therefore not required to meet a specific number of course hours for the student to be considered a CTE completer. An Accounting (non CTE) course would likely be a one period course, offered for one year. NBEA standards drive content in non CTE courses, and a key difference is that while Accounting non CTE can give a student a basis in accounting, a CTE course is designed to prepare the student for a career. See Accounting CTE, below.

*Accounting—CTE (EMIS Course #140100):* Accounting—Career Technical is a course that prepares students for careers that record, classify, summarize, analyze and communicate a business’s financial information and business transactions. Accounting includes such activities as bookkeeping, systems design, and analysis and interpretation of accounting information. Accounting (CTE) courses are often more than one period per day and are offered over the time period of two-consecutive years allowing the student to be a CTE completer. This designation shows employers that the student has
had long term, concentrated instruction in accounting. Often CTE courses are tied to articulation agreements with post-secondary institutions, allowing the student to get a head-start on college credits while in high school.

Business Education: For this study, business education includes any course offered in a traditional high school setting or career and technical school setting that is specifically designed to prepare the student for the workforce – after high school or college. As all careers have an element of business associated with them, this definition encompasses a broad, inclusive definition of business and career technical education curriculum.

Business education refers to any courses based on standards from the 9-12 grade band of NBEA standards that are eligible for high school course credit.

Business Communication (EMIS Course #030600): Business Communication is a course where students master the oral and written communication skills essential to interacting effectively with the people in the workplace and society. Content should be based on National Business Education Association (NBEA) content standards.

Business Economics (EMIS Course #031800): Business Economics is a course that develops a student’s ability to make wise economic decisions related to their personal financial affairs, the successful operation of organizations, and the economic activities of the country. Content should be based on National Business Education Association (NBEA) content standards.

Business Law (EMIS Course #030900): Business Law is a course designed to address statutes and regulations affecting businesses, families and individuals in their related
roles. Content should be based on National Business Education Association (NBEA) content standards.

*Business Mathematics* (EMIS Course #030500): Business Mathematics is defined as a course where students develop the skills necessary to solve mathematical problems, analyze and interpret data, and apply sound decision-making skills in business. Content should be based on National Business Education Association (NBEA) content standards.

*Business—Other* (EMIS Course #033450): This course is defined as a course which instructs students in abbreviated written and/or electronic communication.

*Career Technical Education*: For this study, specific career technical education (CTE) courses are considered a part of the business education curriculum. Career technical education courses provide career based curriculum dependent upon the specific career program. Career technical courses discussed in this study encompass business education related curriculum. Career technical education courses can be housed in either a career and technical school setting, or traditional public secondary school setting.

*Career Technical Schools*: Career technical schools are secondary educational institutions that house curriculum related to a variety of career technical education fields with complementary academic courses provided to meet the student’s academic needs and graduation requirements. Career technical schools are considered public educational institutions and are funded with tax dollars and career technical monies allocated through state and federal funding grants and initiatives.

*Computer Applications* (EMIS Course #036000): Computer Applications is a course in which students identify, evaluate, select, install, use, upgrade, and customize application
software. Computer applications include word processing, database, spreadsheet, presentation and calendaring/scheduling software. Content should be based on National Business Education Association (NBEA) content standards.

*Computer Programming and Software Development (EMIS Course #031700):* Computer Programming and Software Development is a course that allows students to design, develop, test and implement computer programs using structural/procedural, objective oriented, data description, scripting/control, and/or mark-up languages. Content should be based on National Business Education Association (NBEA) content standards.

*Educational Management Information System (EMIS):* EMIS is the “statewide data collection system for Ohio’s primary and secondary education. Staff, student, district/building, and financial data are collected through this system. Staff data include demographic, attendance, and course information. Demographic, student attributes, attendance, program, course, and test data are submitted to ODE at the student level. EMIS provides the architecture standards for reporting data to the Ohio Department of Education” (ODE, EMIS Basics, 2013).

*Employability Skills—CTE (EMIS Course #990362):* Employability Skills—CTE is a course in which the focus is on teaching work related skills for entering, competing and advancing in a changing work world. Because of the CTE designation, this course is funding through legislative initiatives separate from state public school funding.

*Introduction to Business and Administrative Services—CTE (EMIS Course #140050):* The course, Introduction to Business and Administrative Services is considered a career field based course. This means that the course is designed to give basic instruction to
students that will lead to a specialization in the administrative and professional support pathway, the legal management and support pathway, the medical management and support pathway, or the management pathway. This course is intended to be a foundational course for all career courses in the business field as noted and is designated CTE.

*Introduction to Business/General Business* (EMIS Course #032300): The course, Introduction to Business, allows students to study domestic and international business operations including start-up, financing, management, and standard practices. Content should be based on National Business Education Association (NBEA) content standards.

*Introduction to Marketing—CTE* (EMIS Course #040805): In this course, students are prepared for careers that help identify and understand target audience needs and wants, generate demand, or get a good, service or idea to that audience. Please note that this course is also designated CTE.

*JobsOhio Network*: The JobsOhio Network is a partnership of development professionals with the local contacts and expertise in six geographic regions within the State of Ohio. These six regions are designated by the partnership location cities (Toledo, Cleveland, Nelsonville, Columbus, Dayton and Cincinnati -- Ohio’s major metropolitan areas) and each region boasts specific industry strengths and resources.

*Non-Traditional Enrollment*: The Ohio Department of Education, under the requirements of Perkins IV, defines CTE courses as non-traditional “if individuals from one gender comprise less than 25 percent of the individuals employed in those occupations or fields of work” (Ohio Department of Education, Career Tech).
Office Procedures (EMIS Course #032800): Office Procedures is a course that offers instruction in office practices and procedures, office technology, office environment, records management, human relations and telephone techniques. Content should be based on National Business Education Association (NBEA) content standards.

Personal Finance (EMIS Course #031500): Personal Financial is a course designed to help students develop and utilize rational decision making processes to form personal financial decisions in their role as citizens, workers and consumers. Content should be based on National Business Education Association (NBEA) content standards.

Public School: Any schooling institution in the state of Ohio that is funded by tax dollars, as opposed to private funds or privately paid tuition.

Secondary School: Any institution in the state of Ohio housing educational courses for students in grades 9 through 12.

Limitations

This study had conditions and limitations that affected the outcomes. There were nine limitations affecting the study.

Of primary concern, the data does not serve to determine the total number of schools offering courses, only the enrollment numbers in those courses as reported to The Ohio Department of Education through EMIS reporting. Therefore, a school may offer an elective, yet students do not enroll in the course. The data does not serve to reveal whether the course was offered during that particular school year.

A second limitation of the study that affected the outcome is related to the enrollment data provided by the Ohio Department of Education through EMIS.
Family Education Rights and Privacy Act of 1974, as authorized by 34 CFR Section 99, includes a specific regulation requiring the Ohio Department of Education to report data in such a way as to protect student identities. Therefore, when student enrollment in a course was less than 10, a specific enrollment number is unavailable; all that is known is that course enrollment was less than 10 (Family Educational Rights and Privacy [FERPA], 1974). While FERPA language does not specifically dictate the less than 10 rule, it is an Ohio Department of Education policy that was established in conjunction with the federal Privacy Technical Assistance Center (PTAC). Course enrollment data that showed <10 was replaced with 5.5 for data analysis purposes; total enrollment data that showed <10 was replaced with 4.5. The purpose for choosing these numbers was that it these trends would be easily identifiable as the results would show greater than 100% enrollment, a factor which would be impossible to reach.

A third limitation that exists is in the data actually analyzed. In order to have a continuous enrollment pattern, schools that had only been opened a short time were removed. Only schools with enrollment population from 2006-2012 are included in this study.

A fourth limitation is that only data from public secondary schools and career technical schools (formerly known as joint vocational schools) was examined. EMIS data reporting is not required of private secondary institutions, therefore no information is available.

A fifth limitation is the limited history available regarding Figure 1 and the economic development regions. Formerly housed within the Ohio Department of Jobs
and Family Services, economic development regions have long been a part of Ohio’s economic growth initiatives, however, previous regional divisions included as many as 12 separate regions. The JobsOhio Network is “a regional economic development partnership funded by the Ohio Third Frontier, emphasizing return on investment in collaboration with JobsOhio, to support the shared vision of growing the state’s key targeted industries, aiding in job creation and enhancing economic prosperity for Ohio. The Network will support and grow the state’s economy, with a heavy focus on technology and innovation” (JobsOhio). Further research shows that JobsOhio is a “private, nonprofit corporation designed to lead Ohio’s job-creation efforts by singularly focusing on attracting and retaining jobs, with an emphasis on strategic industry sectors in areas of statewide and regional strength.” JobsOhio was created by House Bill 1, signed into law by Ohio Governor Kasich in 2012 (Jobs Ohio). Essentially, each region has a key network organization vital to assisting with business development and growth. Referring to Figure 1, the traditional economic and demographic characteristics of these regions are a factor in the division. A phone interview with a representative of JobsOhio revealed that economic regions have been in place for so long, that no one individual knows specifically how they were defined. However, the dominant characteristics of the regions were characterized by the JobsOhio representative in that phone interview. For purposes of this study, each region was assigned a number for statistical analysis. The region in the center of the state, Region 1, is denoted by Columbus on the map in Figure 1.1. Region 1 is the central Ohio region with many white collar jobs, state courts and corporate organizations. Specifically mentioned during the phone interview, related to
Region 1, were the government jobs, The Ohio State University and the medical centers, each of which impacts the regional economy. Columbus 2020! is the regional development organization for Region 1. Region 2 is the region in the upper northeast corner of the state, denoted by Cleveland and is characterized as being made up of Ohio’s old manufacturing counties. Region 2 is led by Team NEO (Northeast Ohio).

Nelsonville, the city identified with Region 3, is considered Appalachian, often characterized by generational poverty and is led by the Appalachian Business Council. Toledo is associated what has been identified as Region 4. Region 4 is characterized by being a large part of the auto and steel industry. Region 5, to the west of the state and denoted with the City of Dayton is considered the Upper Miami Valley region and is also characterized much like Cleveland with manufacturing and automotive industries. Finally, Region 6, located near Cincinnati is much like Region 1 in its white collar, corporate existence. Proctor and Gamble was identified as an organization having an impact on the regional economy in Region 6. Of note, the phone interviewer shared that the regional economies, as defined, are analogous to the media markets of the state (G. Pellman [personal communication, February 5, 2013]). Finally, a seventh category, Region 7 was added for data analysis separate from the original six regions. Region 7 consisted of online schools offering business education coursework could not be linked to one specific region.

The sixth limitation is that codes used for course input and reporting can vary from school to school. The data received by the Ohio State Department of Education for EMIS “originates at the school district or EMIS reporting entity” (ODE, EMIS Basics
This means there may be differences in coding a course because of the varying origination sites. Specific course definitions are outlined by EMIS and in this writing; however, limitations may exist due to user input error and definition.

The seventh limitation relates to EMIS Course Codes. Data was requested from The Ohio Department of Education in 16 business education areas, however, only 15 courses were analyzed. Course code 40805, Introduction to Marketing-Career Technical, did not begin enrollment until 2009, therefore no data was available for 2006-2008, however course enrollment was analyzed for four consecutive school years 2008-2009, 2009-2010, 2010-2011 and 2011-2012. Course Code 140050, Introduction to Business and Administrative Services—Career Technical, does not have any enrollment data until 2010, therefore no data was available for 2006-2009, however course enrollment was analyzed for three consecutive school years 2009-2010, 2010-2011 and 2011-2012.

The eighth limitation also relates to EMIS Course Codes. Course Code 140075, Interdisciplinary Career Field Business Concepts, is defined by EMIS as a course which addresses business content specific to the various career fields and is addressed in a contextual manner. Content is based on business competencies, including business process and computer applications, with the career field technical content standards for the career field that serves as the anchor class. Only one year of data existed, showing 28 total students enrolled in school year 2011-2012 statewide. Analysis of this course was eliminated.

The ninth and final limitation is related to the request for data related to Course Number 031500, Personal Finance. Recent legislative changes have allowed various
teaching licenses to be valid teaching licenses for the course. Therefore, while one school district might deliver personal finance as taught by a certificated business teacher, another school district may deliver the content using a certificated social studies instructor, and a third district, a family and consumer science teacher. While finance denotes business in most cases, there can be no assumptions made with respect to the fact that Course Number 031500, personal finance, is solely a business education offering.

**Delimitations**

As this study seeks to determine the actual enrollment trends in business education, reasons behind the enrollment are not variables considered. The data obtained reveals student enrollment numbers in 15 courses over a range of seven consecutive years. The data analysis attempts to inform stakeholders in business educators on the trends in enrollment for the purposes of improving the ability to develop curriculum, market business courses to increase enrollment and advocate for legislatively mandated business courses required for graduation. This study is unable to delve into the reasons why students chose a particular course or choose not to enroll in business education at all.

**Summary**

Business education has been identified as an area of education that is facing declining enrollments. Demands for accountability, standards based reform and data driven decision making are all factors of change in today’s educational arena. Business electives face competition from other electives and business course elimination is inevitable when funding concerns arise. No data analysis exists, however, to identify enrollment rates, patterns and trends in specific business education courses. While
business education is identified as an important influence in students becoming productive adults, it is unknown at what rate students are taking business education courses to help them become successful in their career path.
Chapter 2: Review of Literature

A review of literature to determine what is known about the current state of secondary business education course enrollment necessitates the need for this study. Initial searches for business education enrollment reflect data only at the post-secondary level, for college level business courses. Studies of business education teachers and other groups at the secondary level regarding the benefits of enrolling in business education course appear to be plentiful; however, little appears to have been done in evaluating actual enrollment trends. The current literature does not lend itself to understanding what courses Ohio secondary students are enrolling in and whether there has been a growth or decline in that enrollment, or possibly no change in that enrollment.

This literature review is designed to support the objectives of this study. Determining what is known about the current state of business education can improve the ability of the secondary stakeholders (students, teachers, principals, etc.) to better promote, design and deliver quality business education curriculum at the secondary level. The sequence of chapter two is as follows: First, the definition business education and the history of business education (specifically Ohio), is discussed. Second, the status of enrollment in business education courses is discussed. Next, general perceptions about
business education by key stakeholders (including parents/guardians, taxpayers, principals, guidance counselors, etc.) are reviewed. Fourth, research into arguments on the type of student literature tells us should be taking secondary business education is discussed. Fifth, a review of college entrance requirements and their potential impact on enrollment in secondary business courses is described. Next, a review of studies on the success of secondary business education students and their continued success as college business education majors is presented. Seventh, issues related to where business education should be delivered (secondary level, post-secondary level or by employers) are explored. Next, additional discussions of the perceptions of business education, specifically related to rigor and relevance is discussed. Finally, the objectives of the literature review bring us to legislative initiatives and what current and recent legislative mandates exist for secondary education as a whole, as well as a look at the current and recent legislation specifically related to business education. A conceptual framework concludes the chapter, illustrating the variables of interest for this research study.

Definition and History of Business Education

When examining the history of business education from a legislative perspective, one might agree that business education has a fairly long history – most notably as an area of curriculum under the umbrella of Career Technical Education. Courses such as accounting, business administration, management, entrepreneurship, informational technology and other similar business related courses make up the business education segment of CTE (Association for Career and Technical Education [ACTE] (2013). Scott & Sarkees-Wircenski (2005) offer a very clear definition of Career Technical Education
(CTE) as “... the primary system through which youth and adults are prepared to enter competitive employment and continue lifelong learning” (introduction). Secondary CTE courses, specifically business education courses, prepare students for employment whether they are entering the workforce immediately after high school or waiting to enter the workforce after college. Current business education courses give students an opportunity for career exploration activities in high school, hopefully resulting in an employee who has made an informed choice about their career field. Regardless of the name, all legislative initiatives related to CTE and business education relate to the desire of the leadership in the State of Ohio to provide employers with skilled workers.

Business and Office Education (BOE) has been around since the 1800s. “Since the beginning of recorded history, there have been occupations related to business. However, education of office workers began in earnest in the 1800s with the introduction of the typewriter” (Balthaser, 2007, p. 74).

The formative years of CTE, formerly called vocational education, were cited in a text by Shoemaker and Parks as the years 1828-1939. During this time a number of developments and legislative initiatives led to the creation of vocational education, again, an area of which business education is a part. Specifically, the Smith Hughes Act of 1917, a federal initiative providing funding and leadership paved the way for a structured system of vocational education for the country, and in the state of Ohio. Major cities in the state of Ohio (including Akron, Toledo, and Cincinnati) were very supportive of this legislation and really gave vocational education its start in Ohio.
During 1940-1945, the United States was faced with a shortage of skilled workers as workers were deployed for World War II. In addition, as of 1945, only 45% of freshmen were finishing high school (Shoemaker, et. al., 2007), a concern for the economy. It was at this time that programs involving agriculture education, trade and industry (T&I), and family and consumer science became even more a vital part of the educational system. Distributive education (marketing) was not far behind, enacted with the passage of the George-Barden Act in 1946. Balthaser, p. 75, shares “Cooperative Office Education (COE), one of the earliest types of business education, was funded by the George-Barden Act and supervised by the T&I education service”. The Vocational Education Act of 1963 was an initiative undertaken to counteract the problem of youths quitting school by providing educational options intended to improve student engagement and increase student interest. After 1963, Business Office Education course offerings expanded to include more than just secretarial training programs initially in place. These offerings included a wide variety of office and business occupations.

Following the Vocational Education Act of 1963, a logical progression took shape, including legislation on how to offer CTE courses; how to help special needs students while maintaining challenging programs for others; and how to keep potential high school dropouts in school. Shoemaker and Parks share that there was a growth in enrollment by 1969 in the vocational education arena, confirming student interest in occupation related education (Shoemaker, et al., 2007).

During the 1970s, vocational education continued to grow and develop. From this point forward, specific legislation for different areas of vocational education are notable,
including updates to the Smith Hughes Act and the George Barden Act, both funding Career and Office Education. During this time period, a number of student organizations became more commonplace, including a marketing organization, Distributive Education Clubs of America (commonly known as DECA), and Business Professionals of America (Shoemaker, et al., 2007).

Additionally, during the 1980s, Carl D. Perkins became a name that is synonymous with funding in CTE. The first Perkins act passed in 1984 amended previous acts and their amendments. This act had the economic goal of improving the labor force and preparing adults for job opportunities, and targeted the special needs population (Gordon, 2003). The Carl D. Perkins Vocational and Applied Technology Act of 1990 required the establishment of performance standards, measures and accountability in CTE. In 1998, the Carl D. Perkins Vocational and Technical Education Act reauthorized funding through 2004, and made clear the need to integrate academic standards into CTE. In 2006, the Carl D. Perkins Career and Technical Education Improvement Act was signed by President Bush, again authorizing funding and spelling out initiatives for accountability in Career Technical Education. Prior to the 1998 Perkins Act, however, the School-to-Work Opportunities Act was enacted in 1994 in an effort to involve businesses in education students. Revisions and updates to the Perkins act in 1990m 1998 and 2006 all made efforts to advance the effectiveness, accountability and image of vocational education. “All 50 states . . . rely on [Perkins] funding to support secondary . . . CTE programs” (National Association of State Directors of Career Technical Education Consortium (NASDCTEc), CTE At-A-Glance, 2013).
Today’s business education programs fall under the Business and Management Career Cluster, one of the 16 Career Cluster areas. “CTE Programs are organized by 16 Career Clusters and 79 Career Pathways. CTE offers a complete range of career options for students, helping them discover their interest and the educational pathway that can lead to success in high school, college and their chosen career/profession” (NASDCTEc, Career Clusters, 2013).

Over the years, the legislative changes and funding initiatives reflected a perception of the need to teach CTE and business education courses. Given the history of business education and the noted changes over the years to keep funding in place for CTE and business education, what do current enrollment patterns within the state of Ohio tell us? Based on enrollment patterns, are we able to see whether or not courses are relevant to these students or do other external factors contribute to enrollment in business education courses.

**Enrollment in Business Education Courses**

There is a great deal of literature documenting the overall decline in enrollment in business education courses, especially in the past few decades. “World events, legislation, and educational trends have . . . caused increases and decreases in high school business course offerings over the last 50 years” (Railsback & Hite, 2008, p. 151). Various legislative initiatives, including *A Nation at Risk* which “emphasized the need to require six basic subjects: English, math, science, social studies, computer science and foreign language” and the *No Child Left Behind Act* (NCLB) which “called for increased school accountability in two areas: reading and mathematics” have negatively impacted
the enrollment figures for business education (Railsback & Hite). The initial result of *A Nation at Risk* “included an increase in the academic requirements for high school graduation, which subsequently equated to an immediate decline in vocational education enrollments” (Mahinda, 2006, p. 8). Mahinda (2006) notes that “vocational education” was not included in the report and members of the commission issuing *A Nation at Risk* simply dismissed the issue as a lack of time and money. The findings of the Commission completely disregarded business education as a vital form of student learning.

Rader and Meggison (2007) shared, “In the past 25 years, the business education curriculum has experienced the decline and demise of office education programs and courses such as shorthand and office procedures, the growth of word processing and personal computers in the 1980s and 1990s and the advent of curricular innovations such as Web design and speech recognition” (p. 26). Continuing, Rader and Meggison (2007) stated, “Today’s business educators believe [that] high-stakes testing, more rigorous academic standards and the public perception that most high school students will go to college” (p. 26) will continue to contribute to the decline of enrollment in business education courses. In addition, “enrollments in traditional business electives such as accounting, business law and keyboarding have declined and are continuing to decline at the secondary level” (Rader, 2007, p. 26). In a survey of business educators, Kaliski (2007) reported that business educators perceive that the numbers enrolled in business education courses will continue to decline.

One of the many alternatives to business education electives, are the AP, or Advanced Placement course electives. In 2001, the total number of Ohio high school
students, according to the 8th Annual AP Report to the Nation, was 111,281 and in 2011, the total number was 120,855. From those numbers, College Board, publishers of the AP Report to the Nation, share that 12,894 and 24,585, respectively, are high school graduates that took the AP exam. By taking an AP exam, there is an assumption that the student successfully completed the AP course. We see an increase from 12% in 2001 of students taking AP courses, to 20% in 2011 (College Entrance Examination Board, 2012).

Lynch (2000) discussed an overall decline in vocational education enrollment between 1982 and 1994. Two of the reasons for this decline cited were relevant to this topic as well as the discussion of where business education should be housed (secondary or post-secondary level). Those who argued against housing business education at the high school level include the “elitist view that says a formal context of education for work is not appropriate for students aspiring to a four-year college or university” (Abstract, para. 6); and there is “... a general perception that vocational education will inhibit rather than enhance youth’s future career and education choices” (Lynch, 2000, Abstract, para. 6).

A common belief is that college preparatory students have a history of taking few business courses even if their goal in high school is to graduate college with a business degree. A statistical analysis report published by the U.S. Department of Education (Levesque, Laird, Hensley, Choy, Cataldi & Hudson, 2008) studying career technical education from 1990-2005 reflects that 92% of high school students take some type of general labor market course. This statistic showing some improvement comes from the
National Center for Educational Statistics (NCES) that reported that 92% of secondary students took at least one occupational related course, a slight increase from both 1990 and 2000 (USDE NCES, High School Transcript Study 2008). Yet, a 2011 statistical report published by NCES shows an overall decline in business education Carnegie units earned by secondary school graduates. “The Carnegie unit is a standard of measurement that represents one credit for the completion of a 1-year course.” In 1982, graduates earned 1.03 Carnegie units in occupational business courses, whereas 2005 graduates only earned slightly more than one-half credit (.60)/Carnegie unit in occupational business courses. Overall individuals earning career technical/occupational Carnegie units declined from 4.62 in 1982 to 4.01 in 2005 (USDE NCES, High School Transcript Study).

The trend for enrollment in and completion of a business program is declining. According to the NCES, “2005 [high school] graduates earned fewer credits on average and concentrated less often than 1990 graduates in three occupational program areas: business services, materials production and other precision production.” Castellano, et al., (2003) citing a 2000 U.S. Department of Education Report, shares “During the 1980s and 1990s, vocational education enrollments declined in traditional vocational content areas: business, agriculture and the trades” (Castellano, p. 243). While some studies suggest students are still completing some type of occupational course in high school, the decline in the percentage of public high school students taking some type of business coursework in business services declined from 6.7% in 1900 to 1.9% in 2005 (NCES, 2008). DeLuca (2006) citing NCES (2004), reinforces this same overall decline in
enrollment, “the average number of Carnegie units in vocational courses fell from about 3.5 to 3.1 from 1990 through 2000” (p. 13).

Citing Rosenbaum, 1998, Boesel emphasizes that, “college for all has become the norm among high school youth.” Continuing, “enrollments in high school academic programs have increased over time, while enrollments in general and vocational programs have declined” (Boesel, p. 4, 2001). It should be noted, however, that determining a realistic number of students who participate in business or career technical courses is difficult. As Brand, 2008, states “identifying CTE students can be difficult because of the numerous ways participation in CTE classes can be characterized or defined”.

Because the research supports the concern regarding an overall decline in business education enrollment at the secondary level, consideration of business major enrollment at university level is relevant. At the post-secondary level, the Ohio Board of Regents (2009) reported that in 2008, a total of 6,906 individuals received Bachelor’s Degrees in business. Also reported is the ten-year change in the number of business degrees awarded. Since 1999, business degrees awarded have increased a total of 18%, with fluctuations year to year. If we are increasing at the post-secondary level, determining how to improve enrollment at the secondary level is critical. “Research about the value of [business education] and how it can improve student outcomes needs to be more widely disseminated to the broader educational enterprise and the public. Policymakers should use this research to inform the development of high school reform policies and programs” (Brand, 2008, p. 5). Most research on curriculum addresses
graduation rates (both high school and post-secondary) and the need for strong academic/core curriculum.

The National Standards for Business Education (NSBE) are published based on the “conviction that business education competencies are essential for all students” (NBEA, 2007, p. ix). While the standards published in 2007 address standards in 11 specific content areas, the standards are all based on these business education competencies:

“(a) Because all students will participate in the economic system, all students need to be literate in business and economics;

(b) Because all students will encounter a business environment that is characterized by cultural diversity – on both the domestic and international levels – all students need to practice the interpersonal, teamwork, and leadership skills that will help them function successfully in that environment;

(c) Because all students will need to use technology as a tool for personal and organizational productivity, they need to hone the lifelong learning skills that will allow them to adapt to and manage technology effectively; and

(d) Because all students will enter a workplace that is constantly changing, they need to explore and develop flexible career paths and confidence in their ability to adapt to a workplace that demands continuous human capital development.” (NBEA, 2007, p. ix).

The literature regarding enrollment in business education suggests the need to determine whether overall enrollment in business education courses is truly declining,
determining if specific courses are declining or improving in enrollment and whether legislative initiatives impact enrollment data in a secondary business education course.

Perceptions of Business Education

Two of the greatest challenges faced by business education are declines in enrollment and a negative image. Business education has faced many challenges over the years in overcoming negative stereotypes. Brown writes “parents, students and employers still hold stereotypes about career and technical education” (Brown, 2003, p. 1). Initiatives to change course names and remove the vocational education stigma from the minds of the students, parents, administrators, and other stakeholders have been helpful, but change is slow to come. “The public and many policymakers tend to have a negative and/or outdated image of CTE believing that CTE lacks academic rigor, leads to antiquated, undesirable, or low-paying jobs, limits access to college, and serves only low performing students” (Brand, 2008).

Business education courses and career technical education courses are not mandated by state curriculum and rarely mandated individual school districts. Business educators must have recruiting plans in place to encourage student enrollment. “To keep their business programs alive, secondary business teachers have had to explain, defend and sell various stakeholders, including students, on the value of business education” ( Railsback & Hite, 2008, p. 150). The CTE teacher is not only a classroom educator, but also a member of the business education marketing staff. They must market themselves and their programs in all they do each and every day.
Brand, 2008, shares that the structure of educational bureaucracies prevents the development of policies that include business education as a viable, required option for students. “Many education policymakers, especially those who are most familiar with traditional academic or college-preparatory instruction, do not value CTE as pedagogy or assume that instruction is pegged to a low academic level.” While Brand acknowledges that rigor may have been a problem in the past, she also argues that things have changed. “High quality CTE programs can contribute to improved academic outcomes for students” (Brand, p. 6, 2008). Further evidence that policymakers may not value business education is the fact that business educators are not required to be highly qualified educators by definition of the NCLB. Section 1119 discusses qualifications for teachers and specifically states that “all teachers teaching in core academic subjects must be highly qualified”. Core academic subjects include English, reading/language arts, math, science, foreign languages, civics and government, economics, the arts (art/visual art, dance, theater, and music), history and geography. Omitted from this list are physical education, health and business teachers. To be consider “highly qualified”, a teacher must have a minimum of a bachelor’s degree, have full state certification, and have demonstrated subject matter competency in each core academic subject taught. The cliché “actions speak louder than words” can be applied here. By leaving specific subject areas out of the requirement to be highly qualified suggests those courses and subjects are not as important. (No Child Left Behind Act of 2001, 20 U.S.C. 6319 § 1119 (2002)).
With high school guidance counselors, the stigma and stereotype seem almost insurmountable. Huss and Banks, citing the *Major needs of Career and Technical Education in the Year 2000* project, emphasized the negative stereotype that is still so prominent: “...counselors and parents want students to attend four-year colleges and ... counselors and administrators too often see CTE as a ‘dumping ground’ for problem or low-achieving students.” “School counselors can be key figures in the advancement of Career and Technical Education” (Huss & Banks, 2001, page 3). In their study of perceptions of high school guidance counselors, principals and boards of education, Railsback & Hite, 2008, p. 162 found “high school principals appear to be more supportive of business competencies and courses in secondary schools than counselors or board of education presidents, with guidance counselors being the least supportive, at least for certain business courses and competencies”. Mahinda, (2006), “...teachers claim guidance deans are barriers from student enrollment in business courses. These barriers are perceived by some business teachers as follows: increased academic requirements for graduation, perceived need for college-prep courses in predominantly the ‘core-academic’ areas, little time left in the student’s schedule for electives, and perception that business courses have fewer advantages over other ‘academic’ areas for students moving from high school to college. Teachers believe guidance counselors perceive CTE including business as non-college prep coursework. Therefore, guiding students to meet college-prep path in generally also satisfies the NCLB requirements for high school graduation” (p. 36).
**Curriculum for all: Who should be Taking Business Education Courses?**

Should business education courses be required of all youth graduating from a secondary school? Should business education be defined as a core academic area, one that would be tested alongside of math, science, social studies and language arts?

“Defining what educational content is necessary for all youth has become both vexing and contentious,” says Miller, 2002, in her discussion of the role of business education in high school. While enrollment in and perceptions of business education paint a gloom and doom picture of the field, the fact remains that “concepts of business are embedded in virtually every career” (Mahinda, 2006, p. 15). In addition to this basic reality, “employed as well as unemployed individuals apply business education foundations daily from budgeting family income and meeting daily expenses to planning for college and retirement” (Mahinda, 2006, p. 15). Peter Cappelli (2008) argues against the idea that more educational requirements are a fix for what ails our economic system. He concludes that “the nation will derive more economic benefit from apprenticeships [and] school-to-work programs . . .” (Cappelli, 2008, p. 64). Because job skills are not a priority as a form of required education in the secondary education arena, individuals are finding it necessary to acquire job skills as well as specific knowledge for their fields in a post-secondary setting. Stone (2008) argues that the best way to prepare our young people to be successful in the employment world is to “focus on the technical and work-readiness skills employers need, . . . and to ensure access to those skills by today’s adolescents”. This philosophy would expand work-based learning opportunities. Instead
“current data from the Condition of Education (2007), show that the nation’s youth are
taking substantially less CTE than in years past” (Stone, 2008, p. 8).

In reviewing the literature on high school graduation rates and the impact of
business education or CTE courses, one finds many positive connections between the
two. “Several recent studies find that CTE has a positive impact on high school
graduation rates, labor market outcomes and post-secondary enrollment” (NGA Center
for Best Practices, 2007). CTE and business education courses are also likely to
positively impact the dropout rate.

One initiative exploring the needs of employers argues that students need the
competencies published by the Partnership for 21st Century Skills (Partnership). Some
might term this initiative a more up-to-date version of SCANS. In 1991, a specially
appointed commission termed the Secretary’s Commission on Achieving Necessary
Skills (SCANS) completed research geared toward determining the skills and
competencies schools needed to provide students to enhance their ability to enter the
workforce (SCANS, 1991). The SCANS document gave educators objectives for
ensuring students graduated high school with skill sets in five main categories: using
resources, maintaining and using interpersonal skills, managing information,
understanding systems and working with technology (SCANS). At the time, business
and career technical educators found this document to be very valuable in bridging the
gap that existed in the skills of high school graduates and the needs of employers. Much
like SCANS, “The Partnership for 21st Century Skills . . . brings together the business
community, education leaders, and policy makers . . . to ensure that students emerge from
our schools with the skills needed to be effective citizens, workers, and leaders in the 21st century” (Partnership for 21st Century Skills, 2009). Much like SCANS, skills needed for success are grouped into categories. The four broad categories are: Core Subjects and 21st Century Themes (hereinafter referred to as Core Subjects); Learning and Innovation Skills; Information, Media and Technology Skills; and Life and Career Skills. The Partnership stated, “We believe schools must move beyond a focus on basic competency in core subjects to promoting an understanding of content at much higher levels” (Partnership). Ideally, the delivery of these competencies through business education is a step toward reaching that goal. By delivering these competencies in a manner that relates to what an individual might experience in the real world, students are able to make sense of why they are assigned a task. The category of Core Subjects suggests the need for skills involving global awareness; financial, economic, business and entrepreneurial literacy; civic literacy; and health literacy. Global awareness includes objectives of being able to work with individuals of different cultures, religions and lifestyles “in a spirit of mutual respect” (Partnership, 2009). Not only do individuals need to understand the differences in cultures, but employees also need to be tolerant of these differences. Financial, economic, business and entrepreneurial literacy encompasses making appropriate choices for personal financial and economic stability, understanding the role of the economy on individuals and businesses, and being able to use entrepreneurial skills to aid in the growth of business and industry. Individuals able to participate in the betterment of workplace productivity by using their entrepreneurial skills and knowledge can become assets to employers. Civic literacy involves goals much like those of adult
education – the betterment of one’s life situation through an understanding of the rights, responsibilities and opportunities that are a part of our society. Finally, health literacy is an understanding of health and safety issues that impact individuals personally and globally (Partnership, 2009).

The National Standards for Business Education referenced previously “are based on the conviction that business education competencies are essential for all students”. An abbreviated list of the reasons for this conviction include those mentioned earlier, and the premise that “all student will participate in an economic system”, “all student will encounter a business environment characterized by diversity”, all students will use technology as a tool for managing information:” and “technology has accelerated the pace and frequency of change not only in business but in life” (NBEA, 2007, p. x). NSBE would have each and every student participate in business education as a graduation requirement. “Business education programs are organized to prepare individuals for careers in administrative office systems, accounting and finance, management and computer information systems occupations” (Mahinda citing Missouri DESE 2006, p. 16). Continuing, Mahinda (2006) adds, “The business education curriculum should be viewed as fundamental to the total school curriculum” (p. 16).

Lambrecht (2007) reinforces that abundant research has been done to identify skills secondary students need to be successful beyond high school. Related to the Partnership for 21st Century Skills study from 2004, Lambrecht states, “[the study] identifies the need for key business content but makes the judgment that the current curriculum is not adequate to the task of teaching basic economic, financial and business
literacy” (p. 16). Lambrecht’s study focused on seeking direction for the future of business education and identifies the importance of business education, not just as a supporter of other disciplines, but that “the business education area should be respected and known for the values of its content rather than its contribution to ‘academic’ skills and abilities” (Lambrecht, 2007, p. 22).

**College Entrance Requirements and their Impact on Secondary Business Education**

The lack of business education as a college entrance requirement reinforces to college bound students that business education is simply not important. Business education courses are not required for college admission. The entrance requirements for Ohio four-year colleges and universities do not include successful completion of a business education course. As discussed in the background of the problem in Chapter 1, Table 1.1 reflects no mention of business education for any public university. A review of the 2010-2011 Counselor’s Guide to Ohio’s Private Colleges and Universities, published by the Association of Independent Colleges and Universities of Ohio (2010), shows no recommendation for business education as a suggested course for college preparation. Table 1.1 shows that Ohio’s public universities generally require a minimum of two years of foreign language. Some universities, including The Ohio State University, encourage three (3) units of foreign language for strong preparation. Yet, “according to the ‘Job Outlook 2005’ survey, conducted by the National Association of Colleges and Employers, five of the top ten most in-demand college majors for incoming university freshmen throughout the United States are business related.” (Mahinda, 2006, p. 16). With a content area so embedded in the future of each college graduate, why do
we see so no emphasis placed on this as an entrance requirement to a traditional four-year college or university?

DeLuca (2006) citing Oakes, 1985; Ravitch, 2001; Bills, 2004, share that “historically . . . it was assumed that vocational education students would simply transition to work, not college” (p. 2). Continuing, DeLuca states “classic research in [CTE/business education] has suggested that vocational students are socially stigmatized, and might not view themselves as college material” (DeLuca, 2006, p. 4). This type of research may provide insight as to why students may not take secondary business education courses. Although a number of changes in business education over the years have led to more rigorous coursework and expanded curriculum, business education still finds itself as unappealing to the college preparatory student. Even with curriculum that involves expanded career exploration opportunities and personal finance instruction, the desire to take a business education course does not exist. College entrance requirements reinforce that business education is not necessary.

Secondary Business Education Courses and College Enrollment

In 2006, DeLuca, Plank and Estacion published a study discussing the effect on business education/CTE on college enrollment. The results of their study show that “CTE participants were significantly more likely to attend a 2 year college” (as opposed to non-participants) (p. 19). Continuing, “There is a positive relationship between CTE participation and enrolling in 2-year institutions, but a negative relationship between CTE participation and enrolling in 4-year institutions” (p. 19). The overall conclusion that participation is CTE, given all other demographic variables, is unlikely to influence
college enrollment, can be disappointing to those in the field. Ideally, work-based learning through business education or CTE would increase the odds of a particular student attending college because of the career awareness programs that educate students on the needs of the labor market and workforce in general.

Mahinda, 2006, citing Gray (2004) shares that research of CTE programs and post-secondary education reveals that 72% of college prep students go on to college, whereas students who complete three or more credits in a labor market course (business course) only move on to college 60% of the time. Of those attending college after high school who are categorized as CTE, approximately 40% pursue a bachelor’s degree, while others attend a technical or two year institution (Mahinda, 2006).

Castellano, Stringfield & Stone, 2003, completed a study of various school reform efforts and their outcomes. One study considered was the School to Work Reform Study by Griffith and Wade. When reviewing the relationship between career and work related education programs and students’ college enrollment and employment trajectories, the study showed that career technical students had about the same college outcomes as the non-career technical students in terms of receiving degrees, grade point averages and the need for remediation (Castellano, et al., 2003). Castellano, et. al., notes, however, that the generalizability of this study was limited and only looked at one district; therefore other differences could have accounted for the similarities in the two groups.

“Most research on the relationship between education and wages has examined the effects of years of schooling, and, with much less emphasis, the effects of college major” (Altonji, p. 409, 1995). While this study dates back to 1995, a correlation
between high school coursework and college majors is an area of research in which little information is found. A more recent study by Boesel, 2001, addresses what is defined as the college premium, “the ratio of earnings of college graduates to those of high school graduates”. This college premium affects curriculum and preparation goals at the secondary level. Boesel, 2001, “the college premium has increased markedly over the last several decades. So, today the principle way in which high school facilitates later occupational success is not in preparing students directly for the labor market, but in preparing them for college” (Boesel, p. 2., 2001).

Additionally, no research exists into determining what we can about the specific relationship between high school business coursework and success within a college business college major. This very specific research can help influence future curriculum decisions.

Secondary or Post-Secondary: Where Should Business Education be Delivered?

With respect to whether business education should be delivered at the secondary or post-secondary level (or a combination of the two as currently exists), substantial literature argues both sides of this issue. Business education has long been, at the very least, a secondary program options. Initiatives over the years have also provided middle school programs and career exploration activities from K-12 that fall under the category of career technical education. Programs and articulation agreements have evolved to provide connections between secondary and post-secondary institutions and include an opportunity for students to receive college credit while in high school. “A fair amount of disagreement exists about the current mission and purpose, as well as the future direction,
of career and technical education” (Rojewski, 2002, p. 3). Rojewski (2002) presents a conceptual framework of business and career education, sharing the difficulties faced in determining where the courses are most appropriately delivered. “Some voices argue that it’s strictly a postsecondary activity; others argue it rightly belongs in secondary schools as well” (Rojewski, 2002, p. 3, citing Stone 2000).

Rader and Meggison (2007) believe, “At the secondary level, business education is responsible for developing citizens who understand basic business and economic concepts such as banking, insurance, investing, budgeting and credit” (p. 27). Business education at the secondary level is also crucial for an educated entry-level (and beyond) workforce. Legislative initiatives funding and mandating career technical education have consistently addressed the needs for a skilled workforce. The original vocational education act, The Smith-Hughes Act, was designed to prepare young people for jobs. The structure of a secondary school allows innovative delivery options in business education. Rojewski (2002) discusses Tech Prep (a 2 + 2 program, pairing two years of high school with a feed directly into two years of post-secondary), integrated vocational and academic education (the ability to apply what you are learning to real life situations), career academies (school within a school), apprenticeships, placement agreements with employers and school based enterprises (school store, school banking), all as structured options for students to gain work skills as a secondary student. The dynamics and structure of the high school lends itself to the programs discussed. Post-secondary institutions, on the other hand, would find themselves needing to restructure course offerings to put many of these initiatives in place.
Business education at the secondary level is important to taxpayers based on information shared by Lynch (2000) from a public survey data regarding business education and career technical education. The survey shares, “the public does indeed want career education and work skills included as critical components of the public school”. Yet, “parents expect their children to attend college” (Lynch). These two statements should not stand in contrast to one another. Having business education courses available at the secondary level, while a student participates in a college preparatory pathway, is very viable given the number of class periods in a day. In Ohio, career technical education serves 60% of the student population. Without career technical education courses, students would be deprived of essential exposure to employability skills and business skill programs and courses. In addition, many students earn certifications or college credits in their career technical education coursework that puts them a step ahead of their peers when entering college.

Alternatively, there are plenty of arguments in favor of housing business education strictly at the post-secondary level. For colleges and universities, students pay tuition to gain the knowledge needed for success in a career field, where as providing career technical education at the secondary level requires taxpayer money to sufficiently fund these programs. Colleges and universities are more likely able to pass on the cost to students through tuition, while absorbing other costs through state funding if the university is a public university. The taxpayer burden may be lessened, but more likely the funds would be used to fix general education funding or other state programs.
While Castellano, et al., (2003) suggests that a “logical goal of compulsory education would be to help the largest possible percentage of people prepare for and succeed in post-secondary education” (p. 241), the reality is that there are not enough colleges and/or university spots to accommodate every high school graduate. Therefore, it’s reasonable to conclude that business education at the secondary level alone can help fulfill the needs of the labor market.

**Are Rigor and Relevance Synonymous with Business Education?**

The Policies Commission for Business and Economic Education issued Policy Statement 80 about rigor in business education. The policy statement provides us with this definition of rigor: “Academic rigor challenges all students to meet high standards and high expectations while providing the support necessary for success” (This we believe about Rigor in Business Education: Policy Statement 80, 2007). The policy statement concludes by saying, “rigor should be reflected in all dimensions of business education, including curriculum, instruction and assessment.” However, do we find rigor to be a term synonymous with business education?

Research studies often reference the concepts of rigor and relevance in business education, but in what context? Stone, Alfred and Pearson (2008) suggest that business education can enhance a student’s math skills because mathematical concepts can be taught “within a relevant, authentic, and presumably more motivating context.” This study, however, discusses the need for business teachers to become more aware of the core content they are teaching and bridge the “CTE and math language”. The entire
study suggests rigor and relevance should be a part of the business/CTE curriculum, but there are steps, training and initiatives needed to get there.

Many may not realize that rigor and relevance in business education now exists in the form of dual enrollment options at the high school/secondary level. Students have the opportunity in business education as well as core academic courses “to take college-level classes and earn credit” (Brand, 2008, p. 9).

**Effects of Mandates and Policies on Secondary Education**

As with any public institution, mandates for secondary education are plentiful. DeLuca (2006) cites “visible efforts in American public education to increase academic standards and college attendance” (p. 1). Not only does DeLuca reference the No Child Left Behind Act, but also references the fact that individual states have mandated increased graduation requirements and maintain goals of improving tests scores and increasing graduation rates (DeLuca, 2006). Miller, 2002, emphasizes that “educational reform should be about improving academic requirements for all students, college and non-college bound, to ensure that their future life options are not constrained” (p. 16).

Legislative intent often appears to be a matter of fitting every student into one mold that produces a college ready, college bound student.

In Ohio, beginning with the graduating class of 2014, the Ohio Department of Education implemented changes that included one additional year of both math and science into Ohio’s graduation requirements. “Beginning with students who enter ninth grade for the first time on or after July 1, 2010, the requirements for graduation from every public and chartered nonpublic high school shall include twenty units that are
designed to prepare students for college and the workforce”. While completing the core curriculum, students are afforded five (5) elective courses of their choice (Ohio Department of Education, Ohio Core Outline).

Brand, 2008, reminds us that “many policymakers have limited knowledge about CTE and the changes it has undergone or are unsure how CTE can play a role in . . . expanding learning options for youth” (Brand, 2008, p. 4). Mandates require that youth be tested in core academic areas giving us what Brand suggests is a narrow view of student achievement. “Standards based accountability . . . has adopted a narrow definition of success based on academic proficiency in certain core academic subjects”. Therefore, students are not required or encouraged to gain other knowledge and skills important for success in today’s workplace or for success in life after high school. Through current policy, legislators and lawmakers are essentially telling students “disciplinary content knowledge is the only type of knowledge worth learning and devalues the attainment of other types of knowledge” (Brand, 2008, p. 6).

Narrowing the curriculum is a term used by James R. Stone (2008) in his brief article responding to Peter Cappelli’s (2008) arguments. “Narrowing the curriculum to more college preparatory coursework and holding schools accountable may contribute to the dropout problem” (Stone, 2008, p. 8). Education reform over the years in the form of A Nation at Risk and No Child Left Behind, has assumed “two ‘truths’ about public education: (1) the nation’s schools are failing our children, and (2) without preparing all youth for college we are dooming our economic future” (Stone, 2008, p. 8).
Secondary school policies are often developed in a fashion that leaves little opportunity for collaboration among the different divisions developing educational policy. “Educational bureaucracies at the federal, state and local level are organized around discrete and separate divisions of instruction, pedagogy, and services, such as academic instruction, special education, career technical education, and student support services” (Brand, 2008, p. 6).

Brand (2008) also shares that guidance counselors and others who could serve as the first line of information for students on opportunities in business education simply do not have the time or the tools to be or become effective in giving advice for career and education decision-making. This lack of time and opportunity perpetuates the cycle of negative images and perceptions of business education. “Many schools assess counselors by the number of students that enter four-year colleges and universities, which can pressure counselors into recommending that pathway regardless of the interest of the student or quality choices”.

The No Child Left Behind (NCLB) Act signed into law in 2002 was designed to raise the achievement levels of all students. One way of raising the achievement levels of all students according to NCLB was to raise or increase academic rigor. Fletcher, 2006, citing Miller & Gregson, 1999, reminds us that, “CTE has constantly battled for its identity and respect as a relevant, meaningful, and essential program for all students.” (Fletcher, 2006, page 168). The effects of the NCLB on business education has been to further push business education to the backburner as the NCLB policy reinforces the need to for improvement and achievement only in core academic courses.
Rader and Meggison (2007) argue that the NCLB legislation should provide an advantage to business teachers in that they “can take advantage of this opportunity to expand courses and enrollments in personal finance and economics” (p. 27); yet Ohio has opted to recommend personal finance be taught by social studies teachers (although it should be noted each district can choose to have this concept taught by a business educator, reflecting limited progress). As the Ohio Department of Education reports, “Amended Substitute Senate Bill 311, as codified in Ohio Revised Code §3313.603(C)(6), requires integration of economics and financial literacy within social studies classes or another class.” More specifically, “Each school shall integrate the study of economics and financial literacy, as expressed in the social studies academic content standards adopted by the state board of education under section 3301.079 of the Revised Code, into one or more existing social studies credits required under division (C)(6) of this section, or into the content of another class, so that every high school student receives instruction in those concepts . . .” (ODE, Financial Literacy, 2007).

When considering individual abilities or interests, mandated achievement in secondary core courses reduces the time students have in their schedule to take business courses. Legislation fails to consider students who plan a business major in college, or who may not see college in their future. Plank, 2001, recognizes the difficulty students who consider them non-college bound might face. “For students who do not see a four-year college degree as a definite desire or a certainly attainable goal, academic courses isolated from CTE exposure would be likely to seem irrelevant or frustrating. A student who did not feel sure that he or she would be able to enter a four-year college, or that he
or she would want to enter a four-year college, would be likely to find limited meaning and excitement in studying solely core academic subjects” (Plank, 2001).

**Legislation Specific to Business and Career Technical Education**

Legislation and funding for education go hand in hand. Specifically, funding is often an area of concern with respect to any educational initiative, including business and career technical education. When educational initiatives are proposed or mandated, funding must be a part of the mandate. Therefore legislators are often faced with the combined problem of whether or not to mandate business education and/or how to fund business education. Fortunately, funding has always been in place for this business education. While there were earlier events that occurred during what one might term the “formative years” (Shoemaker & Parks, 2007), funding by the federal government in the form of the Smith-Hughes Act of 1917 was the beginning of formalized vocational education (Gordon, 2003) and funding for the initiatives associated with the Act. One could spend a great deal of time analyzing and discussing the numerous other legislative initiatives to define and redefine vocational education since 1917, however, the name behind the act which affects business education and it’s delivery today is Carl D. Perkins. The first Perkins Act was passed in 1984 and amended all previous Vocational Education Acts and their amendments. This act had the economic and educational goal of improving the labor force and preparing adults for job opportunities, yet directly affected secondary career technical education. The act also had the social goal of providing equal opportunities for adults in vocational education (Gordon, 2003). Revisions and updates to this act in 1990, 1998 and 2006 have all made efforts to advance the effectiveness,
accountability and, to an extent, the image of business education. All of the legislation initiatives in business or career technical education have resulted in occurrences designed to improve the overall economic well-being of the United States.

Between 1990 and 1998, several pieces of legislation were passed that intended to directly affect the high school experience of students who participated in what has been known as vocational programs and curricula. As referenced in the previous paragraph, the Perkins Amendments (of 1990, also known as Perkins II; and of 1998, also known as Perkins III) and the School-to-Work Opportunities Act (School-to-Work Opportunities Act [STWOA], 1994) supported career preparation through an integration of academic and vocational training, the targeting of special populations (such as disabled students and minorities), and an emphasis on nontraditional gender pathways to work. STWOA was designed to get businesses involved in educating youth and preparing them for the workforce. STWOA tried to get secondary schools to consider more than the educational institution (i.e., college) in providing educational opportunities and pathways for youth.

Conceptual Framework

The conceptual framework underlying this research study outlines the relationships between gender and course enrollment, grade level and course enrollment, the current economic development regions of the state and course enrollment, race and course enrollment, the impact of legislation on course enrollment and reveals an overall course enrollment percentage for fifteen identified business education courses within the State of Ohio.
For all school year relationships, school years 2005-2006 through 2011-2012 are used. This constitutes seven consecutive years of data. Categorical factors are used for the examining relationships, including demographic variables, enrollment totals, region of the state, school year and course. First, the relationship between school year and enrollment totals in fifteen individual courses is examined, followed by overall total enrollment in those 15 business education courses for those seven (7) consecutive school years is reviewed. Next an evaluation of the relationship between demographic variables (including race and gender) and school year enrollment is examined, both for individual course enrollment and total enrollment for all fifteen courses. Following those analyses, regional enrollment totals for individual courses are evaluated based on school year, followed again, by an evaluation of total enrollment in business education courses based on that region for the identified school year. An analysis of grade level and its impact on enrollment in individual courses and total enrollment is examined. The final evaluation is related specifically to an analysis of the Class of 2014 and their enrollment patterns during their sophomore and freshman years in business education courses after the passage of the curriculum requirements mandated by the Ohio Core. Chapter 3 focuses on the research methods guiding this study.

Summary

The history of business education runs deep, with extensive leadership from and background in the State of Ohio. Business education enrollment is a topic that has been studied, mostly by looking at the number of Carnegie units a student has taken in business education and trying to assess increases and decreases enrollment solely by this
number. These Carnegie units reflect a decline in enrollment, but do not specifically identify courses nor specific trends in enrollment. Factors that may or may not contribute to enrollment patterns include perceptions of stakeholders, college requirements, delivery models and legislative initiatives. A look at specific enrollment patterns and developing a model to review these enrollment patterns is critical for informed decision making regarding business education curriculum.
Chapter 3: Methodology

Chapter 3 discusses the methods used to investigate the research questions for this study as outlined in Chapter 1. The researcher in this study used a publicly available data set from the Ohio Department of Education’s Educational Management Information System (EMIS) to examine enrollment trends in specifically identified business education courses. Using descriptive statistics, the purpose of which is to organize and summarize observations (King & Minium, 2008) and inferential statistics, the purpose of which is to draw conclusion about conditions that exist in a population (King & Minium) the researcher used data analysis methods to determine relationships between independent variables and business course enrollment. The researcher in this study used an Ex Post Facto (causal comparative) research design as the data collected occurred naturally and the variable of interest has already been determined in the natural course of events (Ary, Jacobs, Razavieh, & Sorensen, 2006). The design of this study allowed the researcher to explore and describe relationships between variables, but did not allow the researcher to actually determine cause and effect. This chapter will present the sample, population and participants, data collection procedures and instrumentation and actual data analysis procedures.
Population and Sample

The target population for this study was all students enrolled in a public high school in the state of Ohio. The frame for this study was defined as all high school students enrolled in a secondary public high school from 2005 through 2012. The sample was defined as all students enrolled in a public high school from 2005 through 2012 whose school district used required EMIS reporting procedures as defined by the Ohio Department of Education. The participants in this study were defined as the accessible population as determined by the sample. Students enrolled in online courses through secondary public institutions were eliminated from this study because enrollment in online business courses was extremely low, and enrollment could not be related directly to any particular public school or region within the state of Ohio.

The EMIS data collected consisted of Microsoft Excel spreadsheets generated by the Ohio Department of Education containing overall school enrollment data and course enrollment data for 16 specified business educational courses from approximately 790 secondary public schools in the state of Ohio.

Instrumentation

The instrumentation used for this research was email communication and Microsoft Excel attachments from the Ohio Department of Education and its representative. Business education course codes were obtained from the Ohio Department of Education, and after review, a request for specific data related to business education course codes was presented to the Ohio Department of Education representative. Upon presentation of this request, the resulting information included spreadsheets with publicly
available data on enrollment by gender, enrollment by race, enrollment by grade, and overall school enrollment for school years 2005-2006 through 2011-2012, consecutively. No personal identifiers were provided to the researcher, allowing this study to be classified as not meeting the definition of human subjects research and therefore exempt from the human subject research review required by the The Ohio State University Office of Responsible Research Practices. A copy of the email exchange exempting this study from review is provided in Appendix A.

Data mining is defined as “the process of analyzing data from different perspectives and summarizing it into useful information” (Palace, 1996). Continuing, Palace (1996) shares, “Data mining is the process of finding correlations or patterns among dozens of fields in large relational databases.” While we did not use a database, through a data mining process, the variables in the data sets were used to compile one set of data to input into R. The spreadsheets obtained from the Ohio Department of Education contained thousands and thousands of rows of information, sometimes including data which was not relevant to this student. At times, middle school enrollment numbers or elementary school enrollment numbers were included. This data had to be removed so that a clean set of data was ready for the statistical software. In working with two different graduate students at the Statistical Consulting Services offered by the Math Department at The Ohio State University, data mining was used to get the information into a usable form that was eventually input into the statistical computer software called “R”.
R is a free language and environment for statistical computing and graphics developed at Bell Laboratories (formerly AT&T, now Lucent Technologies) (R Project for Statistical Consulting, 2013). Given the data, a spreadsheet with thousands of entries, The Ohio State University Statistical Consulting Service felt a platform such as “R” was appropriate for analysis. The available variables retrieved for all school years (totaling seven) from EMIS included overall enrollment data for each school year by grade level, course enrollment numbers for sixteen different business education courses, student demographic data elements consisting of gender element, racial/ethnic group element and school district relationship, essentially showing enrollment numbers at a specific Ohio public school. The Ohio Department of Education (ODE) does not collect data from non-public schools, only public districts and public community schools. Public school data is the only data collected by EMIS, therefore only public school data was used.

Ex-post facto research has several threats to validity that raise issues about an experimenter’s ability to draw conclusions (Creswell, 2003). One threat to internal validity is this study is the inability of the researcher to insure adequate procedures were used to determine proper course number data entry when reporting EMIS data to the Ohio Department of Education. This threat can be controlled to the extent that all school districts are supplied with the same data entry guidelines and regulations, a factor which is true related to the data for this study. All schools in the State of Ohio, and therefore in this study, are given the same set of course definitions and information. From this list, a district representative responsible for EMIS reporting is then required to match course offerings with the course descriptions supplied by The Ohio Department of Education for
EMIS. Enrollment figures are then reported by school districts to The Ohio Department of Education on designated reporting dates.

Data Preparation

To allow for analysis that consisted of seven consecutive school years, the researcher had to combine files, as two separate spreadsheets were presented, one with enrollment from 2005-2008 and the other with enrollment from 2008-2012. The final product used for analysis included the course identification number, separate columns for the number of students enrolled in each grade level, columns of total enrollment by school and by course, rows reflecting enrollment by gender and an assignment of a number (1 through 6) to correspond with Ohio’s most current economic development regions. Excluded from the data was a course with enrollment that began in 2012, with only 28 enrollees statewide. Also excluded from the data were students enrolled in online business education courses. The enrollment numbers for online courses consistently reflected less than 10. Less than 10 in a course meant that the Ohio Department of Education is not allowed to report numbers for those courses. In addition, online course enrollment could not be connected with any specific economic development region for adequate analysis.

Variables

Variables in this study include gender, determined by male or female; grade level, determined from EMIS reporting as either 9, 10, 11 or 12; and course number as defined by the Ohio Department of Education; as factors in determining trends in course enrollment individually, and overall course enrollment.
Data Analysis and Study Procedures

Research Question 1

Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about individual enrollment in fifteen (15) different business education courses as determined by EMIS reporting in the state of Ohio? The statistical procedure used to describe the individual enrollment data was a general linear model that included both linear regression for the continuous variables and analysis of variance (ANOVA) for the categorical variables. In this model, some predictors are continuous and some predictors are categorical, requiring the use of both.

Research Question 2

Beginning with school year 2005-2006 through 2001-2012, what was the overall enrollment trend for the fifteen (15) different business education courses as determined by EMIS reporting in the state of Ohio? The statistical procedure used was a general linear model that included both linear regression for the continuous variables and analysis of variance (ANOVA) for the categorical variables. In this model, some predictors are continuous and some predictors are categorical, requiring the use of both.

Research Question 3

Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about the number of males versus the number of females individually enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio? The statistical procedure used was a general linear model that included both linear regression for the continuous variables and analysis of variance.
(ANOVA) for the categorical variables. In this model, some predictors are continuous and some predictors are categorical, requiring the use of both. Additionally, can any non-traditional enrollment trends be identified in these fifteen (15) courses based on enrollment in each course during the school year ended 2012? Descriptive statistics are used for this portion of the research question.

**Research Question 4**

Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about the overall number of males versus the number of females enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio? The statistical procedure used was a general linear model that includes both linear regression for the continuous variables and analysis of variance (ANOVA) for the categorical variables. In this model, some predictors are continuous and some predictors are categorical, requiring the use of both.

**Research Question 5**

Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about racial demographic differences in students enrolled in fifteen (15) different business education courses as determined by EMIS reporting in the state of Ohio? Descriptive statistics obtained from using basic data from an Excel spreadsheet will be used.

**Research Question 6**

Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about trends in enrollment by grade level in the fifteen (15)
different business education courses as determined by EMIS reporting in the state of Ohio? The statistical procedure used was a general linear model that includes both linear regression for the continuous variables and analysis of variance (ANOVA) for the categorical variables. In this model, some predictors are continuous and some predictors are categorical, requiring the use of both.

**Research Question 7**

Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about trends in enrollment by grade level in the whole of the fifteen (15) different business education courses as determined by EMIS reporting in the state of Ohio? The statistical procedure used was a general linear model that includes both linear regression for the continuous variables and analysis of variance (ANOVA) for the categorical variables. In this model, some predictors are continuous and some predictors are categorical, requiring the use of both.

**Research Question 8**

Beginning with the school year 2005-2006 through 2011-2012, and using the JobsOhio Network’s definition of the six economic development regions in Ohio, what does the overall enrollment data reveal about regional differences in individual student enrollment in the fifteen (15) different business education courses as determined by EMIS reporting in the state of Ohio? The statistical procedure used was a general linear model that includes both linear regression for the continuous variables and analysis of variance (ANOVA) for the categorical variables. In this model, some predictors are continuous and some predictors are categorical, requiring the use of both.
Research Question 9

Beginning with the school year 2005-2006 through 2011-2012, and using the JobsOhio Network’s definition of the six economic development regions in Ohio, what does the overall enrollment data reveal about regional differences in the total number of students enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio? The statistical procedure used was a general linear model that includes both linear regression for the continuous variables and analysis of variance (ANOVA) for the categorical variables. In this model, some predictors are continuous and some predictors are categorical, requiring the use of both.

Research Question 10

What does the overall enrollment data reveal about correlations between the increased graduation requirements for the class of 2014 and these increased requirements’ effect on enrollment in the fifteen (15) business education courses? The statistical procedure to be used is a general linear model that includes both linear regression for the continuous variables and analysis of variance (ANOVA) for the categorical variables. In this model, some predictors are continuous and some predictors are categorical, requiring the use of both.

Summary

For Research Questions 1 through 9, to evaluate whether or not enrollment changes were significant, P values were determined. Consistent with all research methods, P Value of less than (<) .05 is considered significant. While linear trends were established for most research questions, and some might show increases or decreases, p
values determined whether or not the decline or increase was statistically significant. For each question a baseline was determined, with significance determined from that baseline. Throughout the data analysis, trends were reviewed to establish consistency between the current question and previous questions. For Question 10, an ANOVA model was used to determine any significant change could be identified in enrollment trends and increased graduation requirements implemented by increased graduation requirements and the additional year of high school math required by the Ohio Core.
Chapter 4: Results of the Study

Chapter 4 outlines the findings of this study and the results of the research questions. First, descriptive statistics are provided to identify the enrollment percentages, reflecting the approximate percentage of students enrolled in the specific business education course within the State of Ohio for the school year ended 2006 through the school year ended 2012. Second, the results of each of the research questions are explained as well as the data interpretation using R and P values.

Descriptive Statistics

For ease of reading, Tables 4.1 to 4.5 provide descriptive statistics related to course enrollment. Beginning with Accounting (non CTE), Business Math and Business Communication, Table 4.1 reflects a sum of total enrollment of students in the state of Ohio for each specific school year and total enrollment percentages based on the total number of students in Ohio taking each respective course. The column “Year” reflects data for the year school year ended 2006, for example (School Year 2005-2006). Sum reflects the total number of students enrolled in accounting, for example, therefore the sum of students taking accounting 2006 in the State of Ohio was 14,193. The Enroll % column reflects the percentage of students enrolled based on total enrollment for the
schools offering accounting and reporting data for an accounting course in the State of Ohio.

Table 4.1 Enrollment rates for Accounting, Business Math and Business Communication, years 2006-2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Accounting (non CTE)</th>
<th>Business Math</th>
<th>Business Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Course 31500</td>
<td>Course 030500</td>
<td>Course 30600</td>
</tr>
<tr>
<td>2006</td>
<td>14193</td>
<td>1084</td>
<td>1152</td>
</tr>
<tr>
<td>2007</td>
<td>14273</td>
<td>1412</td>
<td>1232</td>
</tr>
<tr>
<td>2008</td>
<td>13224</td>
<td>1485</td>
<td>1213</td>
</tr>
<tr>
<td>2009</td>
<td>13103</td>
<td>1459</td>
<td>1267</td>
</tr>
<tr>
<td>2010</td>
<td>11547</td>
<td>1461</td>
<td>1577</td>
</tr>
<tr>
<td>2011</td>
<td>10996</td>
<td>1450</td>
<td>2188</td>
</tr>
<tr>
<td>2012</td>
<td>12019</td>
<td>2199</td>
<td>2181</td>
</tr>
</tbody>
</table>

Tables 4.2 through 4.5 each summarize a set of classes, again, grouped only for ease of reading. These numbers reflect the sum of enrollment in a course in the State of Ohio and are intended to give overall enrollment percentages based on total enrollment in the EMIS reporting schools.

Table 4.2: Enrollment rates for Business Law, Personal Finance and Computer Programming

<table>
<thead>
<tr>
<th>Year</th>
<th>Business Law</th>
<th>Personal Finance</th>
<th>Computer Programming</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Course 30900</td>
<td>Course 31500</td>
<td>Course 31700</td>
</tr>
<tr>
<td>2006</td>
<td>6183</td>
<td>11144</td>
<td>11216</td>
</tr>
<tr>
<td>2007</td>
<td>5854</td>
<td>9387</td>
<td>12422</td>
</tr>
<tr>
<td>2008</td>
<td>5648</td>
<td>10496</td>
<td>11286</td>
</tr>
<tr>
<td>2009</td>
<td>4865</td>
<td>13052</td>
<td>10307</td>
</tr>
<tr>
<td>2010</td>
<td>4262</td>
<td>14413</td>
<td>8962</td>
</tr>
<tr>
<td>2011</td>
<td>4233</td>
<td>19257</td>
<td>7651</td>
</tr>
<tr>
<td>2012</td>
<td>4939</td>
<td>23368</td>
<td>7530</td>
</tr>
</tbody>
</table>
Table 4.3: Enrollment rates for Business Other, Computer Applications, Introduction to Marketing—CTE

<table>
<thead>
<tr>
<th></th>
<th>Business - Other</th>
<th>Computer Applications</th>
<th>Introduction to Marketing -- CTE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Course 33450</td>
<td>Course 36000</td>
<td>Course 40805</td>
</tr>
<tr>
<td>Year</td>
<td>Sum</td>
<td>Enroll. %</td>
<td>Sum</td>
</tr>
<tr>
<td>2006</td>
<td>6135</td>
<td>2.25%</td>
<td>50710</td>
</tr>
<tr>
<td>2007</td>
<td>7895</td>
<td>2.87%</td>
<td>47902</td>
</tr>
<tr>
<td>2008</td>
<td>9846</td>
<td>3.57%</td>
<td>48637</td>
</tr>
<tr>
<td>2009</td>
<td>11665</td>
<td>4.18%</td>
<td>46776</td>
</tr>
<tr>
<td>2010</td>
<td>10891</td>
<td>3.95%</td>
<td>42884</td>
</tr>
<tr>
<td>2011</td>
<td>9823</td>
<td>3.59%</td>
<td>37969</td>
</tr>
<tr>
<td>2012</td>
<td>11416</td>
<td>4.28%</td>
<td>36066</td>
</tr>
</tbody>
</table>

Table 4.4: Enrollment rates for Economics, Introduction to Business and Office Procedures

<table>
<thead>
<tr>
<th></th>
<th>Economics</th>
<th>Introduction to Business</th>
<th>Office Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Course 31800</td>
<td>Course 32300</td>
<td>Course 32800</td>
</tr>
<tr>
<td>Year</td>
<td>Sum</td>
<td>Enroll. %</td>
<td>Sum</td>
</tr>
<tr>
<td>2006</td>
<td>5074</td>
<td>3.01%</td>
<td>18580</td>
</tr>
<tr>
<td>2007</td>
<td>4809</td>
<td>2.82%</td>
<td>18403</td>
</tr>
<tr>
<td>2008</td>
<td>4880</td>
<td>2.88%</td>
<td>19139</td>
</tr>
<tr>
<td>2009</td>
<td>3975</td>
<td>2.33%</td>
<td>18251</td>
</tr>
<tr>
<td>2010</td>
<td>3489</td>
<td>2.04%</td>
<td>15946</td>
</tr>
<tr>
<td>2011</td>
<td>3740</td>
<td>2.22%</td>
<td>16916</td>
</tr>
<tr>
<td>2012</td>
<td>4784</td>
<td>2.87%</td>
<td>17838</td>
</tr>
</tbody>
</table>
Table 4.5: Enrollment rates for Introduction to Business and Administrative Services (CTE), Accounting (Career Technical) and Employability Skills (CTE)

<table>
<thead>
<tr>
<th>Year</th>
<th>Introduction to Business and Administrative Services</th>
<th>Accounting--Career Technical</th>
<th>Employability Skills - Career Technical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Course 140050 (Sum)</td>
<td>Course 140100 (Sum)</td>
<td>Course 990362 (Sum)</td>
</tr>
<tr>
<td>2006</td>
<td>0</td>
<td>684</td>
<td>7123</td>
</tr>
<tr>
<td>2007</td>
<td>0</td>
<td>432</td>
<td>4343</td>
</tr>
<tr>
<td>2008</td>
<td>0</td>
<td>473</td>
<td>4853</td>
</tr>
<tr>
<td>2009</td>
<td>5</td>
<td>543</td>
<td>4994</td>
</tr>
<tr>
<td>2010</td>
<td>944</td>
<td>492</td>
<td>4712</td>
</tr>
<tr>
<td>2011</td>
<td>12624</td>
<td>263</td>
<td>4175</td>
</tr>
<tr>
<td>2012</td>
<td>13819</td>
<td>322</td>
<td>3648</td>
</tr>
</tbody>
</table>

Response to Research Question One

Beginning with school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about individual enrollment in fifteen (15) different business education courses as determined by EMIS reporting in the state of Ohio?

In response to research question one, the researcher used linear regression to evaluate trends in enrollment. Using enrollment data for the fifteen (15) business education courses, as shown in Table 4.6, statistically significant trends in decreasing enrollment from 2005 through 2012 were found in Accounting (non-CTE), Business Law, Computer Programming and Computer Applications:

Table 4.6: Courses with Statistically Significant Decreasing Enrollment

<table>
<thead>
<tr>
<th>Course</th>
<th>Course Code</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting (non CTE)</td>
<td>030100</td>
<td>.0274</td>
</tr>
<tr>
<td>Business Law</td>
<td>030900</td>
<td>.0172</td>
</tr>
<tr>
<td>Computer Programming</td>
<td>031700</td>
<td>.0016</td>
</tr>
<tr>
<td>Computer Applications</td>
<td>036000</td>
<td>.0003</td>
</tr>
</tbody>
</table>
Table 4.7 shows courses with a declining trend in enrollment. However, with P values above that of .05, the results were not statistically significant:

<table>
<thead>
<tr>
<th>Course</th>
<th>Course Code</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Economics</td>
<td>031800</td>
<td>0.263</td>
</tr>
<tr>
<td>Introduction to Business</td>
<td>032300</td>
<td>0.273</td>
</tr>
<tr>
<td>Office Procedures</td>
<td>032800</td>
<td>0.192</td>
</tr>
<tr>
<td>Accounting--CTE</td>
<td>140100</td>
<td>0.080</td>
</tr>
</tbody>
</table>

Statistically significant increasing trends in enrollment were found in the courses shown in Table 4.8 below:

<table>
<thead>
<tr>
<th>Course</th>
<th>Course Code</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Finance</td>
<td>031500</td>
<td>.00542</td>
</tr>
<tr>
<td>Business, Other</td>
<td>033450</td>
<td>.0209</td>
</tr>
</tbody>
</table>

Appendix C shows the full analysis of the fifteen courses and their enrollment trends. In Appendix C, the data analysis shows that enrollment in Business Math, Course 030500, is flat for school years ending 2007-2011. For the school year ended 2012, a sharp increase in enrollment exists. Although the p value is less than .05, the pattern of the data set does not look linear which suggests that linear regression may be inappropriate for this specific analysis. Therefore, information on this course is not included in the reporting above. The same trend is true for Business Communication, Course 030600, a flat enrollment pattern exists in school years ended 2006 through 2009, but increases exist in 2010, with sharp increases in school years ended 2011 and 2012.
Finally, Employability Skills, Course 990362 shows a decreasing trend, but there is no statistical significance.

The Career Technical Courses, Introduction to Business and Administrative Services—CTE, Course 140050 and Introduction to Marketing—CTE, Course 040805, showed increasing trends at the inception of their course codes. P values for these courses exist at levels of 0.02413 and 0.01106, respectively, showing some significance in their increasing enrollment trend.

**Response to Research Question Two**

*Beginning with school year 2005-2006 through 2011-2012, what is the overall enrollment trend for the fifteen different business education courses as determined by EMIS reporting in the state of Ohio?*

In response to research question two, the researcher used linear regression. The year is used as the predictor and the enrollment percentage as the response. In looking at the overall data, no significant trend can be found. Appendix D shows that the P value for evaluating the total enrollment trend in all fifteen (15) business education courses was 0.391. This research question takes the aggregated totals of all business education courses and when all courses are evaluated together, the trends found in Research Question One are canceled out. The linear trend for this research question is not significant.

**Response to Research Question Three**

*Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about the number of males versus the number of females*
individually enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio? Additionally, can we identify any non-traditional enrollment trends in these fifteen (15) courses based on enrollment in each course during the school year ended 2012?

In response to research question three, the researcher again used a general linear model to determine significance in male or female course enrollment. Appendix E reflects the results of that analysis. No significance was found in enrollment trends for gender in any of the fifteen courses. The analysis reflects significance in enrollment trends in the year for some courses, which is consistent with the results for research question one. However, no significant trends exist in gender enrollment from year to year.

In evaluating whether or not any of the course data shows us non-traditional enrollment for the year ended 2012, the Table 4.9 shows we cannot identify any course with non-traditional enrollment figures.
Table 4.9: Male and Female Course Enrollment for 2012

<table>
<thead>
<tr>
<th>Course</th>
<th>Course ID</th>
<th>Female Enrollment</th>
<th>Male Enrollment</th>
<th>Total Enrollment</th>
<th>Female %</th>
<th>Male %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting (non CTE)</td>
<td>30100</td>
<td>5231</td>
<td>6788</td>
<td>12019</td>
<td>44%</td>
<td>56%</td>
</tr>
<tr>
<td>Business Mathematics</td>
<td>30500</td>
<td>1006</td>
<td>1193</td>
<td>2199</td>
<td>46%</td>
<td>54%</td>
</tr>
<tr>
<td>Business Communications</td>
<td>30600</td>
<td>1018</td>
<td>1163</td>
<td>2181</td>
<td>47%</td>
<td>53%</td>
</tr>
<tr>
<td>Business Law</td>
<td>30900</td>
<td>2029</td>
<td>2910</td>
<td>4939</td>
<td>41%</td>
<td>59%</td>
</tr>
<tr>
<td>Personal Finance</td>
<td>31500</td>
<td>10750</td>
<td>12618</td>
<td>23368</td>
<td>46%</td>
<td>54%</td>
</tr>
<tr>
<td>Computer Programming and Software Develop</td>
<td>31700</td>
<td>2910</td>
<td>4620</td>
<td>7530</td>
<td>39%</td>
<td>61%</td>
</tr>
<tr>
<td>Business Economics</td>
<td>31800</td>
<td>2083</td>
<td>2701</td>
<td>4784</td>
<td>44%</td>
<td>56%</td>
</tr>
<tr>
<td>Introduction to Business/General Business</td>
<td>32300</td>
<td>7293</td>
<td>10545</td>
<td>17838</td>
<td>41%</td>
<td>59%</td>
</tr>
<tr>
<td>Office Procedures</td>
<td>32800</td>
<td>1696</td>
<td>1800</td>
<td>3496</td>
<td>49%</td>
<td>51%</td>
</tr>
<tr>
<td>Business (Other)</td>
<td>33450</td>
<td>5172</td>
<td>6244</td>
<td>11416</td>
<td>45%</td>
<td>55%</td>
</tr>
<tr>
<td>Computer Application</td>
<td>36000</td>
<td>16250</td>
<td>19816</td>
<td>36066</td>
<td>45%</td>
<td>55%</td>
</tr>
<tr>
<td>Introduction to Marketing (CTE)</td>
<td>40805</td>
<td>578</td>
<td>725</td>
<td>1303</td>
<td>44%</td>
<td>56%</td>
</tr>
<tr>
<td>Introduction to Business and Administrative Services (CTE)</td>
<td>140050</td>
<td>6109</td>
<td>7710</td>
<td>13819</td>
<td>44%</td>
<td>56%</td>
</tr>
<tr>
<td>Accounting (CTE)</td>
<td>140100</td>
<td>155</td>
<td>167</td>
<td>322</td>
<td>48%</td>
<td>52%</td>
</tr>
<tr>
<td>Employability Skills (CTE)</td>
<td>990362</td>
<td>1435</td>
<td>2213</td>
<td>3648</td>
<td>39%</td>
<td>61%</td>
</tr>
</tbody>
</table>

Response to Research Question Four

Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about the overall number of males versus the overall number of females enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio?

In response to research question four, the researcher again used linear regression to determine any significant trends in overall enrollment as determined by a P value. While trends in enrollment could be identified by the year, an overall decreasing trend (using the year as one variable), no significant trends were found in gender enrollment.
related to overall course enrollment. Appendix F shows data analysis results for this research question.

**Response to Research Question Five**

*Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about racial demographic differences in students enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio?*

In response to research question five, the researcher evaluated total enrollment numbers from the Excel data files. When enrollment was less than 10 students, <10 was the entry in the data file; this unknown number was not added, as the researcher cannot predict the true enrollment number. Based on these totals, ethnicity and/or race had no statistical significance in course enrollment. American Indian and Pacific Islander student numbers totaled zero for all seven years’ worth of data. The black, non-Hispanic population had the highest enrollment of all minority races. Data on white student enrollment is also provided.

Table 4.10: Overall Course Enrollment by Race

<table>
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<th>RACE</th>
<th>ENROLLMENT YEAR</th>
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<tbody>
<tr>
<td></td>
<td>SY06</td>
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<td>Hispanic</td>
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<td>Multi-Racial</td>
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<tr>
<td>Pacific Islander</td>
<td>0</td>
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<tr>
<td>White</td>
<td>102169</td>
</tr>
</tbody>
</table>
Response to Research Question Six

Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about trends in enrollment by grade level in the fifteen (15) different business education courses as determined by EMIS reporting in the state of Ohio?

In response to research question six, the researcher used a general linear model using the categorical variable, grade level and the continuous variable, school year. Using this model, the response variable is the enrollment percentage for each individual class and the predictors are the categorical variables – grade level (grade 9 is the baseline) and school year. Results are discussed by class below; specific data can be found in Appendix G.

Enrollment in Accounting (non CTE), Course Number 030100: The data analysis shows that the higher the grade level, the higher the enrollment. Along the years, there is an overall decreasing trend, confirming the trend found in research question number 1.

Enrollment in Business Math, Course Number 030500: The data analysis shows that while enrollment in grades 9 and 10 are not significantly different; grade 11 and grade 12 contain significantly higher enrollment.

Enrollment in Business Communication, Course Number 030600: The data analysis shows that enrollment in Grade 10 has significantly lower enrollment than grade 9. There is no significant difference in enrollment between Grade 9 and 11. But when comparing Grade 12 to grade 9, Grade 12 has a significantly higher enrollment rate.
Enrollment in Business Law, Course Number 030900: The data analysis shows an increasing trend in grade level; but still reveals an overall decreasing trend through the years. This is consistent with the data analysis performed for research question one.

Enrollment in Personal Finance, Course Number 031500: The data reveals an increasing enrollment trend as a student progresses through high school. The higher the grade level, the higher the enrollment in personal finance.

Enrollment in Computer Programming, Course Number 031700: The data analysis for enrollment in this course reveals that compared to Grade 9, all other grades have significantly lower enrollment rates and Grade 11 has the lowest enrollment.

Enrollment in Business Economics, Course Number 031800: The data analysis reveals enrollment increases as grade level increases; however, the enrollment trends are not statistically significant. The enrollment increases, but not by any significant amount.

Enrollment in Introduction to Business, Course Number 032300: The data analysis for enrollment in this course shows Grade 10 enrollment is lower than Grade 9’s enrollment, but not significantly. Grade 11 is not significantly different from Grade 9, but Grade 12 shows a higher enrollment than Grade 9. Grade 12 shows the highest enrollment.

Enrollment in Office Procedures, Course Number 032800: The data analysis shows that when compared to Grade 9 all other three grades are significantly lower, therefore enrollment declines as the student progresses through high school.
Enrollment in Computer Applications, Course Number 036000: This course data, like office procedures, shows a decreasing enrollment trend as the student progresses through high school.

Enrollment in Business (Other), Course Number 033450: This course data analysis shows no significance in enrollment differences throughout the grades in this course. Grade 9 and Grade 12 enrollment are very similar and Grade 10 and 11 show less enrollment than Grade 9.

Enrollment in Accounting—CTE, Course Number 140100: The data analysis for this course shows an increasing trend as the student goes through high school; the higher the grade level, the higher the enrollment in the course.

Enrollment in Employability Skills, Course Number 990362: For this course, Grades 11 and 12 have significantly higher enrollment than Grade 9 and Grade 10, which show similar enrollment numbers.

Enrollment in Introduction to Business and Administrative Services—CTE, Course Number 140050: The enrollment data analysis shows that the higher grade level of the student, the lower the enrollment. The data analysis suggests that this is a mostly freshman course.

Enrollment in Introduction to Marketing—CTE, Course Number 040805: The data for this course shows no significance in differences in enrollment by grade level.

Response to Research Question Seven

Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about trends in enrollment by grade level in the whole of the
fifteen (15) different business courses as determined by EMIS reporting in the state of Ohio?

In response to research question seven, the researcher used general linear model. As with gender, the school year is not significant when considering total enrollment in business education courses. Grade 10 and 11, compared to Grade 9, are significantly lower in business education enrollment, while Grade 12 is not significantly different from Grade 9. Appendix H shows the data analysis results for this question.

Response to Research Question Eight

Beginning with the school year 2005-2006 through 2011-2012, and using the JobsOhio Network’s definition of the six economic development regions in Ohio, what does the overall enrollment data reveal about regional differences in individual student enrollment in fifteen (15) business education courses as determined by EMIS reporting in the State of Ohio?

In response to research question eight, the researcher used a general linear model. Similar to question six, results are discussed individually by course. Online course participant data was not included in the analysis as the numbers were not statistically significant. Appendix I shows the data analysis for each course.

Enrollment in Accounting (non CTE), Course Number 030100: Regions 1, 2 and 6 show statistically the same enrollment, while Region 3’s enrollment is significantly higher than Region 1. Region 4 shows higher enrollment than Region 5 and Region 5 shows greater enrollment than Region 1. Region 4 shows the highest enrollment in Accounting.
Enrollment in Business Math, Course Number 030500: Region 4 shows higher enrollment than the other regions but is not statistically significant. However, Region 6’s enrollment in Business Math is significantly higher than that of the other regions.

Enrollment in Business Communication, Course Number 030600: Region 4 shows increased enrollment over the other regions.

Enrollment in Business Law, Course Number 030900: Regions 1, 4 and 5 have similar enrollment; Regions 2, 3 and 6 have lower enrollment, with Regions 3 and 6 showing significantly lower enrollments.

Enrollment in Personal Finance, Course Number 031500: Regional enrollment in this course is consistent; however Region 6 shows slightly higher enrollments.

Enrollment in Computer Programming, Course Number 031700: Region 1 and 3 have consistent enrollment and Regions 2, 4, and 6 have higher enrollment than Regions 1 and 3. Region 5 has enrollment that is significantly higher than the other regions.

Enrollment in Business Economics, Course Number 031800: All regions except Region 5 have similar enrollment; Region 5 however shows significantly lower enrollment.

Enrollment in Introduction to Business/General Business, Course Number 32300: Regions 2, 4, 5 and 6 each show significantly higher enrollment in this course than Region 1 and 3, which show similar course enrollment.

Enrollment in Office Procedures, Course Number 032800: Regions 4 and 6 show statistically significant higher enrollment than the other four regions (1, 2, 3 and 5).
Enrollment in Computer Applications, Course Number 036000: In this course, enrollment among the regions is generally the same, however, Region 5 has significantly higher enrollment and Region 6 significantly lower enrollment.

Enrollment in Business Other, Course Number 033450: Regions 1, 3, 4 and 5 have consistent enrollment data; Region 2 is significantly lower than Region 1; Region 6 shows statistically significant enrollment higher than Region 1.

Enrollment in Accounting--CTE, Course Number 140100: Region 1 and 4 show the same enrollment, while the other four regions (2, 3, 4 and 6) show lower enrollment figures.

Enrollment in Employability Skills, Course Number 990362: Regions 1 and 6 show consistent enrollment figures; Regions 2, 3, 4, and 5 higher show significantly higher enrollment numbers than the other regions.

Enrollment in Introduction to Business and Administrative Services—CTE, Course Number 140050: Enrollment in this course is statistically the same among all regions.

Enrollment in Introduction to Marketing—CTE, Course Number 040805: Only Region 3 shows a difference in course enrollment and is significantly lower than enrollment in the other five regions.

Response to Research Question Nine

Beginning with the school year 2005-2006 through 2011-2012, and using the JobsOhio Network’s definition of the six economic development regions in Ohio, what does the overall enrollment data reveal about regional differences in the total number of students
enrolled in fifteen (15) business education courses as determined by EMIS reporting in the State of Ohio?

In response to research question nine, the researcher again used a general linear model. Regions 4, 5 and 6 show statistical significance in their enrollment numbers over the other three regions. Region 3 has enrollment slightly higher than Regions 1 and 2, but is not statistically significant. Please review Appendix J for specific data analysis information.

Response to Research Question Ten

What does the overall enrollment data reveal about correlations between the increased graduation requirements for the class of 2014 and these increased requirements’ effect on enrollment in fifteen (15) business education courses? Can correlations be drawn between the increased graduation requirements and trends in enrollment?

In response to research question ten, the researcher used an Analysis of Variance Model to evaluate the data. Using categorical factors, this analysis sought to determine if the increased graduation requirements under Ohio Core (one additional year of math) could be correlated to decreased enrollment in business education courses. The question specifically investigates whether enrollment of the class subject to the requirements of Ohio Core common core showed a decline in business education enrollment. The ANOVA model compared the Class of 2014, enrolled as freshmen during 2010-2011 and the Class of 2015, enrolled as freshmen during 2011-2012 to two generations of classes (Class of 2012 and Class of 2013) class not subject to the increased requirements (before the Ohio Core requirements were implemented). The results showed that the enrollment
rate is negatively correlated with increased graduation requirements, therefore, in the early analysis of the requirements of the Ohio Core, these requirements did not negatively affect overall business education enrollment. Appendix K contains the data analysis for Research Question 10.

**Summary**

Little statistical significance was found in enrollment changes over a seven (7) year period from school year ending 2006 to school year ending 2012. While some statistical significance was found in declining or increasing enrollment within some courses, the majority of courses and business education enrollment overall did not show statistical significance in the decline in enrollment.
Chapter 5: Summary, Conclusions and Recommendations

Statement of the Problem

This descriptive research study sought to describe the status of enrollment in business education in Ohio and, specifically, the enrollment trends in secondary business education courses in Ohio beginning with the 2005-2006 school year through the 2011-2012 school year.

Method

The target population for this study was all students enrolled in a public high school in the state of Ohio. The frame for this study was defined as all high school students enrolled in a secondary public high school from 2005 through 2012. The sample was defined as all students enrolled in a public high school from 2005 through 2012 whose school district used required EMIS reporting procedures as defined by the Ohio Department of Education. The participants in this study were defined as the accessible population as determined by the sample. Students enrolled in online courses through secondary public institutions were eliminated from this study because enrollment in online business courses was extremely low, and enrollment could not be related directly to any particular public school or region within the state of Ohio.
The EMIS data collected consisted of Microsoft Excel spreadsheets from the Ohio Department of Education containing overall enrollment data and course enrollment data for 16 specified business educational courses from approximately 790 secondary public schools in the state of Ohio.

The data for each research objective one (1) through nine (9) were analyzed using descriptive statistics and linear regression. The data for research objective ten (10) was analyzed using descriptive statistics and an analysis of variance model.

**Findings: Descriptive Statistics – Overall Enrollment Rates**

Enrollment rates were calculated by taking the number of students enrolled in a course for the specific school year, and dividing that amount by the total number of students who had the opportunity to take the course. Enrollment rates are reported as a percentage of total student enrollments.

The findings of enrollment rates for business education courses reflects fairly low overall percentages of enrollment for most business courses, especially in the most recent year of available data, 2012. Course enrollment in 2012 does not exceed 6% of the student population, with three exceptions: Personal Finance with 7.03% (course with increasing enrollment percentages), Computer Applications with 8.48% (course with decreasing enrollment percentages) and Introduction to Business and Administrative Services—CTE at 13.07% (course with increasing enrollment percentages since reporting began in 2010).

From the school year ending 2006 to the school year ending 2012, the highest enrollment in any course evaluated was 13.07% was in Introduction to Business and
Administrative Services-CTE in 2012. Aside from this number in 2012, the highest rates to be found are in Employability Skills-CTE and Computer Applications. In 2006, these courses enjoyed rates as high as 11.58% and 11.50%, respectively. These 2006 numbers prove to be rare, as most enrollment rates are lower and decline to lower percentages as the years pass.

In examining the course enrollment numbers for school years ending 2006 through 2012, Accounting (non CTE) shows a top enrollment percentage in 2007, in which 3.56% of students in Ohio with the opportunity to take accounting actually enrolled in the course. All years reflect enrollment lower than 4% overall; enrollment percentages are fairly consistent during the time period evaluated.

Business Law also shows an overall consistency in enrollment percentage, but never reaches 3% of the student population. The same can be said for Economics, however, in 2006 the enrollment percentage peaked at 3.01%.

Introduction to Business also maintains some consistency in enrollment percentage with higher student enrollment as rates are not lower than 4.65% during the period of time evaluated in this study. Office Procedures course enrollment is fairly consistent as well, peaking in 2008 with 3.27% of the student population enrolling.

Business Math, Business Communication and Accounting-CTE, all show enrollment percentages of less than 2% of the student population, with the only exception being Business Math enrollment in 2012, which reached 2.09%. From a descriptive statistic standpoint, enrollment in these three courses has remained relatively the same,
but low, for the time period researched. Accounting-CTE shows the most percentage decline in enrollment.

Business, Other is a course category with enrollments consistently higher than 2%, but lower than 5% during the time period evaluated.

Personal Finance shows consistently increasing enrollment beginning with the school year ending in 2008. Two other courses with increasing enrollment percentages are Introduction to Marketing-CTE and Introduction to Business and Administrative Services-CTE, however course reporting for these specific course codes began in 2009 and 2010, respectively.


Summary

Summary of Results for Research Question One

Beginning with school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about individual enrollment in fifteen (15) different business education courses as determined by EMIS reporting in the state of Ohio?

The overall enrollment data show that differences in enrollment in the fifteen (15) course areas exist to varying degrees in varying directions, with the majority of courses
showing no statistical significance in changes in enrollment. Accounting (non-CTE), Business Law, Computer Programming and Computer Applications all show statistically significant decreasing enrollment patterns, while the opposite is true for only two courses, Business, Other and Personal Finance. No statistical significance was evident in the enrollment patterns of the other nine (9) courses. Patterns and trends were evident in these nine (9) courses, but not to a level that a researcher would find significant.

Summary of Results for Research Question Two

Beginning with school year 2005-2006 through 2011-2012, what is the overall enrollment trend for the fifteen different business education courses as determined by EMIS reporting in the state of Ohio?

No overall enrollment trend in an increasing or decreasing direction was found when taking the cumulative results of enrollment of all fifteen business education courses.

Summary of Results for Research Question Three

Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about the number of males versus the number of females individually enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio? Additionally, can we identify any non-traditional enrollment trends in these fifteen (15) courses based on enrollment in each course during the school year ended 2012?

As with research question two, the data show no overall enrollment trend in an increasing or decreasing pattern with this analysis. Gender, therefore, does not have an
impact on enrollment. When using the Ohio Department of Education’s definition of non-traditional careers, again, enrollment in the fifteen (15) courses does not reflect any non-traditional enrollment. In compliance with Perkins IV, The Ohio Department of Education cites “nontraditional Career Technical Education (CTE) programs are identified as those connected to occupations or fields of work in which individuals from one gender comprise less than 25 percent of the individuals employed in those occupations or fields of work.” In no course do enrollment percentages for one gender fall at or below the 25% signifying non-traditional enrollment.

**Summary of Results for Research Question Four**

*Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about the overall number of males versus the overall number of females enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio?*

The overall enrollment data show no significant trends in overall gender total enrollment in the fifteen (15) business education courses.

**Summary of Results for Research Question Five**

*Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about racial demographic differences in students enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio?*

Total enrollment numbers reveal no statistical significance in racial demographics and enrollment in business education courses.
Summary of Results for Research Question Six

*Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about trends in enrollment by grade level in the fifteen (15) different business education courses as determined by EMIS reporting in the state of Ohio?*

Data analysis related to enrollment in business education courses at each grade level (9-12) in the fifteen (15) business education courses does vary.

In analyzing the enrollment in the fifteen courses, Accounting (non CTE), Business Law, Personal Finance, Economics, Accounting-CTE and Introduction to Business and Administrative Services-CTE, all reveal a pattern of increasing enrollment as the student progresses through their high school grade levels. The higher the grade level, the higher the enrollment in the course.

Business Math and Employability Skills courses show higher enrollment by upperclassmen, students who are juniors (grade 11) and seniors (grade 12).

Both Business Communication and Introduction to Business show the highest enrollment numbers in Grade 12, followed by comparable enrollment numbers in Grades 9 and 11, and the lowest enrollment at Grade 10.

In Computer Programming, Office Procedures and Computer Applications, the data reflects that Grade 9 has the highest enrollment rate, with statistically significant lower enrollment in all other grade levels.

Business, Other, shows the highest enrollment in Grades 9 and 12, lower enrollment numbers, but comparable in Grades 10 and 11.
Finally, Introduction to Marketing—CTE shows no significant difference in enrollment by grade level.

**Summary of Results for Research Question Seven**

*Beginning with the school year 2005-2006 through 2011-2012, what does the overall enrollment data reveal about trends in enrollment by grade level in the whole of the fifteen (15) different business courses as determined by EMIS reporting in the state of Ohio?*

The data analysis shows no statistical significance in grade level enrollment overall. The numbers, however, tell us that Grades 10 and 11 have overall lower enrollment than students enrolled in Grades 9 and 12.

**Summary of Results for Research Question Eight**

*Beginning with the school year 2005-2006 through 2011-2012, and using the JobsOhio Network’s definition of the six economic development regions in Ohio, what does the overall enrollment data reveal about regional differences in individual student enrollment in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio?*

In evaluating the regional data, some distinguishing enrollment trends were noted. This summary section will reveal results by region.

Region 1, the central Ohio region, characterized as being the region with many white collar jobs, state courts, corporate organizations and government jobs, showed significant differences in enrollment in Accounting—CTE, sharing similar enrollment number with Region 4. Statistically, the other four regions showed lower enrollment
numbers in this course. No other statistically notable differences in course enrollment from the other regions were found.

Region 2, the region whose key city is noted as Cleveland, is characterized as being Ohio’s old manufacturing region, showed no statistical differences in course enrollment that were worth noting.

Region 3, the area around Nelsonville, is considered Appalachian, often characterized by generational poverty. Region 3 also did not stand out for statistically significant enrollment differences, with the exception of having the lowest enrollment of all regions in Introduction to Marketing—CTE.

Region 4, the area noted on the map in Figure 1.2 around Toledo is characterized by being a large part of the auto and steel industry. This region shows the highest enrollment in Accounting (non CTE) and Business Communication. Region 4 shares the highest enrollment numbers with Region 6 for Office Procedures and shares with Region 1 the highest enrollment numbers for Accounting—CTE.

Region 5, in the western portion of the State of Ohio, where Dayton is labeled the key city, is described to be much like Region 2 (Cleveland) with manufacturing and automotive industries. Region 5 showed statistically higher enrollments in Computer Programming and Computer Applications and statistically lower enrollment as compared to the other regions in Business Economics.

Region 6, one of the smaller regions geographically and associated with Cincinnati, is described as much like Region 1 in its white collar, corporate existence. This region showed significantly higher enrollment than the other regions in Business
Math. Region 6 shares the highest enrollment numbers with Region 4 for Office Procedures and showed statistically significantly lower enrollment than the other five regions in Computer Applications.

Region 7, although identified and marked in the data, was not significant in evaluating enrollment trends, as Region 7 identified only online course enrollment in specific business courses. As an online participant, no identifiable connection could be made to enrollment trends in Regions 1 through 6.

Some courses showed consistency among regions, but nothing that stood out as statistically significant related to a particular region. As an example, Introduction to Business and Administrative Services-CTE showed statistically the same enrollment numbers across each region.

Other consistent course enrollments, with small differences, included Business Law, which showed higher enrollment in Regions 1, 4 and 5, with lower enrollment in Regions 2, 3 and 6. Enrollment in General Business was consistent for Regions 2, 4, 5 and 6, but lower enrollment in Regions 1 and 3. Enrollment in Business, Other was consistent for Regions 1, 3, 4 and 5, but some differences exist with Region 2 enrollment being lower than Region 1 and Region 6 showing enrollment numbers higher than Region 1 for this non-descript course. In contrast to Business, Other enrollment is enrollment in Employability Skills. Regions 1 and 6 show similar enrollment numbers, but the other four regions show significantly higher numbers of enrollment in the Employability Skills course.
No statistical significance was found in enrollments among the regions for Personal Finance.

**Summary of Results for Research Question Nine**

*Beginning with the school year 2005-2006 through 2011-2012, and using the JobsOhio Network’s definition of the six economic development regions in Ohio, what does the overall enrollment data reveal about regional differences in the total number of students enrolled in fifteen (15) business education courses as determined by EMIS reporting in the state of Ohio?*

Analysis of overall enrollment numbers in Regions 1 through 6 showed that Regions 4, 5 and 6 had higher overall enrollment; Region 3 would fall next in line and Regions 1 and 2 had the lowest overall enrollment. However, enrollment differences between the regions were not statistically significant.

**Summary of Results for Research Question Ten**

*What does the overall enrollment data reveal about correlations between the increased graduation requirements for the class of 2014 and these increased requirements’ effect on enrollment in fifteen (15) business education courses?*

In this early analysis, comparing the overall business education course enrollment of the Class of 2014 to the overall business education course enrollment of the Classes of 2012 and 2013, the results show that the increased graduation requirements have no effect on enrollment in business education courses.
Conclusions

Conclusion 1 – Overall Enrollment

Findings from this study do not reflect the sharp decline in business education course enrollment as a whole that one might expect to see after reading literature related to business education enrollment. Railsback & Hite (2008) cited worldly events as having an impact on the increases and decreases in course enrollment; certainly this non-quantified summary is confirmed.

Railsback & Hite (2008) also cited the legislative initiative of No Child Left Behind as having a negative impact on enrollment figures for business education. In addition, Mahinda, 2006, references a decline in enrollments as a result of the report A Nation at Risk which called for increased graduation requirements and made no mention of vocational courses as a need for secondary students. Rader and Meggison (2007) share the concern of business educators that the public perception that most high school students will attend college will continue to contribute to the decline of enrollment in business education courses. Rader (2007) specifically cites a decline in electives such as business law and accounting. Finally, Kaliski (2007) reported that business educators perceive that the numbers enrolled in business education courses will continue to decline.

While this research study in enrollment figures pertains only to the state of Ohio, for school years ending 2006 through 2012, declines or increases in enrollment of specific courses are confirmed, but statistically, an overall increase or decline in business education enrollment overall is not confirmed. Accounting and Law, cited by Rader (2007) as courses with declining enrollment have actually had fairly consistent
enrollment with slight fluctuations over the seven year period analyzed when considering descriptive numbers. Statistically significant results confirmed that Accounting and Law both indeed had decreasing enrollment from for the school years ending 2006 through 2012. Only two courses were found to be statistically significant in their increase, and one of those courses in non-descript in its title: Personal Finance, which is currently required for graduation in the state of Ohio and “Business, Other”, a course code schools can use when they are unsure of what category to use for a business course for purposes of EMIS reporting.

What is confirmed is that business education courses have fluctuations, increases and decreases, in course enrollment, with few specific courses in Ohio being identified as showing a consistent increase in enrollment. In contrast, business education is not enjoying the growth that other high school course offerings, Advanced Placement courses, can claim. The College Entrance Board in 2012 cited an increase from 12% of students taking AP courses in 2001 to 20% in 2011. Aside from Introduction to Business and Administrative Services-CTE in Ohio, which claims a 13% growth from the inception of this course in 2010, no other course in this study can boast that type of growth. Policy standards from business education advocates, including the NSBE, argue that business education courses are needed by all students to become productive citizens and members of a working society. However, growth and business education are not synonymous terms.
**Conclusion 2—Demographics**

When determining ways to increase enrollment in business education, it appears as though gender, race and regions of the state have very little to do with the course enrollment as it is currently structured. No statistically significant gender or race demographics have an impact on business education course enrollments. Regionally, some significant differences exist, but the differences are so slight that they seem to be unrelated to the descriptors applied to those various regions. Not enough information exists on the region themselves to truly draw valid conclusions. For example, it is impossible to determine why Business Math enrollment is up in Region 6 or why Accounting-non CTE is up in Region 4.

Enrollment among the grade levels varies, with the sophomore and junior classes (Grades 10 and 11) showing the lowest enrollment in business education courses. Freshman and seniors (Grades 9 and 12) show comparable enrollment numbers and those numbers are higher than the sophomores and juniors.

**Conclusion 3—Increased Graduation Requirements**

This analysis provided an opportunity to examine one class under the increased graduation requirements and review whether or not the increased requirements had an effect on business education electives. The Class of 2014 is the first graduating class subject to the increased requirements. When comparing their enrollment in business education electives to the Class of 2012 and 2013, no significant change was found. That would initially suggest that increased graduation requirements do not have an effect on enrollment in business education electives.
Recommendations

Because the data do not show truly outstanding growth in any course, with the exception of Introduction to Business and Administrative Services-CTE, business educators and stakeholders in the field of business education must continue to be advocates for this secondary educational opportunity. This advocacy stretches from educating school personnel to top level state and federal legislators on the rigor and relevance of business education. This advocacy includes business educators participating in state level curriculum development whenever possible to enhance and insure the rigor and relevance of coursework in business education. This advocacy also includes work in developing business education courses that can meet the requirements of the Ohio Core – in accounting or business math, for example – to help improve course enrollment in business education. Business education needs to move into the mainstream of secondary education in Ohio by being having course options students can take that fulfill the Ohio Core and graduation requirements, and potentially fulfilling college entrance requirements. A key element of this advocacy recommendation is the training of business educators to understand advocacy. Business educator training programs must educate future teachers on the need to be marketing personnel for their own courses to maintain not only the valuable business education curriculum, but also business education jobs. Secondary students need business education. Schools need quality business teachers who understand their roles as teachers and advocates for business education.

These data were collected from the Ohio Department of Education for a seven year period. Much of what was determined through statistical analysis showed decline or
growth in most business education courses to be not statistically significant. Future analyses using similar data for extended long term studies are recommended.

Longitudinal linear trends in enrollment need to be established with additional years of data to determine long term trends and potential statistical significance. This is especially important as students are required to graduate high school in the State of Ohio with four years of required math credits. How will the increase in graduation requirements beginning with the graduating class of 2014 affect enrollment in business courses long term?

In conducting this research study, specific course enrollment numbers were used. Descriptive data based on enrollment in the fifteen different business education courses over the seven year period, gives a starting point for evaluation of course offerings. Based on enrollment figures, each individual course can be evaluated for its overall enrollment number and impact on business education in the State of Ohio. Furthermore, enrollment trends should reflect whether or not student interest in business education courses is waxing or waning. Curriculum specialists at the state level can take these numbers and continue to evaluate them over the long term. Questions related to relevancy to the secondary education arena must be asked so that courses stay relevant, rigorous and in demand. Business education courses are some of the few students can identify as using the skills taught later on in life. Being sure courses are of interest and are in demand is critical to the survival of this elective.

Much of the data was found to be not statistically significant when evaluating trends. Future research is needed for a longitudinal study of enrollment in business
education. As EMIS ages, more and more data will become available, allowing for determinations by future researchers.

Summary

With the current state of education and emphasis on core academic courses, business education must continue to fight for its survival in the secondary educational arena. Advocacy is essential, and advocates must be armed with data to show the benefits of and need for business education. Advocates must work to make business education courses an option for meeting the requirements for graduation as dictated by legislative initiatives and school district personnel. Accounting is one example of a course that with proper rigor and curriculum could meet the requirements for high school graduation and the fourth year of math. Continued evaluation of longitudinal trends is essential to truly determine the state of business education in Ohio. Where does course enrollment stand now and what course curriculum needs upgraded to meet the needs and interests of Ohio students, while fulfilling the needs of the local job market?
References


Association of Independent Colleges and Universities of Ohio and Ohio Association of Private College Admission Directors (2012). *Counselor’s guide to Ohio’s independent colleges and universities*. Columbus: Ohio Association of Private College Admission Directors.


APPENDIX A: Institutional Review Board Documentation
EMAIL #1 (AFTER SUBMISSION OF IRB PROPOSAL)

From: Prestage, Tani [mailto:colvin.51@osu.edu]
Sent: Wednesday, July 03, 2013 1:11 PM
To: Zirkle, Christopher; Sander, Kristina
Subject: BUSINESS EDUCATION ENROLLMENT TREND STUDY

Dear Investigators,

In order to make a determination, I reviewed your exempt request for the protocol above. The following elements need to be addressed before your application can receive a determination.

NOTE: if no identifiers are provided to researchers, this would not meet the definition of human subjects research and would not need human subject research review. Also, if codes for data points link up to a key and ODE signs a data use agreement with researchers not to share with researchers, this also does not meet human subjects research definition. However, if ODE requires review we can proceed with the exempt review.

1. Proposal states data collected includes assignment of a number representing Ohio regions; please confirm that each area would have at least 25,000 residents to remain unidentifiable.
2. Provide a data collection spreadsheet listing headers of the data points being collected.
3. Our records indicate that Kristina Sander has not completed a conflict of interest (COI) disclosure. A COI disclosure is required for all investigators and key personnel participating in research. The online COI disclosure is currently available at [http://go.osu.edu/coi](http://go.osu.edu/coi) Contacts: Technical support, orhelpdesk@osu.edu; questions, conflictinfo@osu.edu.

As applicable, your clarifications and/or modifications should be submitted via reply email as follows:
- Provide a reply email with a detailed, point-by-point response to each of the items.
- Revise all applicable documents with changes underlined.

Once the above elements are satisfied, you will be notified with a determination. Please let me know if you have any questions.

Thanks,

Tani Prestage, MPH, MA, CIP Quality Improvement Specialist Office of Research Office of Responsible Research Practices 300 Research Administration Building | 1960 Kenny Road Columbus, OH 43210 614-292-0214 Office | 614-688-0366 Fax prestage.2@osu.edu orrp.osu.edu

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EMAIL #2 (RESPONSE TO IRB)

From: Zirkle, Christopher [mailto:zirkle.6@osu.edu]
Sent: Friday, July 05, 2013 11:32 AM
To: Prestage, Tani; Sander, Kristina
Subject: RE: BUSINESS EDUCATION ENROLLMENT TREND STUDY

Tani

No personal identifiers will be provided to the researchers. ODE did not indicate they required a review. So, it would appear we can withdraw the request, correct? Kris Sander did complete the COI, so that should be resolved.

Do you require anything further from us in order to proceed with this research?

Thank you

Chris Zirkle

EMAIL #3 (RESPONSE FROM IRB)

From: Prestage, Tani <colvin.51@osu.edu>
to: "Zirkle, Christopher" <zirkle.6@osu.edu>,
"Sander, Kristina" <sander.6@osu.edu>
date: Mon, Jul 8, 2013 at 8:03 AM
subject: RE: BUSINESS EDUCATION ENROLLMENT TREND STUDY
mailed-by: osu.edu

Chris,
This is good-I will add this email to file and determine the study not human subjects research. Thanks

Tani
APPENDIX B: JobsOhio County and Region Listing
<table>
<thead>
<tr>
<th>County</th>
<th>Zip Code</th>
<th>Region Based on Jobs Ohio</th>
<th>County</th>
<th>Zip Code</th>
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<td>45036</td>
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</table>
APPENDIX C: Data for Question #1 – Individual Course Enrollment Trends
Question 1
Accounting, Course ID Number: 03100

Call: lm(formula = er ~ year, data = course1data)
Residuals:

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-0.009857</td>
<td>0.125483</td>
<td>-0.023973</td>
<td>0.044639</td>
<td>-0.206380</td>
<td>-0.193542</td>
<td>0.263629</td>
</tr>
</tbody>
</table>

Coefficients:

|                  | Estimate | Std. Error | t value | Pr(>|t|) |
|------------------|----------|------------|---------|----------|
| (Intercept)      | 217.80201| 69.58591   | 3.130   | 0.0260 * |
| year             | -0.10681 | 0.03464    | -3.084  | 0.0274 * |

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 1

Residual standard error: 0.1833 on 5 degrees of freedom
Multiple R-squared: 0.6554,    Adjusted R-squared: 0.5865
F-statistic: 9.509 on 1 and 5 DF,  p-value: 0.02735
Call: `lm(formula = er ~ year, data = course2data)`

Residuals:

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>0.08494</td>
<td>-0.06860</td>
<td>-0.17743</td>
<td>0.34787</td>
</tr>
</tbody>
</table>

Coefficients:

|                      | Estimate | Std. Error | t value | Pr(>|t|) |
|----------------------|----------|------------|---------|---------|
| (Intercept)          | -241.82080 | 89.51286   | -2.702  | 0.0427  * |
| year                 | 0.12107   | 0.04456    | 2.717   | 0.0419  * |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.2358 on 5 degrees of freedom
Multiple R-squared: 0.5962,  Adjusted R-squared: 0.5155
F-statistic: 7.383 on 1 and 5 DF,  p-value: 0.04191
Call: lm(formula = er ~ year, data = course3data)

Residuals:

  1       2       3       4       5       6       7
0.17507  0.07159 -0.12403 -0.28235 -0.14973  0.23430  0.07516

Coefficients:

                        Estimate Std. Error t value Pr(>|t|)
(Intercept)             -352.3246   78.5178  -4.487  0.00648 **
year                    0.17605    0.03908   4.505  0.00637 **

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.2068 on 5 degrees of freedom
Multiple R-squared: 0.8023,  Adjusted R-squared: 0.7628
F-statistic: 20.29 on 1 and 5 DF,  p-value: 0.006372
Call: lm(formula = er ~ year, data = course4data)

Residuals:
1       2       3       4       5       6       7
0.05995 0.06305 0.10330 -0.15020 -0.26494 -0.10767  0.29651

Coefficients:
            Estimate Std. Error  t value Pr(>|t|)
(Intercept) 275.65911   77.90164  3.5390   0.0166 *
year        -0.13599    0.03878 -3.5069   0.0172 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.2052 on 5 degrees of freedom
Multiple R-squared: 0.7111,  Adjusted R-squared: 0.6532
F-statistic: 12.3 on 1 and 5 DF,  p-value: 0.01715
Call:  lm(formula = er ~ year, data = course5data)

Residuals:
   1       2       3       4       5       6       7
 0.9705 -0.2102 -0.5276 -0.4615 -0.6993  0.1217  0.8065

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -1285.5970   275.4445  -4.667  0.00550 **
year          0.6420     0.1371   4.683  0.00542 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 . ’ 0.1 ’ ’ 1

Residual standard error: 0.7255 on 5 degrees of freedom
Multiple R-squared: 0.8143, Adjusted R-squared: 0.7772
F-statistic: 21.93 on 1 and 5 DF,  p-value: 0.00542
Call: lm(formula = er ~ year, data = course6data)

Residuals:
1    2    3    4    5    6    7
-0.45265  0.36268  0.21203  0.14128 -0.06784 -0.23379  0.03829

Coefficients:
Estimate Std. Error t value Pr(>|t|)
(Intercept) 720.38789  115.41698   6.242  0.00155 **
year       -0.35649    0.05745 -6.205  0.00159 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.304 on 5 degrees of freedom
Multiple R-squared: 0.8851,   Adjusted R-squared: 0.8621
F-statistic: 38.51 on 1 and 5 DF,  p-value: 0.001587
Call: lm(formula = er ~ year, data = course7data)

Residuals:

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<th>3</th>
<th>4</th>
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<td>-0.46508</td>
<td>-0.20486</td>
<td>0.54052</td>
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</table>

Coefficients:

|                | Estimate | Std. Error | t value | Pr(>|t|) |
|----------------|----------|------------|---------|---------|
| (Intercept)    | 179.61808 | 140.29794  | 1.280   | 0.257   |
| year           | -0.08811 | 0.06983    | -1.262  | 0.263   |

Residual standard error: 0.3695 on 5 degrees of freedom
Multiple R-squared: 0.2415,  Adjusted R-squared: 0.08981
F-statistic: 1.592 on 1 and 5 DF,  p-value: 0.2627
Call: lm(formula = er ~ year, data = course8data)

Residuals:

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<th>2</th>
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<th>4</th>
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<td>-0.007660</td>
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</tbody>
</table>

Coefficients:

| Estimate | Std. Error | t value | Pr(>|t|) |
|----------|------------|---------|---------|
| Intercept| 146.23362  | 114.51733 | 1.277  | 0.258  |
| year     | -0.07018   | 0.05700   | -1.231 | 0.273  |

Residual standard error: 0.3016 on 5 degrees of freedom
Multiple R-squared: 0.2327, Adjusted R-squared: 0.07919
F-statistic: 1.516 on 1 and 5 DF, p-value: 0.273
Call:  lm(formula = er ~ year, data = course9data)

Residuals:
  1        2        3        4        5        6        7
0.05137  -0.32226  0.40920  -0.06765  -0.04978  -0.03121  0.01033

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 138.82506   90.17620   1.539    0.184
year       -0.06771    0.04489  -1.508    0.192

Residual standard error: 0.2375 on 5 degrees of freedom
Multiple R-squared: 0.3128,    Adjusted R-squared: 0.1753
F-statistic: 2.276 on 1 and 5 DF,  p-value: 0.1918
Call: lm(formula = er ~ year, data = course10data)

Residuals:

1        2        3        4        5        6        7
-0.14371 -0.31870  0.32761  0.39941  0.14113 -0.33511 -0.07061

Coefficients:

Estimate Std. Error t value Pr(>|t|)
(Intercept) 1040.56839  123.17614   8.448 0.000382 ***
year         -0.51292    0.06131 -8.366 0.000399 ***

---

Signif. codes:  0 ‘****’ 0.001 ‘***’ 0.01 ‘**’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.3244 on 5 degrees of freedom
Multiple R-squared: 0.9333,    Adjusted R-squared: 0.92
F-statistic: 69.99 on 1 and 5 DF,  p-value: 0.0003995
Call: lm(formula = er ~ year, data = course11data)
Residuals:
  1       2       3       4       5       6       7  
-0.42965 -0.09936  0.32745  0.65699  0.14595  0.49792 -0.10345

Coefficients:
                          Estimate Std. Error   t value   Pr(>|t|)
(Intercept)                -564.63103  170.91257    -3.304     0.0214 *
year                        0.28281    0.08507     3.324     0.0209 *
---                          
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.4502 on 5 degrees of freedom
Multiple R-squared: 0.6885,    Adjusted R-squared: 0.6262
F-statistic: 11.05 on 1 and 5 DF,  p-value: 0.02091
Call: lm(formula = er ~ year, data = course12data)

Residuals:

1     2     3     4     5     6     7
0.18133 -0.28703 -0.07394  0.17976  0.17836 -0.25305  0.07457

Coefficients:

Estimate Std. Error t value Pr(>|t|)
(Intercept) 188.17833   85.64838  2.197   0.0794 .
year        -0.09311    0.04263  -2.184   0.0807 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.2256 on 5 degrees of freedom
Multiple R-squared: 0.4882,    Adjusted R-squared: 0.3859
F-statistic:  4.77 on 1 and 5 DF,  p-value: 0.0807
Call: lm(formula = er ~ year, data = course13data)

Residuals:
  1       2       3       4       5       6       7
1.98047 -2.10630 -0.57206  0.05186  0.30286  0.17562  0.16755

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 1406.9579   504.8073   2.787   0.0386 *
year       -0.6966     0.2513  -2.772   0.0393 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.33 on 5 degrees of freedom
Multiple R-squared: 0.6058, Adjusted R-squared: 0.527
F-statistic: 7.685 on 1 and 5 DF, p-value: 0.03926
Call: lm(formula = er ~ year, data = course14data)
Residuals:
   1     2     3     4     5     6     7
3.1242 0.8736 1.3770 -3.6233 -5.0425 3.3498 2.6952

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -4517.8188 1415.0912 -3.193    0.0242 *
year          2.2506     0.7044   3.195    0.0241 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 3.727 on 5 degrees of freedom
Multiple R-squared: 0.6712,    Adjusted R-squared: 0.6055
F-statistic: 10.21 on 1 and 5 DF,  p-value: 0.02413
Call:
\texttt{lm(formula = er \sim year, data = course15data)}

Residuals:
\begin{tabular}{cccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 \\
0.8631 & 0.2114 & -0.4404 & -1.0329 & -0.9228 & 0.4701 & 0.8514 \\
\end{tabular}

Coefficients:
\begin{verbatim}
              Estimate Std. Error t value  Pr(>|t|) 
(Intercept)  -130.82595   8.2595   333.0638  -3.928   0.0111 * 
year           0.6517     0.1658   3.931   0.0111 * 
\end{verbatim}

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.8773 on 5 degrees of freedom
Multiple R-squared: 0.7556,    Adjusted R-squared: 0.7067
F-statistic: 15.45 on 1 and 5 DF,  p-value: 0.01106

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APPENDIX D: Data for Question #2 – Overall Course Enrollment Trends
Question 2

Call: lm(formula = er ~ year)

Residuals:

1 2 3 4 5 6 7
0.19877 -0.04814 0.03087 -0.09498 -0.38026 -0.02988 0.32363

Coefficients:

             Estimate Std. Error t value Pr(>|t|)
(Intercept) -83.11370   93.31293  -0.891    0.414
year         0.04360    0.04645   0.939    0.391

Residual standard error: 0.2458 on 5 degrees of freedom
Multiple R-squared: 0.1498,    Adjusted R-squared: -0.0202
F-statistic: 0.8812 on 1 and 5 DF,  p-value: 0.391
APPENDIX E: Data for Question #3 – Gender Enrollment Trends in Individual Courses
DATA FOR QUESTION 3

Course 30100 – Accounting
Call: lm(formula = EnrollRate ~ Gender + Year, data = DataCourse1)

Residuals:
  Min     1Q  Median     3Q    Max
-0.02493 -0.01857 -0.01244  0.01244  0.06020

Coefficients:
  Estimate Std. Error t value Pr(>|t|)
(Intercept)  9.007396   7.932360   1.136    0.280
GenderM      0.006594   0.015794   0.418    0.684
Year        -0.004470   0.003948  -1.132    0.282

Residual standard error: 0.02955 on 11 degrees of freedom
Multiple R-squared: 0.1169,    Adjusted R-squared: -0.04368
F-statistic: 0.728 on 2 and 11 DF,  p-value: 0.5048

Course 030500 – Business Math
Call: lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse2)

Residuals:
  Min     1Q  Median     3Q    Max
-0.013125 -0.008032 -0.003475  0.003828  0.029533

Coefficients:
  Estimate Std. Error t value Pr(>|t|)
(Intercept)         8.867056   3.592582   2.468 0.0312 *
  as.factor(Gender)M  0.001660   0.007153   0.232   0.8208
  Year                 -0.004410   0.001788  -2.466 0.0313 *

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 .’ 0.1 ‘ ’ 1

Residual standard error: 0.01338 on 11 degrees of freedom
Multiple R-squared: 0.3581,    Adjusted R-squared: 0.2414
F-statistic: 3.068 on 2 and 11 DF,  p-value: 0.08733
**Course 030600 – Business Communication**

Call: `lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse3)`

Residuals:

```
          Min 1Q Median 3Q Max
-0.0107443 -0.0050968 -0.0009391 0.0013482 0.0186277
```

Coefficients:

```
                                Estimate Std. Error t value Pr(>|t|)
(Intercept)                    4.8595125  2.5763535   1.886   0.0859 .
as.factor(Gender)M  0.0002818  0.0051296   0.055   0.9572
Year                           -0.0024161  0.0012824  -1.884   0.0863 .
```

***

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.009597 on 11 degrees of freedom
Multiple R-squared: 0.2441,   Adjusted R-squared: 0.1067
F-statistic: 1.776 on 2 and 11 DF,  p-value: 0.2145

**Course 030900 – Business Law**

Call: `lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse4)`

Residuals:

```
          Min 1Q Median 3Q Max
-0.016553 -0.011143 -0.004140 0.008504 0.026362
```

Coefficients:

```
                                Estimate Std. Error t value Pr(>|t|)
(Intercept)                    1.5697311  3.9633289   0.396    0.700
as.factor(Gender)M  0.0019451  0.0078911   0.246    0.810
Year                           -0.0007737  0.0019728  -0.392    0.702
```

Residual standard error: 0.01476 on 11 degrees of freedom
Multiple R-squared: 0.01913,   Adjusted R-squared: -0.1592
F-statistic: 0.1073 on 2 and 11 DF,  p-value: 0.8992
Course 031500 – Personal Finance
Call: lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse5)

Residuals:
   Min 1Q Median 3Q Max
-0.0048446 -0.0029499 -0.0004775 0.0019948 0.0075790

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 2.879922  1.121473   2.568   0.0261 *
 as.factor(Gender)M 0.0001397 0.0022329  0.062   0.9516
  Year -0.0014326 0.0005582 -2.566   0.0262 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.004177 on 11 degrees of freedom
Multiple R-squared: 0.3746,  Adjusted R-squared: 0.2609
F-statistic: 3.295 on 2 and 11 DF,  p-value: 0.07563

Course 031700 – Computer Programming
Call: lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse6)

Residuals:
   Min 1Q Median 3Q Max
-0.034194 -0.010774  0.007864 0.011040 0.022945

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 12.54368 5.23696   2.395   0.0355 *
 as.factor(Gender)M 0.006521 0.010427  0.625   0.5444
  Year -0.006232 0.002607 -2.391   0.0358 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.01951 on 11 degrees of freedom
Multiple R-squared: 0.357,  Adjusted R-squared: 0.2401
F-statistic: 3.054 on 2 and 11 DF,  p-value: 0.08814
Course 031800 – Business Economics
Call: lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse7)

Residuals:
    Min      1Q  Median      3Q     Max
-0.0178248 -0.0115847  0.0006423  0.0058099  0.0303839

Coefficients:
                          Estimate Std. Error t value Pr(>|t|)
(Intercept)              13.456983   3.881480   3.467  0.00527 **
as.factor(Gender)M       0.003859   0.007728   0.499  0.62736
Year                     -0.006691   0.001932  -3.463  0.00530 **
---
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.01446 on 11 degrees of freedom
Multiple R-squared: 0.5268, Adjusted R-squared: 0.4407
F-statistic: 6.122 on 2 and 11 DF, p-value: 0.01633

Course 032300 – Introduction to Business
Call: lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse8)

Residuals:
    Min      1Q  Median      3Q     Max
-0.0183333 -0.008245 -0.001922  0.006898  0.030648

Coefficients:
                          Estimate Std. Error t value Pr(>|t|)
(Intercept)              13.166382   3.906131   3.371  0.00624 **
as.factor(Gender)M       0.002686   0.007777   0.345  0.73634
Year                     -0.006549   0.001944  -3.368  0.00627 **
---
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.01455 on 11 degrees of freedom
Multiple R-squared: 0.5104, Adjusted R-squared: 0.4213
F-statistic: 5.733 on 2 and 11 DF, p-value: 0.01969
Course 032800 – Office Procedures
Call: lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse9)

Residuals:
  Min 1Q Median 3Q Max
-0.0049624 -0.0030799 -0.0004943  0.0020912  0.0075299

Coefficients:
  Estimate Std. Error t value Pr(>|t|)
(Intercept) 2.981e+00 1.160e+00 2.571  0.0260 *
as.factor(Gender)M 3.841e-05 2.309e-03 0.017 0.9870
Year -1.483e-03 5.773e-04 -2.569  0.0261 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.00432 on 11 degrees of freedom
Multiple R-squared: 0.375,    Adjusted R-squared: 0.2613
F-statistic: 3.3 on 2 and 11 DF,  p-value: 0.07541

Course 036000 – Computer Applications
Call: lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse10)

Residuals:
  Min 1Q Median 3Q Max
-0.03947 -0.02643 -0.02001  0.03020  0.05402

Coefficients:
  Estimate Std. Error t value Pr(>|t|)
(Intercept) 7.104867  9.994566  0.711  0.492
as.factor(Gender)M 0.006746  0.019900  0.339  0.741
Year  -0.003522  0.004975 -0.708  0.494

Residual standard error: 0.03723 on 11 degrees of freedom
Multiple R-squared: 0.05303,  Adjusted R-squared: -0.1191
F-statistic: 0.308 on 2 and 11 DF,  p-value: 0.741
**Course 033450 – Business (Other)**

Call: `lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse11)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.018150</td>
<td>-0.012397</td>
<td>-0.008819</td>
<td>0.004296</td>
<td>0.055220</td>
</tr>
</tbody>
</table>

Coefficients:

|                     | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------|----------|------------|---------|---------|
| (Intercept)         | 6.191458 | 6.142510   | 1.008   | 0.335   |
| as.factor(Gender)M  | 0.006576 | 0.012230   | 0.538   | 0.602   |
| Year                | -0.003073| 0.003057   | -1.005  | 0.336   |

Residual standard error: 0.02288 on 11 degrees of freedom
Multiple R-squared: 0.1056,   Adjusted R-squared: -0.05697
F-statistic: 0.6496 on 2 and 11 DF,  p-value: 0.5412

**Course 140100 – Career Technical Accounting**

Call: `lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse12)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
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<td>-0.015590</td>
<td>-0.011748</td>
<td>-0.009372</td>
<td>-0.006720</td>
<td>0.072021</td>
</tr>
</tbody>
</table>

Coefficients:

|                     | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------|----------|------------|---------|---------|
| (Intercept)         | 2.213424 | 7.535095   | 0.294   | 0.774   |
| as.factor(Gender)M  | 0.003659 | 0.015003   | 0.244   | 0.812   |
| Year                | -0.001097| 0.003751   | -0.292  | 0.775   |

Residual standard error: 0.02807 on 11 degrees of freedom
Multiple R-squared: 0.01301,   Adjusted R-squared: -0.1664
F-statistic: 0.07251 on 2 and 11 DF,  p-value: 0.9305
### Course 990362 – Employability Skills

Call: `lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse13)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.023712</td>
<td>-0.007584</td>
<td>-0.002352</td>
<td>0.007244</td>
<td>0.034501</td>
</tr>
</tbody>
</table>

Coefficients:

| Estimate | Std. Error | t value | Pr(>|t|) |
|----------|------------|---------|----------|
| (Intercept) | 12.826862  | 4.444516 | 2.886  | 0.0148 * |
| as.factor(Gender)M | 0.002595  | 0.008849 | 0.293  | 0.7748 |
| Year      | -0.006381  | 0.002212 | -2.884 | 0.0149 * |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.01656 on 11 degrees of freedom
Multiple R-squared: 0.4331, Adjusted R-squared: 0.33
F-statistic: 4.202 on 2 and 11 DF, p-value: 0.04408

### Course 140050 – Introduction to Business Administrative Services

Call: `lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse14)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.04795</td>
<td>-0.03871</td>
<td>-0.02317</td>
<td>0.03611</td>
<td>0.10130</td>
</tr>
</tbody>
</table>

Coefficients:

| Estimate | Std. Error | t value | Pr(>|t|) |
|----------|------------|---------|----------|
| (Intercept) | 13.747844  | 14.708953 | 0.935  | 0.370 |
| as.factor(Gender)M | 0.007561  | 0.029286 | 0.258  | 0.801 |
| Year      | -0.006823  | 0.007322 | -0.932 | 0.371 |

Residual standard error: 0.05479 on 11 degrees of freedom
Multiple R-squared: 0.07835, Adjusted R-squared: -0.08922
F-statistic: 0.4676 on 2 and 11 DF, p-value: 0.6384
Course 040805 – Introduction to Marketing

Call: lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = DataCourse15)

Residuals:
   Min     1Q Median     3Q    Max
-0.017833 -0.008455 -0.003309  0.001837  0.040820

Coefficients:
                      Estimate Std. Error t value Pr(>|t|)
(Intercept)         6.652776   4.582536 1.452    0.174
as.factor(Gender)M  0.002577   0.009124 0.282    0.783
Year                 -0.003309   0.002281 -1.451    0.175

Residual standard error: 0.01707 on 11 degrees of freedom
Multiple R-squared: 0.1657,    Adjusted R-squared: 0.01396
F-statistic: 1.092 on 2 and 11 DF,  p-value: 0.3693
APPENDIX F: Data for Question #4 – Overall Gender Course Enrollment Trends
QUESTION 4

Call: lm(formula = EnrollRate ~ as.factor(Gender) + Year, data = RawData)

Residuals:
  Min      1Q  Median      3Q     Max
-0.029737 -0.014094 -0.006620  0.002135  0.128179

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)    7.87127  1.72183  4.571 8.33e-06 ***
as.factor(Gender)M  0.00356  0.00343   1.039      0.3
Year          -0.00391  0.00086 -4.563 8.63e-06 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.02484 on 207 degrees of freedom
Multiple R-squared: 0.09568,  Adjusted R-squared: 0.08694
F-statistic: 10.95 on 2 and 207 DF,  p-value: 3.015e-
APPENDIX G: Data for Question #6 – Individual Course Enrollment Trends by Grade Level
Question 6 – Trends in Enrollment by Grade Level

**Course 03100 -- Accounting**  
Call: `lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = course1data)`

Residuals:  
- Min  1Q  Median  3Q  Max
-7.329e-03 -2.803e-03 -8.797e-05 1.854e-03 8.457e-03

Coefficients:  
| Estimate  | Std. Error | t value | Pr(>|t|) |
|------------|------------|---------|---------|
| (Intercept)| 2.4260133  | 0.7329149| 3.310   | 0.00306 ** |
| as.factor(Grade)2| 0.0157973  | 0.0020637| 7.655  | 9.06e-08 *** |
| as.factor(Grade)3| 0.0384715  | 0.0020637| 18.642 | 2.23e-15 *** |
| as.factor(Grade)4| 0.0515898  | 0.0020637| 24.999 | < 2e-16 *** |
| Year        | -0.0012044 | 0.0003648| -3.301 | 0.00312 ** |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.003861 on 23 degrees of freedom  
Multiple R-squared: 0.9705,  Adjusted R-squared: 0.9654
F-statistic: 189.3 on 4 and 23 DF, p-value: < 2.2e-16

**Course 030500 -- Business Math**  
Call: `lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course2data)`

Residuals:  
- Min  1Q  Median  3Q  Max
-4.659e-03 -1.954e-03 -3.694e-05 1.182e-03 1.314e-02

Coefficients:  
| Estimate  | Std. Error | t value | Pr(>|t|) |
|------------|------------|---------|---------|
| (Intercept)| -2.4857358 | 0.7243253| -3.432  | 0.00228 ** |
| as.factor(Grade)2| 0.0028279  | 0.0020395| 1.387   | 0.17887 |
| as.factor(Grade)3| 0.0100946  | 0.0020395| 4.950   | 5.29e-05 *** |
| as.factor(Grade)4| 0.0188385  | 0.0020395| 9.237   | 3.35e-09 *** |
| Year        | 0.0012406  | 0.0003605| 3.441   | 0.00223 ** |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.003816 on 23 degrees of freedom  
Multiple R-squared: 0.8322,  Adjusted R-squared: 0.803
F-statistic: 28.51 on 4 and 23 DF, p-value: < 2.2e-16
Course 030600 -- Business Communication
Call: lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course3data)

Residuals:
   Min     1Q   Median     3Q    Max
-5.028e-03 -1.668e-03 -7.542e-06 1.769e-03 5.508e-03

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   -3.487e+00  5.610e-01  -6.215  2.43e-06 ***
as.factor(Grade)2 -5.628e-03  1.580e-03  -3.563  0.00165 **
as.factor(Grade)3 -4.362e-05  1.580e-03  -0.028 0.97821
as.factor(Grade)4  4.415e-03  1.580e-03   2.795  0.01029 *
Year          1.743e-03  2.792e-04   6.241  2.29e-06 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.002955 on 23 degrees of freedom
Multiple R-squared: 0.7759, Adjusted R-squared: 0.7369
F-statistic: 19.91 on 4 and 23 DF,  p-value: 3.36e-07

Course 030900 -- Business Law
Call: lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course4data)

Residuals:
   Min     1Q   Median     3Q    Max
-0.0062617 -0.0034710 -0.0001784  0.0024182  0.0074723

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)       3.0292209  0.8084875   3.747  0.00105 **
as.factor(Grade)2  0.0116685  0.0022765  5.126  3.42e-05 ***
as.factor(Grade)3  0.0294865  0.0022765 12.953  4.74e-12 ***
as.factor(Grade)4  0.0398477  0.0022765 17.504  8.65e-15 ***
Year             -0.0015054  0.0004024 -3.741  0.00107 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.004259 on 23 degrees of freedom
Multiple R-squared: 0.9432, Adjusted R-squared: 0.9333
F-statistic: 95.45 on 4 and 23 DF,  p-value: 5.625e-14
Course 031500 -- Personal Finance
Call: lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course5data)

Residuals:
  Min 1Q Median 3Q Max
-0.010416 -0.005375 -0.002179  0.002887  0.025610

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)   -1.268e+01  1.660e+00  -7.639  9.38e-08 ***
as.factor(Grade)2  1.133e-02  4.674e-03   2.424   0.0236 *
as.factor(Grade)3  2.498e-02  4.674e-03   5.345  1.99e-05 ***
as.factor(Grade)4  3.592e-02  4.674e-03   7.684  8.50e-08 ***
Year            6.325e-03  8.262e-04   7.655  9.07e-08 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.008744 on 23 degrees of freedom
Multiple R-squared:  0.8458,  Adjusted R-squared:  0.819
F-statistic: 31.54 on 4 and 23 DF,  p-value: 4.929e-09

Course 031700 -- Computer Programming
Call: lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course6data)

Residuals:
  Min 1Q Median 3Q Max
-1.108e-02 -1.319e-03  4.804e-05  1.911e-03  1.348e-02

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      7.087e+01  1.020e+01   6.947  4.41e-07 ***
as.factor(Grade)2 -0.0105787  0.0028724  -3.683  0.00123 **
as.factor(Grade)3 -0.0155358  0.0028724  -5.409  1.70e-05 ***
as.factor(Grade)4 -0.0106356  0.0028724  -3.703  0.00117 **
Year             -0.0035024  0.0005078  -6.898  4.95e-07 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.005374 on 23 degrees of freedom
Multiple R-squared:  0.774 ,  Adjusted R-squared:  0.7347
F-statistic: 19.7 on 4 and 23 DF,  p-value: 3.692e-07

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Course 031800 -- Business Economics
Call: lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course7data)

Residuals:
  Min     1Q Median     3Q    Max
-1.243e-02 -5.409e-03  3.771e-05 3.944e-03  1.138e-02

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 2.0103420  1.3883120   1.448    0.161
as.factor(Grade)2 0.0042121  0.0039091   1.078    0.292
as.factor(Grade)3 0.0192515  0.0039091   4.925 5.62e-05 ***
as.factor(Grade)4 0.0276601  0.0039091   7.076 3.30e-07 ***
Year        -0.0009939  0.0006910  -1.438    0.164
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.007313 on 23 degrees of freedom
Multiple R-squared: 0.7459,    Adjusted R-squared: 0.7017
F-statistic: 16.88 on 4 and 23 DF,  p-value: 1.377e-06

Course 032300 -- Introduction to Business/General Business
Call: lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course8data)

Residuals:
  Min     1Q Median     3Q    Max
-0.0056040 -0.0021337  0.0001137 0.0018050  0.0089772

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 1.5046098  0.6760720   2.226   0.0361 *
as.factor(Grade)2 -0.0035717  0.0019037  -1.876   0.0734 .
as.factor(Grade)3  0.0016837  0.0019037   0.884   0.3856
as.factor(Grade)4  0.0089881  0.0019037   4.721 9.32e-05 ***
Year        -0.0007237  0.0003365  -2.151   0.0423 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.003561 on 23 degrees of freedom
Multiple R-squared: 0.6886,    Adjusted R-squared: 0.6344
F-statistic: 12.71 on 4 and 23 DF,  p-value: 1.329e-05
**Course 032800 -- Office Procedures**

Call: `lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course9data)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.0062227</td>
<td>-0.0020617</td>
<td>-0.0003646</td>
<td>0.0015514</td>
<td>0.0081133</td>
</tr>
</tbody>
</table>

Coefficients:

| Estimate  | Std. Error | t value | Pr(>|t|) |
|-----------|------------|---------|---------|
| (Intercept) | 1.4180603 | 0.7013707 | 2.022   | 0.054976 . |
| as.factor(Grade)2 | -0.00966222 | 0.0019749 | -4.893 | 6.09e-05 *** |
| as.factor(Grade)3 | -0.0101780 | 0.0019749 | -5.154 | 3.19e-05 *** |
| as.factor(Grade)4 | -0.0082048 | 0.0019749 | -4.155 | 0.000383 *** |
| Year       | -0.0006885 | 0.0003491 | -1.972 | 0.060736 . |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.003695 on 23 degrees of freedom
Multiple R-squared: 0.6265, Adjusted R-squared: 0.5615
F-statistic: 9.643 on 4 and 23 DF, p-value: 9.89e-05

---

**Course 036000 -- Computer Applications**

Call: `lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course10data)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.021123</td>
<td>-0.003825</td>
<td>0.001197</td>
<td>0.004276</td>
<td>0.022254</td>
</tr>
</tbody>
</table>

Coefficients:

| Estimate  | Std. Error | t value | Pr(>|t|) |
|-----------|------------|---------|---------|
| (Intercept) | 9.8735715 | 1.8439692 | 5.355 | 1.94e-05 *** |
| as.factor(Grade)2 | -0.0736711 | 0.0051922 | -14.189 | 7.29e-13 *** |
| as.factor(Grade)3 | -0.1075498 | 0.0051922 | -20.714 | 2.25e-16 *** |
| as.factor(Grade)4 | -0.1132208 | 0.0051922 | -21.806 | < 2e-16 *** |
| Year       | -0.0048283 | 0.0009179 | -5.260 | 2.45e-05 *** |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.009714 on 23 degrees of freedom
Multiple R-squared: 0.9649, Adjusted R-squared: 0.9587
F-statistic: 157.9 on 4 and 23 DF, p-value: 2.288e-16

151
**Course 033450 -- Business Other**
Call: lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course11data)

Residuals:

<table>
<thead>
<tr>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.0070593</td>
<td>-0.0031660</td>
<td>-0.0003576</td>
<td>0.0028686</td>
<td>0.0104375</td>
</tr>
</tbody>
</table>

Coefficients:

| Estimate       | Std. Error | t value | Pr(>|t|) |
|---------------|------------|---------|---------|
| (Intercept)   | -5.6393659 | 0.9412506 | -5.991   | 4.14e-06 ***|
| as.factor(Grade)2 | -0.0048595 | 0.0026503 | -1.834   | 0.0797 .    |
| as.factor(Grade)3 | -0.0057784 | 0.0026503 | -2.180   | 0.0397 *    |
| as.factor(Grade)4 | 0.0026300   | 0.0026503 | 0.992    | 0.3314      |
| Year          | 0.0028256   | 0.0004685 | 6.031    | 3.77e-06 ***|

---
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.004958 on 23 degrees of freedom
Multiple R-squared: 0.685, Adjusted R-squared: 0.6302
F-statistic: 12.5 on 4 and 23 DF, p-value: 1.511e-05

**Course 140100 -- Career Technical Accounting**
Call: lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course12data)

Residuals:

<table>
<thead>
<tr>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.0065742</td>
<td>-0.0028592</td>
<td>-0.0001072</td>
<td>0.0028608</td>
<td>0.0047697</td>
</tr>
</tbody>
</table>

Coefficients:

| Estimate       | Std. Error | t value | Pr(>|t|) |
|---------------|------------|---------|---------|
| (Intercept)   | 2.172368   | 0.642959 | 3.379   | 0.00259 **|
| as.factor(Grade)2 | 0.004343  | 0.001810 | 2.399   | 0.02495 *  |
| as.factor(Grade)3 | 0.015602  | 0.001810 | 8.618   | 1.17e-08 ***|
| as.factor(Grade)4 | 0.017829  | 0.001810 | 9.848   | 1.02e-09 ***|
| Year          | -0.001080  | 0.000320 | -3.376  | 0.00261 ** |

---
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.003958 on 23 degrees of freedom
Multiple R-squared: 0.8653, Adjusted R-squared: 0.8419
F-statistic: 36.93 on 4 and 23 DF, p-value: 1.065e-05

152
**Course 990362 -- Employability Skills**

Call: `lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course13data)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-3.772e-02</td>
<td>-1.687e-02</td>
<td>-1.042e-05</td>
<td>1.002e-02</td>
<td>1.107e-01</td>
</tr>
</tbody>
</table>

Coefficients:

|                           | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------------|----------|------------|---------|----------|
| (Intercept)               | 14.009361| 5.614128   | 2.495   | 0.0202 * |
| as.factor(Grade)2         | -0.007667| 0.015808   | -0.485  | 0.6322   |
| as.factor(Grade)3         | 0.083759 | 0.015808   | 5.298   | 2.23e-05 *** |
| as.factor(Grade)4         | 0.078778 | 0.015808   | 4.983   | 4.86e-05 *** |
| Year                      | -0.006960| 0.002794   | -2.491  | 0.0204 * |

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.02957 on 23 degrees of freedom
Multiple R-squared: 0.7371,   Adjusted R-squared: 0.6914
F-statistic: 16.13 on 4 and 23 DF,  p-value: 2.011e-06

**Course 1400500 -- Business Foundations**

Call: `lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Course14data)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.08582</td>
<td>-0.02954</td>
<td>-0.01338</td>
<td>0.02742</td>
<td>0.12997</td>
</tr>
</tbody>
</table>

Coefficients:

|                           | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------------|----------|------------|---------|----------|
| (Intercept)               | -43.44793| 10.04505   | -4.325  | 0.000250 *** |
| as.factor(Grade)2         | -0.03739 | 0.02828    | -1.322  | 0.199186 |
| as.factor(Grade)3         | -0.05674 | 0.02828    | -2.006  | 0.056751 |
| as.factor(Grade)4         | -0.05899 | 0.02828    | -2.085  | 0.048319 * |
| Year                      | 0.02166  | 0.00500    | 4.333   | 0.000246 *** |

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.05292 on 23 degrees of freedom
Multiple R-squared: 0.5144,   Adjusted R-squared: 0.4299
F-statistic: 6.09 on 4 and 23 DF,  p-value: 0.001708
**Course 040805 -- Introduction To Marketing**

Call: `lm(formula = EnrollRate ~ as.factor(Grad) + Year, data = Course15data)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>-1.573e-02</td>
<td>-6.816e-03</td>
<td>-4.360e-05</td>
<td>4.700e-03</td>
<td>2.120e-02</td>
</tr>
</tbody>
</table>

Coefficients:

|                     | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------|----------|------------|---------|---------|
| (Intercept)         | -1.307e+01 | 1.811e+00  | -7.221  | 2.38e-07 *** |
| as.factor(Grade)2   | 7.356e-03  | 5.098e-03  | 1.443   | 0.163   |
| as.factor(Grade)3   | 3.013e-03  | 5.098e-03  | 0.591   | 0.560   |
| as.factor(Grade)4   | -6.687e-04 | 5.098e-03  | -0.131  | 0.897   |
| Year                | 6.512e-03  | 9.013e-04  | 7.225   | 2.35e-07 *** |

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.009538 on 23 degrees of freedom
Multiple R-squared: 0.7062,  Adjusted R-squared: 0.6551
F-statistic: 13.82 on 4 and 23 DF,  p-value: 6.955e-06
APPENDIX H: Question #7 – Trends in Overall Enrollment by Grade Level
Question 7 – Overall Trends in Enrollment by Grade Level

Call: lm(formula = EnrollRate ~ as.factor(Grade) + Year, data = Q6data)

Residuals:

Min 1Q Median 3Q Max
-0.0051843 -0.0025870 0.0001924 0.0015852 0.0076608

Coefficients:

                  Estimate Std. Error t value Pr(>|t|)
(Intercept)     -8.043e-01  6.087e-01  -1.321   0.19938
as.factor(Grade)2 -9.617e-03  1.714e-03  -5.611    1.04e-05 ***
as.factor(Grade)3 -5.590e-03  1.714e-03  -3.261    0.00344 **
as.factor(Grade)4 -7.182e-05  1.714e-03  -0.042    0.96694
Year               4.246e-04  3.030e-04   1.401   0.17449

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.003206 on 23 degrees of freedom
Multiple R-squared: 0.669, Adjusted R-squared: 0.6114
F-statistic: 11.62 on 4 and 23 DF, p-value: 2.618e-05
APPENDIX I: Question 8 – Trends in Course Enrollment by JobsOhio Network Regions
Question 8 -- Individual Region

**Course 30100 -- Accounting**

Call: lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse1)

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.0078419</td>
<td>-0.0020913</td>
<td>-0.0001112</td>
<td>0.0021328</td>
<td>0.0107582</td>
<td></td>
</tr>
</tbody>
</table>

Coefficients:

| Estimate        | Std. Error | t value | Pr(>|t|)   |
|-----------------|------------|---------|------------|
| (Intercept)     | 2.0010465  | 0.6050122 | 3.307      | 0.00219 ** |
| as.factor(Region)2 | 0.0029204 | 0.0020864 | 1.400      | 0.17040    |
| as.factor(Region)3 | 0.0092271 | 0.0020864 | 4.422      | 9.05e-05 *** |
| as.factor(Region)4 | 0.0134961 | 0.0020864 | 6.469      | 1.87e-07 *** |
| as.factor(Region)5 | 0.0052082 | 0.0020864 | 2.496      | 0.01741 *  |
| as.factor(Region)6 | 0.0016274 | 0.0020864 | -0.780     | 0.44063    |
| Year            | -0.0009820 | 0.0003012 | -3.261     | 0.00248 ** |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.003903 on 35 degrees of freedom
Multiple R-squared: 0.7099, Adjusted R-squared: 0.6601
F-statistic: 14.27 on 6 and 35 DF, p-value: 3.743e-08

**Course 30500 – Business Math**

Call: lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse2)

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.0216139</td>
<td>-0.0024129</td>
<td>-0.0007102</td>
<td>0.0031452</td>
<td>0.0179281</td>
<td></td>
</tr>
</tbody>
</table>

Coefficients:

| Estimate        | Std. Error | t value | Pr(>|t|)   |
|-----------------|------------|---------|------------|
| (Intercept)     | -1.6094070 | 1.2431052 | -1.295     | 0.203912   |
| as.factor(Region)2 | -0.0062408 | 0.0042869 | -1.456     | 0.154369   |
| as.factor(Region)3 | -0.0014560 | 0.0042869 | -0.340     | 0.736167   |
| as.factor(Region)4 | 0.0082349 | 0.0042869 | 1.921      | 0.062915   |
| as.factor(Region)5 | -0.0067121 | 0.0042869 | -1.566     | 0.126417   |
| as.factor(Region)6 | 0.0187568 | 0.0042869 | 4.375      | 0.000104 *** |
| Year            | 0.0008084  | 0.0006188 | 1.306      | 0.199910   |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.00802 on 35 degrees of freedom
Multiple R-squared: 0.6062, Adjusted R-squared: 0.5387
F-statistic: 8.979 on 6 and 35 DF, p-value: 5.88e-06
### Course 30600 – Business Communication

Call: `lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse3)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.016563</td>
<td>-0.003426</td>
<td>-0.001129</td>
<td>0.002215</td>
<td>0.028851</td>
</tr>
</tbody>
</table>

Coefficients:

| Estimate | Std. Error | t value | Pr(>|t|) |
|----------|------------|---------|---------|
| (Intercept) | -3.2197818 | 1.2932185 | -2.490  0.01768 * |
| as.factor(Region)2 | -0.0056823 | 0.0044598 | -1.274  0.21102 |
| as.factor(Region)3 | 0.0006952 | 0.0044598 | 0.156  0.87702 |
| as.factor(Region)4 | 0.0153250 | 0.0044598 | 3.436  0.00154 ** |
| as.factor(Region)5 | 0.0030275 | 0.0044598 | 0.679  0.50170 |
| as.factor(Region)6 | 0.0003532 | 0.0044598 | 0.079  0.93732 |
| Year | 0.0016092 | 0.0006437 | 2.500  0.01726 * |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.008343 on 35 degrees of freedom
Multiple R-squared: 0.4692, Adjusted R-squared: 0.3782
F-statistic: 5.157 on 6 and 35 DF, p-value: 0.0006883

### Course 30900 – Business Law

Call: `lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse4)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.0062528</td>
<td>-0.0027982</td>
<td>-0.0005052</td>
<td>0.0018454</td>
<td>0.0111927</td>
</tr>
</tbody>
</table>

Coefficients:

| Estimate | Std. Error | t value | Pr(>|t|) |
|----------|------------|---------|---------|
| (Intercept) | 2.1685364 | 0.5933208 | 3.655  0.000836 *** |
| as.factor(Region)2 | -0.0053172 | 0.0020461 | -2.599  0.013605 * |
| as.factor(Region)3 | -0.0163314 | 0.0020461 | -7.982  2.17e-09 *** |
| as.factor(Region)4 | -0.0003744 | 0.0020461 | -0.183  0.855876 |
| as.factor(Region)5 | 0.0021799 | 0.0020461 | 1.065  0.293987 |
| as.factor(Region)6 | -0.0101225 | 0.0020461 | -4.947  1.88e-05 *** |
| Year | -0.0010652 | 0.0002953 | -3.607  0.000957 *** |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.003828 on 35 degrees of freedom
Multiple R-squared: 0.7609, Adjusted R-squared: 0.72
F-statistic: 18.57 on 6 and 35 DF, p-value: 1.437e-09
**Course 31500 – Personal Finance**

Call: `lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse5)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.015198</td>
<td>-0.006470</td>
<td>-0.001519</td>
<td>0.003298</td>
<td>0.026636</td>
</tr>
</tbody>
</table>

Coefficients:

|                     | Estimate  | Std. Error | t value | Pr(>|t|) |
|---------------------|-----------|------------|---------|---------|
| (Intercept)         | -1.422e+01| 1.698e+00  | -8.379  | 6.99e-10*** |
| as.factor(Region)2  | 8.752e-03 | 5.855e-03  | -1.495  | 0.1439  |
| as.factor(Region)3  | 3.484e-03 | 5.855e-03  | 0.595   | 0.5556  |
| as.factor(Region)4  | 3.582e-03 | 5.855e-03  | 0.612   | 0.5446  |
| as.factor(Region)5  | 1.307e-03 | 5.855e-03  | 0.223   | 0.8246  |
| as.factor(Region)6  | 1.519e-02 | 5.855e-03  | 2.594   | 0.0138  * |
| Year                | 7.102e-03 | 8.451e-04  | 8.404   | 6.51e-10*** |

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.01095 on 35 degrees of freedom
Multiple R-squared: 0.7154, Adjusted R-squared: 0.6666
F-statistic: 14.66 on 6 and 35 DF, p-value: 2.711e-08

**Course 31700 – Computer Programming**

Call: `lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse6)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.0172865</td>
<td>-0.0040305</td>
<td>-0.0006664</td>
<td>0.0056558</td>
<td>0.0127910</td>
</tr>
</tbody>
</table>

Coefficients:

|                     | Estimate  | Std. Error | t value | Pr(>|t|) |
|---------------------|-----------|------------|---------|---------|
| (Intercept)         | 7.3158624 | 1.1827600  | 6.185   | 4.40e-07 *** |
| as.factor(Region)2  | 0.0083898 | 0.0040788  | 2.057   | 0.047208 * |
| as.factor(Region)3  | 0.0003831 | 0.0040788  | 0.094   | 0.925696 |
| as.factor(Region)4  | 0.0070316 | 0.0040788  | 1.724   | 0.093548 . |
| as.factor(Region)5  | 0.0174595 | 0.0040788  | 4.281   | 0.000138 *** |
| as.factor(Region)6  | 0.0075922 | 0.0040788  | 1.861   | 0.071108 . |
| Year                | -0.0036241 | 0.0005887  | -6.156  | 4.82e-07 *** |

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.007631 on 35 degrees of freedom
Multiple R-squared: 0.6408, Adjusted R-squared: 0.5793
F-statistic: 10.41 on 6 and 35 DF, p-value: 1.299e-06

160
**Course 31800 – Business Economics**

Call: `lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse7)`

Residuals:

<table>
<thead>
<tr>
<th></th>
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Coefficients:

|                     | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------|----------|------------|---------|----------|
| (Intercept)         | 2.0186928| 0.9692296  | 2.083   | 0.0446 * |
| as.factor(Region)2  | -0.0089131| 0.0033425  | -2.667  | 0.0115 * |
| as.factor(Region)3  | -0.0073111| 0.0033425  | -2.187  | 0.0355 * |
| as.factor(Region)4  | -0.0043137| 0.0033425  | -1.291  | 0.2053   |
| as.factor(Region)5  | -0.0229557| 0.0033425  | -6.868  | 5.66e-08 *** |
| as.factor(Region)6  | 0.0074658 | 0.0033425  | 2.234   | 0.0320 * |
| Year                | -0.0009887| 0.0004824  | -2.049  | 0.0480 * |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.006253 on 35 degrees of freedom
Multiple R-squared: 0.7347, Adjusted R-squared: 0.6892
F-statistic: 16.15 on 6 and 35 DF, p-value: 8.351e-09

---

**Course 32300 – General Business**

Call: `lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse8)`

Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
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Coefficients:

|                     | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------|----------|------------|---------|----------|
| (Intercept)         | 0.8025848| 0.8823152  | 0.910   | 0.369237 |
| as.factor(Region)2  | 0.0092459| 0.0030427  | 3.039   | 0.004473 ** |
| as.factor(Region)3  | 0.0012712| 0.0030427  | 0.418   | 0.678658 |
| as.factor(Region)4  | 0.0218145| 0.0030427  | 7.169   | 2.31e-08 *** |
| as.factor(Region)5  | 0.0127377| 0.0030427  | 4.186   | 0.000182 *** |
| as.factor(Region)6  | 0.0124733| 0.0030427  | 4.099   | 0.000234 *** |
| Year                | -0.0003779| 0.0004392  | -0.860  | 0.395375 |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.005692 on 35 degrees of freedom
Multiple R-squared: 0.6723, Adjusted R-squared: 0.6161
F-statistic: 11.97 on 6 and 35 DF, p-value: 2.853e-07
Course 32800 – Office Procedures
Call: lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse9)
Residuals:
   Min     1Q Median     3Q    Max
-0.016579 -0.004666 -0.001294  0.005063  0.017951

Coefficients:
            Estimate  Std. Error t value  Pr(>|t|)
(Intercept)      0.4391281  1.4088467   0.312    0.75712
as.factor(Region)2  0.0038711  0.0048585   0.797    0.43096
as.factor(Region)3  0.0043957  0.0048585   0.905    0.37179
as.factor(Region)4  0.0247556  0.0048585   5.095  1.20e-05 ***
as.factor(Region)5  0.0050245  0.0048585   1.034    0.30815
as.factor(Region)6  0.0168244  0.0048585   3.463  0.00143 **
Year              -0.0002081  0.0007013  -0.297    0.76838
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.009089 on 35 degrees of freedom
Multiple R-squared: 0.524,    Adjusted R-squared: 0.4424
F-statistic: 6.421 on 6 and 35 DF,  p-value: 0.0001247

Course 36000 – Computer Applications
Call: lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse10)
Residuals:
   Min     1Q Median     3Q    Max
-0.016902 -0.004178  0.001417  0.004349  0.011765

Coefficients:
            Estimate  Std. Error t value  Pr(>|t|)
(Intercept)      10.1074461  1.1802463  8.564 4.15e-10 ***
as.factor(Region)2  0.0008623  0.0040702   0.212    0.833446
as.factor(Region)3  0.0011194  0.0040702   0.275    0.784908
as.factor(Region)4 -0.0070199  0.0040702  -1.725    0.093398 .
as.factor(Region)5  0.0274347  0.0040702   6.740  8.28e-08 ***
as.factor(Region)6 -0.0167069  0.0040702  -4.105  0.000230 ***
Year              -0.0049812  0.0005875  -8.479  5.27e-13 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.007615 on 35 degrees of freedom
Multiple R-squared: 0.8523,    Adjusted R-squared: 0.827
F-statistic: 33.67 on 6 and 35 DF,  p-value: 3.879e-13
Course 33450 – Business (Other)
Call: lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse11)
Residuals:

   Min 1Q Median 3Q Max
-0.021518 -0.003671  0.001045  0.004385  0.016233

Coefficients:

            Estimate Std. Error t value Pr(>|t|)
(Intercept)  -5.8811461  1.3006110  -4.522  6.74e-05 ***
  as.factor(Region)2 -0.0088600  0.0044853  -1.975   0.0562 .
  as.factor(Region)3  0.0049650  0.0044853   1.107   0.2759
  as.factor(Region)4  0.0063821  0.0044853   1.423   0.1636
  as.factor(Region)5 -0.0027762  0.0044853  -0.619   0.5399
  as.factor(Region)6  0.0282008  0.0044853  6.287  3.23e-07 ***
Year          0.0029441  0.0006474   4.548  6.24e-05 ***

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.008391 on 35 degrees of freedom
Multiple R-squared: 0.7444,  Adjusted R-squared: 0.7005
F-statistic: 16.98 on 6 and 35 DF,  p-value: 4.462e-09

Course 140100 – Career Technical Accounting
Call: lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse12)
Residuals:

   Min 1Q Median 3Q Max
-0.009732 -0.002369 -0.001125  0.002473  0.015546

Coefficients:

            Estimate Std. Error t value Pr(>|t|)
(Intercept)         1.3517269  0.7408823   1.824  0.076625 .
  as.factor(Region)2 -0.0091828  0.0025550  -3.594  0.000992 ***
  as.factor(Region)3 -0.0155203  0.0025550  -6.075  6.16e-07 ***
  as.factor(Region)4  0.0022344  0.0025550   0.875  0.387788
  as.factor(Region)5 -0.0162305  0.0025550  -6.352 2.66e-07 ***
  as.factor(Region)6 -0.0169479  0.0025550  -6.633  1.14e-07 ***
Year               -0.0006639  0.0003688  -1.800  0.080460 .

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.00478 on 35 degrees of freedom
Multiple R-squared: 0.7667,  Adjusted R-squared: 0.7267
F-statistic: 19.17 on 6 and 35 DF,  p-value: 9.541e-09
**Course 990362 – Employability Skills**

Call: `lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse13)`

Residuals:

<table>
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<tr>
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<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
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Coefficients:

|                     | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------|----------|------------|---------|----------|
| (Intercept)         | 12.855806| 4.059566   | 3.167   | 0.00319 ** |
| as.factor(Region)2  | 0.043397 | 0.014000   | 3.100   | 0.00381 ** |
| as.factor(Region)3  | 0.110090 | 0.014000   | 7.864   | 3.04e-09 *** |
| as.factor(Region)4  | 0.082042 | 0.014000   | 5.860   | 1.18e-06 *** |
| as.factor(Region)5  | 0.094530 | 0.014000   | 6.752   | 7.99e-08 *** |
| as.factor(Region)6  | -0.008463| 0.014000   | -0.604  | 0.54942   |
| Year                | -0.006380| 0.002021   | -3.157  | 0.00327 ** |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.02619 on 35 degrees of freedom
Multiple R-squared: 0.7972, Adjusted R-squared: 0.7624
F-statistic: 22.93 on 6 and 35 DF, p-value: 8.823e-11

**Course 140050 – Introduction to Business and Administrative Services**

Call: `lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse14)`

Residuals:

<table>
<thead>
<tr>
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Coefficients:

|                     | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------|----------|------------|---------|----------|
| (Intercept)         | -45.591415| 6.276034   | -7.264  | 1.75e-08 *** |
| as.factor(Region)2  | -0.026293 | 0.021643   | -1.215  | 0.233    |
| as.factor(Region)3  | -0.008441 | 0.021643   | -0.390  | 0.699    |
| as.factor(Region)4  | -0.023912 | 0.021643   | -1.105  | 0.277    |
| as.factor(Region)5  | -0.033830 | 0.021643   | -1.563  | 0.127    |
| as.factor(Region)6  | -0.019981 | 0.021643   | -0.923  | 0.362    |
| Year                | 0.022721  | 0.003124   | 7.273   | 1.70e-08 *** |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.04049 on 35 degrees of freedom
Multiple R-squared: 0.6162, Adjusted R-squared: 0.5504
F-statistic: 9.365 on 6 and 35 DF, p-value: 3.863e-06
Course 40805 – Introduction to Marketing

Call: lm(formula = EnrollRate ~ as.factor(Region) + Year, data = DataCourse15)

Residuals:
   Min     1Q Median     3Q    Max
-0.0177780 -0.0075788 -0.0002449  0.0060039  0.0253246

Coefficients:
                       Estimate Std. Error t value Pr(>|t|)
(Intercept)              -1.205e+01  1.683e+00 -7.163 2.36e-08 ***
as.factor(Region)2 -3.390e-03  5.804e-03  -0.584  0.5629
as.factor(Region)3 -1.044e-02  5.804e-03  -1.799   0.0807 .
as.factor(Region)4  9.707e-04  5.804e-03   0.167   0.8681
as.factor(Region)5  1.893e-03  5.804e-03   0.326   0.7462
as.factor(Region)6  1.316e-03  5.804e-03   0.227   0.8219
Year                   6.006e-03  8.377e-04   7.170 2.31e-08 ***
---
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.01086 on 35 degrees of freedom
Multiple R-squared: 0.6237,    Adjusted R-squared: 0.5592
F-statistic: 9.669 on 6 and 35 DF,  p-value: 2.793e-06
APPENDIX J: Question 9 – Trends in Overall Region Enrollment in Business Education
Question 9 – Trends in Overall Region Enrollment in Business Education

Call: lm(formula = EnrollRate ~ as.factor(Region) + Year, data = Q8data)

Residuals:

<p>| | | | | |</p>
<table>
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</table>

Coefficients:

|                     | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------|----------|------------|---------|---------|
| (Intercept)         | -1.1394629 | 0.5924184  | -1.923  | 0.06259 |
| as.factor(Region)2  | -0.0003983 | 0.0020430  | -0.195  | 0.84654 |
| as.factor(Region)3  | 0.0037327  | 0.0020430  | 1.827   | 0.07622 |
| as.factor(Region)4  | 0.0068356  | 0.0020430  | 3.346   | 0.00197 **|
| as.factor(Region)5  | 0.0070345  | 0.0020430  | 3.443   | 0.00151 **|
| as.factor(Region)6  | 0.0067989  | 0.0020430  | 3.328   | 0.00207 **|
| Year                | 0.0005882  | 0.0002949  | 1.995   | 0.05392 |

---

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.003822 on 35 degrees of freedom
Multiple R-squared: 0.4851,    Adjusted R-squared: 0.3968
F-statistic: 5.495 on 6 and 35 DF,  p-value: 0.0004297
APPENDIX K: Question 10 – Do correlations exist between increased graduation requirements and enrollment in the fifteen different business education courses?
"Model 10" output

```
EnrollRate ~ as.factor(Change) + as.factor(Course) + as.factor(Region),
data = RealData10
```

Coefficients:

| Term                      | Estimate | Std. Error | t value | Pr(>|t|) |
|---------------------------|----------|------------|---------|----------|
| (Intercept)               | 1.8530   | 0.4391     | 4.220   | 2.82e-05 *** |
| as.factor(Change)1        | 1.6184   | 0.2794     | 5.792   | 1.12e-08 *** |
| as.factor(Course)30500    | -1.3335  | 0.5356     | -2.490  | 0.013045 *   |
| as.factor(Course)30600    | -1.4756  | 0.5356     | -2.755  | 0.006041 **   |
| as.factor(Course)30900    | -0.7896  | 0.5356     | -1.474  | 0.140914     |
| as.factor(Course)31500    | 1.7346   | 0.5356     | 3.239   | 0.001266 **   |
| as.factor(Course)31700    | 1.8468   | 0.5356     | 3.448   | 0.000603 ***   |
| as.factor(Course)31800    | -0.5180  | 0.5356     | -0.967  | 0.333886      |
| as.factor(Course)32300    | 2.4674   | 0.5356     | 4.607   | 4.98e-06 ***   |
| as.factor(Course)32800    | 0.2308   | 0.5356     | 0.431   | 0.66647       |
| as.factor(Course)33450    | 1.2470   | 0.5356     | 2.328   | 0.020221 *     |
| as.factor(Course)36000    | 7.7360   | 0.5356     | 14.444  | < 2e-16 ***   |
| as.factor(Course)40805    | -0.8736  | 0.5356     | -1.631  | 0.103376      |
| as.factor(Course)140050   | 1.3155   | 0.5356     | 2.456   | 0.014320 *     |
| as.factor(Course)140100   | -1.9544  | 0.5356     | -3.649  | 0.000286 ***   |
| as.factor(Course)990362   | 0.7008   | 0.5356     | 1.308   | 0.191230      |
| as.factor(Region)2        | -0.4130  | 0.3387     | -1.219  | 0.223270       |
| as.factor(Region)3        | 0.2454   | 0.3387     | 0.724   | 0.469114       |
| as.factor(Region)4        | 1.0589   | 0.3387     | 3.126   | 0.001856 **    |
| as.factor(Region)5        | 0.3478   | 0.3387     | 1.027   | 0.304991       |
| as.factor(Region)6        | 0.6639   | 0.3387     | 1.960   | 0.050463 .     |

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.454 on 609 degrees of freedom
Multiple R-squared: 0.4978,  Adjusted R-squared: 0.4813
F-statistic: 30.18 on 20 and 609 DF,  p-value: < 2.2e-16
"Model 9" output

EnrollRate ~ as.factor(Change) + as.factor(Course) +
   as.factor(Region),
data = RealData9

Coefficients:              Estimate Std. Error t value Pr(>|t|)
(Intercept)              -0.067223   0.799659  -0.084 0.933033
as.factor(Change)1       1.691500   0.391911   4.316 1.85e-05 ***
as.factor(Course)30500    0.089633   0.089633   0.969728 -0.007 0.994101
as.factor(Course)30600    0.998652   0.998652   1.030 0.303500
as.factor(Course)30900   -0.181903   0.998652   1.030 0.303500
as.factor(Course)31500   2.203517   0.998652   2.203517 0.023416 *
as.factor(Course)31700   4.328510   0.998652   4.328510 9.60e-07 ***
as.factor(Course)31800   1.016524   0.998652   1.016524 0.294936
as.factor(Course)32300   4.810569   0.998652   4.810569 9.60e-07 ***
as.factor(Course)32800   3.229139   0.998652   3.229139 0.000921 ***
as.factor(Course)33450   3.652556   0.998652   3.652556 0.000182 ***
as.factor(Course)36000  16.625391   0.998652  16.625391 < 2e-16 ***
as.factor(Course)40805 -0.006553   0.998652  -0.006553 0.994610
as.factor(Course)140050  6.778076   0.998652   6.778076 7.26e-07 ***
as.factor(Course)140100 -0.510528   0.998652  -0.510528 0.598757
as.factor(Course)990362  1.815221   0.998652   1.815221 0.061702 .
as.factor(Region)2    -0.430219   0.613310  -0.701 0.483368
as.factor(Region)3     0.052263   0.613310   0.085 0.932119
as.factor(Region)4    1.004222   0.613310   1.637 0.102068
as.factor(Region)5    0.194811   0.613310   0.318 0.750868
as.factor(Region)6    0.382387   0.613310   0.623 0.533202
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 4.444 on 609 degrees of freedom
Multiple R-squared: 0.4908,   Adjusted R-squared: 0.4741
F-statistic: 29.35 on 20 and 609 DF,  p-value: < 2.2e-16
"Model 1" output

EnrollRate ~ as.factor(Change) + as.factor(Course) + as.factor(Grade) + as.factor(Region),
data = RealData

Coefficients:     Estimate Std. Error t value Pr(>|t|)
(Intercept)        2.5644     0.3544  7.237 6.08e-13 ***
as.factor(Change)1  1.6641     0.2532   6.573 5.97e-11 ***
as.factor(Course)30500 -1.6341     0.3962  -4.125 3.83e-05 ***
as.factor(Course)30600 -1.8531     0.3962  -4.677 3.06e-06 ***
as.factor(Course)30900 -1.0368     0.3962  -2.617  0.008926 **
as.factor(Course)31500  1.2469     0.3962   3.147  0.001667 **
as.factor(Course)31700  0.7936     0.3962   2.003  0.045273 *
as.factor(Course)31800 -0.6979     0.3962  -1.762  0.078261 .
as.factor(Course)32300  1.9234     0.3962   4.855  1.28e-06 ***
as.factor(Course)32800 -0.3727     0.3962  -0.941  0.346954
as.factor(Course)33450  0.4525     0.3962   1.142  0.253520
as.factor(Course)36000  6.5896     0.3962  16.633  < 2e-16 ***
as.factor(Course)40805 -2.4062     0.3962  -6.074  1.44e-09 ***
as.factor(Course)140050  0.1627     0.3962   0.411  0.681368
as.factor(Course)140100 -2.4476     0.3962  -6.178  7.56e-10 ***
as.factor(Course)990362  3.9742     0.3962  10.031  < 2e-16 ***
as.factor(Grade)10 -0.2785     0.2078  -1.341  0.180191
as.factor(Grade)11  0.7254     0.2170   3.343  0.000842 ***
as.factor(Grade)12  1.0872     0.2170   5.010  5.82e-07 ***
as.factor(Region)2 -0.2507     0.2506  -1.000  0.317184
as.factor(Region)3  0.2229     0.2506   0.890  0.373727
as.factor(Region)4  0.9787     0.2506   3.906  9.64e-05 ***
as.factor(Region)5  0.3446     0.2506   1.375  0.169108
as.factor(Region)6  0.2270     0.2506   0.906  0.365106
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 3.631 on 2496 degrees of freedom
Multiple R-squared: 0.3184,  Adjusted R-squared: 0.3121
F-statistic: 50.69 on 23 and 2496 DF,  p-value: < 2.2e-16