

## ABSTRACT

Title of Dissertation: A CUNNING HAND AND A CULTURED MIND:  
AN EXAMINATION OF HIGH SCHOOL GRADUATES  
WHO COMPLETED AN INTEGRATED TECHNICAL AND  
ACADEMIC PROGRAM

Kelly V. Cockrum, Doctor of Philosophy, 2004

Dissertation directed by: Dr. Dennis R. Herschbach  
Department of Education Policy  
and Leadership

The problem of this study was to compare selected characteristics of students who completed an integrated curriculum of technical and academic studies with students who completed either an academic, a technical, or a general curriculum. The researcher analyzed changes in participation, select demographics, academic achievement and post-secondary plans of students in the integrated curriculum against the other three curricula. The changes were measured across a seven-year time frame—1993 to 2000. The results were:

1. The integrated curriculum had the greatest percentage increase of students of the four curriculum categories from 1993 to 2000.
2. When considering change across the time, the integrated curriculum had the greatest percentage increase for both genders, in four out of the five ethnic divisions, and for students participating in English Speakers of Other Languages (ESOL) programs. For students participating in

the Free or Reduced Price Meals (FARMS) program, the integrated curriculum had the second greatest percentage increase.

3. Findings from statistical analysis revealed that when Grade Point Average (GPA), Academic Grade Point Average (AGPA), and SAT scores were used as benchmarks, students in an integrated curriculum were academically competitive with students from the academic curriculum. This holds true across the selected demographic categories.
4. Students in the integrated curriculum are planning to attend post-secondary institutions in increasing numbers and the numbers are comparable to students in the academic curriculum.

A summary of recommendations included: (a) efforts should be directed at determining the present attitudes and perceptions held by educators, parents, and students toward technical education; (b) additional research studies should be conducted on the particular type of technical programs completed by students in an integrated program; (c) additional research studies should be conducted to determine why all students, but ESOL or FARMS participants in particular, continue to stay in the general or technical curriculum; and (d) additional research studies should be conducted to determine why high-level students are taking the integrated curriculum.

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by

Kelly V. Cockrum

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Advisory Committee:

Professor Dennis Herschbach, Chairperson/Advisor  
Professor Gilbert R. Austin  
Professor Charles Beatty  
Professor Albert Gardener  
Professor Thomas Weible

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## DEDICATION

This study is dedicated to Cindy, Emily, Hailey, Nathan, and Matthew, my loving wife and children. Your support, patience, and encouragement made the completion of this study possible. Your unconditional love makes me possible.

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## CHAPTER I

### INTRODUCTION TO THE STUDY

Hail to the skillful cunning hand!

Hail to the cultured mind!

Contending for the World's command,

Here let them be combined.

These words, written by Calvin M. Woodward, were inscribed over the entrance of America's first manual training school, which opened in Saint Louis in 1880. Manual training, as intended by Woodward, incorporated academic courses with drafting and manual tool exercises in wood and metal working. This integration of practical and intellectual work was intended to round out the educational experience of the student by fully developing the mind. Like the majority of educators of his day, Woodward believed in the concept of mental discipline. The mind was thought to be made up of different faculties that could be developed through rigorous intellectual work. Woodward believed that academic instruction developed only certain faculties of the mind; however, the other parts would be reached through manual training. An educational program which combined manual exercises with academics was a "means of more completely and efficaciously educating the brain" (Woodward, 1887, p. 205).

Although manual training gained wide popularity and acceptance in the latter part of the 1800s, it lost its appeal at the beginning of the 1900s. One reason was that the theories of faculty psychology that supported manual training were replaced by

behaviorist psychology. Whereas proponents of manual training believed education should be more general, the new theorists suggested that instruction should be specific with specific outcomes. Secondly, the rise of scientific management in industry influenced educational thought. There was greater emphasis on the teaching of science and mathematics, and manual training became less relevant. Finally, educators wanted vocational training, i.e., specific training for certain occupations. Society was facing massive immigration, industrialization, and urbanization, and more definitive training would allow students to directly enter specific jobs and, consequently, make positive contributions to society (Herschbach, McPherson, & Latimer, 1982).

The move to incorporate an industrial or vocational-oriented education to enhance the common school curriculum was embraced by educators, politicians, and industrial leaders. A coalition of proponents came to dominate public discussion and eventually helped pass the first federal legislation for secondary schools, the Smith-Hughes Act of 1917. This legislation validated vocational education as an integral part of the American educational system.

The Smith-Hughes Act of 1917 was instrumental in the development of a second path in the nation's schools in the hope of attracting and retaining youth who formerly would not have advanced very far in the public schools. Whereas the traditional liberal education assured students had an adequate academic background to enter universities, vocational education prepared students to enter occupations.

The structure of the Smith-Hughes Act and, specifically, two of the law's mandates were responsible for the evolution of a dual system in which academic preparation was separated from vocational. The first mandate, and the one with the most powerful effect, called for separate and distinct funding of specific occupational programs. The programs and their related requirements were outlined for careers in

agriculture, trade and industries, and home economics (Tanner & Tanner, 1975). The second mandate dealt with the administration and the creation of a Federal Board of Vocational Education (FBVE). While the administration was set at the national level, each state was given the option of creating a separate board for vocational education or a joint board with general education (Herschbach, 1973, p. 362). Most states opted for separate boards; and even in those states with single boards, program administration tended to grow apart.

What evolved over time, therefore, was an administrative system through which the Federal Board of Vocational Education allocated funds to states, and the states in turn added their own money and funds to local schools for specialized vocational programs. Funding tended to be administered through separate administrative structures. Consequently, the curriculum in schools often became separated into academic or vocational paths. These two separate paths currently exist in American schools.

In addition to the academic and vocational path, a third path began to emerge in the 1920s. Compulsory attendance laws and the depression brought an increase in enrollment in the public schools in the 1920s and 1930s. But many students were not interested in enrolling in vocational or college preparation programs. These students were increasingly referred to as "the new fifty per cent" (Butterfield, 1934). Unlike the estimated 25% of students who were being prepared for a "professional specialization" through an academic curriculum and the 25% who were being trained for "skilled trades" through a vocational curriculum, students of the new 50% were thought to benefit most directly from a social adjustment curriculum grounded in general studies. These studies were concerned with the practical aspects of living. The curriculum would be made up of courses such as consumer math, casual reading, and social studies for citizenship.

Conscious of the need to provide education for a burgeoning student population, government at all levels was forced to evaluate its current spending on vocational education in the midst of the economic crisis of the 1930s. A political battle for funding ensued, and vocational education was vulnerable to cutbacks because its programs were expensive. One outcome was that the Federal Board of Vocational Education was absorbed into the Office of Education. This, in effect, resulted in the FBVE losing its independence and its power. Ultimately, vocational education suffered an overall loss of status and autonomy.

The struggle between additional funding and cutbacks in the legislation continued until a compromise was struck: Congress would continue to fund vocational education, but a committee was established at the prompting of the Roosevelt administration to assess the relationship of federal aid to education and, specifically, vocational programs (Congressional Record, June 16, 1936, cited in Russell Report). This committee published the Russell Report (Russell, 1938).

The Russell Report, named after John Dale Russell, Professor of Education at the University of Chicago, was one of the first reports to be critical of vocational education and its separation from academic programs. It described vocational education as "limited to a type of instruction defined very narrowly and specifically." Further, it stated that the current programs "encouraged the creation of a dual or separate school system" (p. 237). The report recommended that vocational education be more general and less occupation specific (Russell, 1938). Although highly critical of vocational education and its educational value, the Russell report did not significantly impact the dual educational system that evolved from the Smith-Hughes Act.

Federal vocational education legislation just prior to and after the Russell Report perpetuated the vocational/academic division in the curriculum. The George-

Reed Act of 1929, the George-Ellzey Act of 1934, the George-Deen Act of 1936, and the George-Barden Act of 1946 funded and supported programs defined by occupational categories, including agriculture, home economics, industrial arts, and distributive education.

Federal support for education, however, was not limited to vocational education. During the 1940s, interest in the third, or general path, was rekindled in a movement called life adjustment education. It was supported and popularized by Charles Prosser, a believer in specific training and a principal contributor to the Smith-Hughes Act. Prosser believed that 60% of the youth of secondary school age would not receive the life adjustment training they needed "unless administrators of public education with the assistance of the vocational education leaders formulate a comparable program for this group" (Prosser, 1945, p. 325). The United States Office of Education supported the idea of an alternative curriculum by sponsoring regional meetings and eventually publishing Life Adjustment Education for Every Youth (U.S. Office of Education, 1951). Functionality was the key to the curriculum with classes in home and family living, civic competence, and health and physical fitness (Tanner & Tanner, 1975, p. 338).

Although life adjustment education was never brought to a national scale, it contributed to the duality of vocational and academic subjects. Spring (1976) believed vocational education leaders supported life adjustment education primarily to keep their programs for students who were truly interested in learning a skilled trade. An alternative such as life adjustment would attract the majority of non-college bound students and prevent vocational education from being a "dumping ground" for those not planning to go to college. Regardless of its motivation or the fact it had little impact on academic or vocational education, life adjustment education helped support the continued existence of the three curriculum paths.



A serious attempt to address the duality issue came when the National Education Association's Educational Policies Commission published Education for ALL American Youth - A Further Look (1944, revised 1952). This publication supported a model where students in comprehensive high schools would have access to a variety of programs for successful entry to the world of work. Students in grade 10 would spend one-sixth of their day, and students in grades 11 and 12 would spend one-third of their day, in a vocational curriculum. The vocational programs would be less occupationally specific, more interrelated, and geared to the needs of the community. This would be done without compromising the education of those planning to attend a four-year institution. Unfortunately, the curriculum proposed by the NEA fell victim to poor timing. The Cold War and the communist threat influenced the passage of the National Defense Education Act in 1958, and with it came a greater emphasis on math and science programs and college preparation in contrast to vocational education (Educational Policies Commission, 1952).

With greater national emphasis on academic preparation as the means to address the issues surrounding the cold war, vocational educators reconsidered their contribution to the nation's students. In the 1960s, federal legislation in the form of the Vocational Education Act of 1963 and the subsequent amendments of 1968 began to address social and economic inequalities between students. As educators attempted to improve the opportunities for specific groups of students (as defined by ethnicity, physical ability, or intellectual ability), funding was tied to the needs of those groups. In addition, vocational education changed from offering specific occupational training programs to emphasizing developmental programs with more generic work skills. This new focus, in addition to contemporary federal legislation dealing with manpower and job retraining, began to narrow the traditional gap between vocational and academic programs.

This change was the latest response to the historical debate faced by vocational education that had existed since the Smith-Hughes Act of 1917: Should schools offer specific skill training for certain occupations or offer more general work skills with additional academic preparation? A preliminary report to the amendments of 1968 from the Advisory Council of Vocational Education (1968) drew attention to the issue and strongly advocated an integrated approach. The report stated that the key to improved vocational education programs "is to build a better means of integrating academic education, skill training, and work experience" (p. 6).

Additional support for integrating academic and vocational education came in the early 1970s from a movement called career education. Championed by then Commissioner of Education, Sidney Marland, career education sought to address rebellion and social unrest by making education "meaningful" (i.e., related to employment or post-secondary plans). Career education would begin in elementary school with brief introductions to careers and continue to be refined through middle school. At the high school level, the curriculum would be grouped into 15 career or occupational clusters characterized by the integration of academics and vocational subjects. In the end, students would be prepared to enter post-secondary education or employment (Marland, 1972).

Career education was conceived of as a pragmatic, long-term program for making connections between schooling and the student's life immediately following high school. The ideal of a practical education focused on occupational goals lost its appeal in the late 1970s. By the 1980's, academic preparation was hailed as the key to opportunity and success, and many school leaders were concerned about strengthening the existing academic curriculum.

The Reagan administration in the early 1980s formulated policy positions to appeal to various political constituencies. Education policies of the 1980s allocated

additional resources to college-bound students, promoted alternatives to public schools, and raised the academic requirements of high schools. Reagan's policies were bolstered by the alleged poor performance of American students in comparison to foreign counterparts. Widely circulated education reform literature, led by A Nation at Risk (1983), called for increased academic requirements for American students. The urgency of these reforms was couched in the jargon of national survival (Education Commission of the States, 1983; National Commission on Excellence in Education, 1983; Sizer, 1984).

The assertion that students were not adequately prepared to succeed in a technologically advanced society, in the face of increased international economic competition, led to predictions of a dismal future for the United States. Although the Carl D. Perkins Vocational Education Act of 1984 (P.L. 98-124) was passed in this period of academic emphasis, it was perceived as lacking any serious academic commitment (American Vocational Association, 1992).

Although the emphasis on academics was important, the role of vocational education in an educational program should not be overlooked. The subject field continues to play an important role when national vocational education enrollment is considered. For example, the July 1989 report from the National Assessment of Vocational Education stated, "20 percent of all high school course work is taken in vocational subjects. For work-bound students ...nearly 30 percent of their time in high school is spent in vocational education" (Wirt, Muraskin, Goodwin, & Meyer, 1989, p. 3). Also, the U.S. General Accounting Office (GAO) report from 1993 estimated 58% of students with disabilities and 65% of those who were disadvantaged participated in vocational education in school year 1990-91 (p. 35).

The magnitude of vocational education is also significant. For example, in 1990-91 approximately 3.6 million, or 48%, of secondary students participated in

vocational-technical education programs. They were enrolled in 94,000 programs in 11,600 schools (U.S. General Accounting Office, 1993, p. 4). Given the ubiquitous nature of the programs, policy makers and educators could not "afford to ignore its actual and potential contribution ..." (National Assessment, 1989, p. 3).

Recognizing the magnitude of vocational education enrollment and the logical need to expand the academic component, Congress passed the 1990 Carl D. Perkins Vocational and Applied Technology Act of 1990. The legislation appropriated more than \$1.6 billion to "rebuild and reorient vocational education" (Wirt, 1991, p. 433). This was the largest grant in the history of federal support for vocational and technical education and reflected a "dramatic and positive shift in Federal policy" (Hayward & Benson, 1993, p. iii).

The 1990 Perkins Act contained a notable departure from traditional vocational education legislation when it called for the integration of vocational and academic subjects after 70 years of separation. This law heralded the end of the duality established by the Smith-Hughes Act of 1917. The 1990 Perkins Act required that every program supported by federal money "integrate academic and vocational education in such programs through coherent sequences of courses so that students achieve both academic and occupational competencies" (Perkins Act, 1990, Section 235 (c)(1)(B)). The Act also emphasized that technical education should be less concerned with specific skills and focus on a well-rounded education (Perkins Act, 1990, Section 115 (b)(1)).

Implicit in the Perkins Act were four outcomes or intents that would result from the Act and the integration of academic and technical subjects. The first was that the passage of the legislation would engender increased interest in the integration of vocational and academic curriculums. The heightened interest would result in an increase in the total number of students in integrated curriculums. The second

expected outcome was a greater diversity of students in the new integrated curriculum (Section 235 (b), Section 235 (c)(1)(C)). The third was that students participating in the integrated curriculum would demonstrate a higher level of academic achievement than vocational students had demonstrated in the past (Section 113 (a)(3)(B)(ii), Section 115 (b)(1), Section 116 (a)(2)). Students in the integrated curriculum may achieve academic levels comparable to students in the college preparation curriculum. The fourth, and final, expected outcome was that students from the integrated curriculum would plan to pursue post-secondary education opportunities at higher rates than expected from technical students in the past (Section 232, (Title III Part E)). Students in the integrated curriculum may plan to attend post-secondary education at rates comparable to students in the college preparation curriculum (Perkins Act, 1990).

Thus, in 1990 vocational education legislation took a dramatic turn.

Legislators recognized that the union of academic and vocational programs would create a more valuable education. The 1990 Perkins Act directed schools to integrate academic and vocational education and remove the traditional paths associated with the high school curriculum. This study addressed how this new direction affected one local education agency.

### Research Overview

The study site is a large suburban school district in the mid-Atlantic region spanning grades K-12. Over 130,000 students were enrolled in the 2000-2001 school year. The district is one of the most affluent in the country, with a median household income in 2000 of \$74,280. But family wealth varies greatly with large and increasing pockets of low-income families. Ethnic diversity is also growing, as evidenced by an increase in the non-white population from 23.3% in 1990 to 35.2% in 2000. Income levels roughly mirror ethnic divisions; the poorer areas of the district are the most

diverse. The Latin American population is growing the most rapidly, fueled by a large influx of immigrants, including a large number of people from San Salvador.

The educational system for this large and diverse community prides itself on its emphasis on academic achievement. In fact, studies by the district report that 80% of graduates continue their education at a post-secondary institution. Graduates of the school system must complete four credits in math and English, three credits in social studies and science, and two credits in either a foreign language or technical studies. This curriculum is considered only a minimum preparation for entrance into the state universities.

Vocational/technical programs are also offered. Thirteen of the 23 comprehensive high schools have either two or three vocational programs, while the remaining ten schools have from five to eleven programs. These programs are available to all interested students, and subjects range from child development to engineering technology. The district supports one technical high school in addition to the comprehensive schools. Students attend this technical school for half the day and the "home" schools for the other half. The offerings at the technical school range from traditional vocational subjects of plumbing or carpentry to emerging fields like biotechnology or network operations and programming.

Although the school system has active vocational/technical programs, it has mirrored the American educational scene in that distinctions have been drawn between academic and vocational subjects. This is illustrated in the disparity in the number and variety of programs in the comprehensive high schools and the existence of a separate technical school. However, the influence of the 1990 Perkins Act and a shift in perception of vocational education generated interest in an integrated curriculum.

The Perkins Act of 1990 contained four expected outcomes which would result from the integration of academic and technical subjects: (a) increase the total number

of students in integrated curriculums, (b) a greater diversity of students, (c) a higher level of academic achievement than vocational students had demonstrated in the past, and (d) pursuit of post-secondary education opportunities at higher rates than expected from technical students in the past. The purpose of this study is to examine these outcomes over a seven-year period. In particular, the study examines how many students took both vocational and academic curriculums in a system that emphasizes academic achievement. Besides gross numbers, the intent is to determine whether those students involved are low-income students, low academic achievers, or children of recent immigrants; as vocational students are often stereotyped as members of these groups. Finally, because vocational programs have been perceived as training oriented with immediate job placement as an objective, the study intends to find out if the post-secondary plans of students who have taken a technical program are enhanced by the integrated curriculum.

Two sampling time frames are used for the seven-year period: the graduating class of 1993 and the graduating class of 2000. Student data from 1993 were selected as this was when the school system began collecting data in order to qualify for federal technical education funding through the Perkins Act of 1990. The 2000 class is used as this was the most recent year data was available in a compiled form. Although seven years elapsed between the collection of the first and second sets of data, the data in both sampling frames are compatible. In addition, the time span between the two samples is large enough to reflect the change in the integrated curriculum.

In order to study the first outcome of increased participation in the integrated curriculum, each graduating class was divided into four categories based on the curriculum completed by the student. Students were grouped into vocational studies, academic studies, integrated technical and academic studies, or a general curriculum.

The graduating class of 1993 exceeded 6100 students and the class of 2000 had over 7000 graduates. Table 1 illustrates the division of each class into four curriculums.

Table 1

Curriculum Divisions For Each Year

Class of 1993			
Technical	Academic/college preparation	Integrated technical and academic	General
Class of 2000			
Technical	Academic/college preparation	Integrated technical and academic	General

The criteria for the curriculum divisions in each class are mentioned here but detailed in Chapter III:

- Technical students followed a state approved course of study which was career focused and prepared the student for immediate entry in an occupational group or specific job.
- Academic or college preparation students followed a course of study which prepared students to meet standard college entrance requirements.
- Integrated technical and college preparation students followed a course of study which met both the technical and college criteria.
- General education students met the system standards to graduate but did not complete enough credits for the technical curriculum and/or the college preparation courses.

The technical, academic, and general categories represent the traditional paths in American education, while the integrated technical and college path represents an emerging group of students. Although all curriculum categories and student demographic characteristics were compared and contrasted, the integrated group in particular was the focus of this study. It was assumed that this integrated category



would show an increase in the number of participants between the two sampling time frames. This assumed increase was considered to be an indication of the success of the integrated concept encouraged by federal vocational education legislation.

In addition to the expected increase in numbers of students taking the integrated curriculum, the second outcome addresses the duality issue grounded in historical perceptions surrounding vocational education. Since the Smith-Hughes Act, critics feared that any type of non-academic education would target specific students, including those whose academic achievement to date was substandard, certain ethnicities, low-income students, and/or students whose English was not fluent.

Opponents of vocational education believed these students were sorted from the general student population and did not receive an academic or liberating education; instead they have taken a less demanding curriculum or "training" that confined them to a specific occupation. Their vocational education was viewed as undemocratic and a limitation to their upward mobility (Ravitch, 2000, Spring, 1976).

To address these perceptions and research the reality in the school system, four specific categories from the student record were selected to represent student characteristics. The first two are gender and ethnicity. To represent income level, participation in the Free and Reduced Price Meals program (FARMS) was used. This program provides meals that are free or at a reduced price for students who qualify because of family size and/or family income. The income characteristic was selected to determine the number and percentage of low-income students present in each category. To represent immigration, participation in the English for Speakers of Other Languages program (ESOL) was selected. Students in this program are recent immigrants or live in a home where English is not the primary language. The immigration characteristic was selected to determine the number and percentage of students with limited English proficiency present in each category.

The third expected outcome would be that students in the integrated curriculum would demonstrate improvement in academic achievement. Historically, students involved with technical education have been perceived as less intellectually capable than those in an academic curriculum. To examine this perception, a student's Grade Point Average (GPA) and Scholastic Aptitude Test (SAT) scores were selected from the student record. Two-way analysis of variance (ANOVA) was used to compare academic achievement between the curriculum categories and between the sample years. It was believed there would be no statistical differences in the categories.

The fourth expected outcome would be that students from the integrated curriculum would plan to pursue post-secondary education opportunities at higher rates than expected from technical students in the past. Data for this analysis came from a second source of information, a senior exit survey administered to graduates. The survey collected information regarding the graduate's view of his or her high school experience and post-secondary plans.

The graduates' plans are an important outcome as vocational education has been perceived as only preparing a student for a job, hence, hindering the continuation of his education past high school. Analyzing the responses to the question regarding post-secondary plans addressed this perception. The responses dealing with intentions after high school on the senior exit survey were analyzed with chi square.

### Statement of the Problem

The problem of this study was to compare selected characteristics of students who completed an integrated curriculum of technical and academic studies with students who completed either an academic, a technical, or general curriculum. Eight groups of high school graduates were studied. The first four groups graduated in 1993 and are identified by completion of an academic, a technical, an integrated technical-

academic, or a general curriculum. The remaining four groups graduated in 2000 and are also identified by completion of one of the four curriculums. The change over the seven years in the number and percentage of students in the integrated curriculum and the change in the demographic characteristics of each curriculum was analyzed.

### Statement of Purpose

The purpose of this study was to examine the integration of vocational and academic programs in one school system through an analysis of change in student demographic characteristics, academic achievement, and post-secondary plans over seven years. In addition, this study sought to examine the commonly held perception that the post-secondary options of students in a technical curriculum are limited by their courses. It also looked to determine if an integrated technical curriculum can expand and enhance a student's academic performance. This study also provides state, local, and federal policy makers with information on the percentage of students in each type of curriculum, the ethnicity and economic and immigration status of such students, and the academic performance of these students as measured by GPA and SAT scores.

### Research Questions

The following research questions guided this study.

1. What were the changes between 1993 and 2000 in the number and percentage of students who completed: (a) a technical curriculum, (b) an academic curriculum, (c) an integrated technical and academic curriculum, or (d) a general curriculum?
2. What were the gross number and percentage of change in gender, ethnicity, family income, and linguistic background between each curriculum category from 1993 and 2000?

3. When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the groups' Grade Point Average (GPA) and Academic Grade Point Average (AGPA) between the four curriculum categories in 1993 and 2000?
4. When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the students' highest SAT mean score between curriculum categories from 1993 and 2000?
5. Was there a statistically significant independence in the post-secondary educational plans between students in the technical, academic, general, or integrated technical and academic curriculum in 1993 and 2000?

#### Assumptions

The following assumptions were made in pursuit of this study:

1. The graduates answered the senior exit survey administered by the school system accurately and truthfully. Also, although some questions in the exit survey were added or altered from 1993 to 2000, the responses required for this study were not dramatically altered and remained suitable for analysis.
2. The school system had a uniform grading policy for all academic and technical subjects across the time period.
3. The statistical procedures selected for this study were appropriate for analysis of the data.

## Limitations

The following limitations were inherent in the study:

1. In order for students to be classified in the technical curriculum category or the integrated academic and technical curriculum, they must have earned the necessary credits in a state approved sequence of courses. However, there are significant numbers of students who have taken varying numbers of vocational courses. These range from students who have taken a few classes to students who have fallen just short of completing the state requirements. Also, this study does not take into account the numerous vocationally oriented programs at individual schools. These programs do not fall under a state approved curriculum; nevertheless, they are vocational in nature.
2. The study does not try to establish that changes resulting from the development of an integrated curriculum are solely attributed to the Perkins Act of 1990. Other Federal legislation and state and local initiatives contributed to the integrated program and the students involved.
3. The students answered the survey responses truthfully.

## Statement of Procedure

The procedure of this study was as follows:

1. A preliminary review of literature on the evolution of vocational education was conducted. In addition to books and journals, the review included federal legislation and federal, state and local reports. The literature was supplemented by discussions with local education agency personnel and representatives of the State Department of Education.

2. Problem delineation was discussed and given focus through consultation with advisors, colleagues, and local and state education personnel.
3. A preliminary review of data was conducted with local education agency personnel.
4. Preliminary proposal acceptance was secured from the advisor.
5. The review of literature was expanded.
6. Official request for data was submitted to the local education agency.
7. The data were received from the local education agency and analyzed.
8. The findings and conclusions were formulated.
9. Recommendations for further study were formulated.

#### Definition of Terms

Terminology has always been an issue when discussing education with a vocational component. In the early 1900s, the term industrial education gave way to the more familiar term vocational education. Krug (1964) recognized the difference and claimed the term vocational education "usually appeared in the everyday speech-making and writing of the school men themselves" (p. 217). [See Herschbach (1973) and Herschbach, McPherson & Latimer (1982) for differences in the philosophical and ideological foundations between an industrial education and a vocational education.] In the latter half of the 1900s, the terms career or technical education were introduced. The terms vocational, career, and technical education have been used synonymously with each other and by leaders in the field. For the scope of this study, the term vocational education will apply through the 1900s until 1989. The term technical education will be used when referencing the time frame from 1990 to the present. This coincides with the 1990 Perkins Act.

Academic education (also referred to as college preparation) - A course of study that meets standard college entrance requirements. This includes students who have completed at least four credits of math, four credits in English, three credits of social studies and three credits of science. For purposes of this study, completion of algebra 2 was added as a descriptor for students preparing for college.

ESOL (English Speakers of Other Languages) - A program designed for students who need improvement in speaking and writing English. Many students in this program have recently moved to the United States or live in a home where English is not the primary language.

FARMS (Free and Reduced priced Meals) - A program that supplies students with free or reduced priced meals. Participants in FARMS meet guidelines which are based on a combination of family size and income. For purposes of this study, participation in FARMS was used as an income indicator. Qualification for FARMS is associated with being below minimum income levels.

GPA (Grade Point Average) - A number calculated by multiplying the number of credits for the course by the number of the corresponding grade earned for the class. The product is then divided by the course credit with the result being the un-weighted GPA. In addition, this study used Academic GPA (AGPA). AGPA is the average of all credit-bearing courses with course codes between 1000 and 3999. This spread captures all core subject areas of English, math, social studies, science, and foreign language. It also captures ESOL, some internships, computer sciences, and non-required English classes.

Integrated curriculum - For the purpose of this study, integrated curriculum means the same as integration. It does not refer to a specific sequence or group of courses.

Integration (of vocational and academic education) - A program that combines the state defined sequence of vocational/technical courses with the course work required for entry into most universities. Note: For more on this subject, read The Cunning Hand, The Cultured Mind: Models for Integrating Vocational and Academic Education by W. Norton Grubb, Gary Davis, Jeannie Lum, Jane Plihal and Carol Morgaine.

Local educational agency (LEA) - "...a board of education or other legally constituted local school authority having administrative control and direction of public elementary or secondary schools in a city, county, township, school district, or political subdivision in a State..." (Perkins Act, Section 521 [22] Public Law 101-392 [H.R. 7]; September 25, 1990).

Post-secondary educational institution - "an institution legally authorized to provide post-secondary education within a State..." (Perkins Act, Section 521 [23] Public Law 101-392 [H.R. 7]; September 25, 1990).

SAT (Scholastic Aptitude Test) - an exam administered to many high school juniors and seniors as part of college entrance requirements.

Technical education - a term chosen by the researcher to reference vocational education. Use of the term technical education coincides with the passage of the 1990 Perkins Act. (See Vocational Education for a complete definition.)

Technology education - "an applied discipline designed to promote technological literacy which provides knowledge and understanding of the impacts of technology including its organizations, techniques, tools and skills to solve practical problems and extend human capabilities in areas such as construction, manufacturing, communication, transportation, power and energy" (Perkins Act, Section 521 [39] Public Law 101-392 [H.R. 7]; September 25, 1990).



Vocational education - organized educational programs offering a sequence of courses which are directly related to the preparation of individuals in paid or unpaid employment in current or emerging occupations requiring other than a baccalaureate or advanced degree. Such programs shall include competency-based applied learning that contributes to an individual's academic knowledge, higher-order reasoning, and problem-solving skills, work attitudes, general employability skills, and the occupational-specific skills necessary for economic independence as a productive and contributing member of society. Such term also includes applied technology education (Perkins Act, Section 521 [41] Public Law 101-392 [H.R. 7]; September 25, 1990). Note: For this study, this term indicates the student has completed the state-approved sequence of courses for a particular program, and this program was completed at a separate career center or through an identified program at a comprehensive high school.

The 1990 Perkins Act - a short title chosen by the researcher to represent the 1990 Carl D. Perkins Vocational and Applied Technology Education Act Amendments.

Special populations – individuals with handicaps, educationally and economically disadvantaged individuals (including foster children), individuals of limited English proficiency, individuals who participate in programs designed to eliminate sex bias, and individuals in correctional institutions (Perkins Act, Section 521 [31] Public Law 101-392 [H.R. 7]; September 25, 1990).

## Organization of the Study

The study will be organized in the following chapters:

Chapter I - Introduction

Chapter II - Review of Literature

Chapter III - Research Design and Methodology

Chapter IV - Results of the Study

Chapter V - Summary, Conclusions and Recommendations

## CHAPTER II

### REVIEW OF RELATED LITERATURE

Few concerns within the American educational arena have created as much controversy as vocational education. In the two decades prior to 1900, a number of national leaders engaged in a debate based on the degree to which vocational courses would be incorporated into the curriculum of the school. On one side of the debate were those who wanted highly defined vocational programs with specific instruction. The curriculum would be centered around the preparation for a specific occupation or particular job. The belief at the time was that academic courses were not needed for these students since they were going directly to the workforce (Prosser, 1945; Snedden, 1915). The contrary opinion was that vocational and academic courses would work together for the benefit of the student. The mix of the abstract and the concrete could result in improved learning. This opinion was championed after the turn of the century by John Dewey who believed that "education through occupations consequently combines within itself more of the factors conducive to learning than any other method" (Dewey, 1916, p. 361). Not only would learning improve, according to Dewey, but the combination of an academic and vocational education would prepare students to be life-long learners. The use of occupations as the context, yet working in tandem with academic courses, would supply "modes of experience which are intrinsically valuable; . . . truly liberalizing in quality" (Dewey, 1916, p. 235).

The debate was temporarily quieted with the passing of the first federal legislation to support secondary schools—the Smith-Hughes Act of 1917. Terms of the act established specific and specialized programs that focused primarily on preparing students to enter an occupation upon graduating from high school. Because the terms and the accompanying funding streams were explicitly directed to vocational programs, a division between academic and vocational programs developed. This resulting dualism was supported by ensuing federal vocational education legislation and continued through most of the twentieth century.

Although legislation supported the continued division of the two curriculums, the controversy surrounding vocational education endured. Recent criticism of vocational education contends that these students are sorted from the general student population and do not receive an academic or liberating education; instead they take a less demanding curriculum or "training" that confines them to a specific occupation. In the sense that academic and career options are limited, vocational education is viewed as undemocratic and a limitation to the student's upward mobility (Ravitch, 2000; Spring, 1976). In addition, the on-going division raises the issue of the perceived value of vocational education. Oakes (1985) reported that higher status and more resources go to college preparation courses, teachers, and students than to their counterparts in general academic and vocational programs. These inequities are helping to create an even greater disparity between college-bound students and those not planning to immediately continue their post-secondary education.

#### Support from Literature

Even with the controversy surrounding vocational education, its positive contribution to a quality education program is recognized. For example, Goodlad (1984) believed that vocational education, along with guided work experience, "is an

essential, not merely an elective, part of general education..." (p. 147). To counter the opinion that technical education is for certain kids sorted and placed on a certain path, Goodlad responded that "vocational education is for all students, not just an alternative to academic studies for the less academically oriented" (p. 147). To dispel the perception that vocational education programs only consist of occupational training, the National Commission on Secondary Vocational Education published The Unfinished Agenda: The Role of Vocational Education in the High School (1985). The report emphasized that secondary vocational programs "teach problem solving and analytical skills" (p. 4). Also, the applied nature of the courses and the small-group lessons reinforce basic communication and interpersonal skills and promote their transferability to other settings, the report contended.

#### Moving to Integration

While there continued to be sound support for the traditional view of vocational education, the concept of combining vocational and academic programs started to gain momentum in the 1980s. Although the idea of integrating the two curriculums has been around for close to one hundred years, The Forgotten Half (William T. Grant Foundation, 1988) noted that properly conceived and directed integrated vocational-technical and academic instruction deserves "far greater recognition than it currently enjoys among many educators and policymakers" (p. 129). An integrated curriculum has the potential to graduate students with the knowledge and skill to succeed. Similarly, the National Commission on Secondary Vocational Education (1985) concluded that "all secondary students need a balance of both academic and vocational experiences to prepare themselves for life in a changing world" (p. 23).

Additional support for the integrating of academic and vocational courses into a comprehensive curriculum was generated when 14 states joined together to form the Southern Regional Education Board (SREB) in 1989. Once organized, the board then worked with leaders in and out of education studying vocational and non-vocational graduates. The SREB concluded that in order to raise the academic and technological literacy of high school graduates, "Students pursuing a vocational major should be required to complete a vigorous and coherent program combining academic and vocational study" (Bottoms & Presson, 1989, p.vi).

The trend away from job-specific vocational education to one with a strong academic component continued with the Congressional hearings for the renewal of the 1984 Perkins Act. Although the need for graduates to be prepared to enter the workforce was recognized by a varied and diverse group of supporters, the traditional view of vocational education was now giving way to a broader definition. Few contributors at the hearings mentioned preparation in specific occupational skills, occupational preparedness or careers. Instead, many testimonies mentioned the need for vocational education to have a broad education mission. For example, James Oglesby, president-elect of the National School Boards Association, testified before the House hearings that vocational education "must provide students with the cognitive and occupation skills necessary to pursue a lifetime of productive employment" (Y4. Ed 8/1: 101-15, 1989. Hearing on H.R. 7., p. 289).

Incorporating and increasing the academic component was an important part of a new concept of vocational education, one that moved from the traditional view of vocational education as specific skill preparation to the incorporation and increasing use of an academic component. In keeping with the academic emphasis, Dr. Dale Parnell, president of the American Association of Community and Junior Colleges, stated that "It is the Vocational Education Act, not the Vocational Job Training Act."

The fact that it "... is an education bill, not a job training bill ... makes it quite different, and it must be broader" (Y4. L 11/4: S.hrg. 101-317, 1989, Hearing on S. 1109, p. 1017). Increasing the academic component was thought to provide students with a well-rounded educational experience and increase their postsecondary options.

Congress renewed the 1984 Perkins Act in 1990 and renamed it The Carl D. Perkins Vocational and Applied Technology Education Act. This legislation contained a notable departure from the earlier, traditional vocational education legislation. It called for an enhanced role for vocational education in the nation's education arena, one that would place a greater emphasis on the integration of academics and academic achievement while also reaching out to students in typically under-served populations. The new direction taken by the legislation was influenced by prevailing social and educational issues. Factors that influenced this new objective were: (a) educational reform literature, (b) the emerging global economy, (c) a greater appreciation for the contribution of vocational education, and (d) new research on the learning process. The following reviews the literature relating to these factors.

Many of the initial changes in the structure and implementation of vocational education can be traced to the influence of widely circulated reform literature represented by A Nation at Risk (National Commission on Excellence in Education, 1983), Action for Excellence (Education Commission of the States, 1983), Horace's Compromise.- The Dilemma of the American High School (Sizer, 1984) and The Paideia Proposal (Adler, 1982), among others. These publications highlighted the alleged poor performance of American students, most notably when compared to their foreign counterparts. The solution to the perceived faltering academic status of America's children was a renewed emphasis on academics, expressed through

instruction focused on "back-to-basics" and an increase in academic requirements for graduation.

A Nation at Risk (1983) specifically outlined a plan that increased academic requirements for the nation's students. This plan recommended new basics or "core academic standards" for high school graduation that included the following: a minimum of four years of English, three years each of mathematics, science, and social studies, and one-half year of computer science. American schools incorporated the standards into their requirements. The percentage of graduates meeting these requirements increased from 13% in 1982 to 38% in 1990 to 50% in 1994 (Levesque, et al., 2000, pg.62). The fallout resulting from the academic emphasis had an immediate and deleterious effect on vocational education. With increased academic graduation requirements there was a decline in enrollment in vocational education (Douglass, 1989; Lonza, 1988; Rossetti, 1989). Fewer students could take vocational courses and still have room in their schedule to meet the increase in the basic courses required for graduation.

Another factor influencing the direction of the 1990 Perkins Act was the changing worldwide economic situation. Increased modes of communication and networks had altered the traditional business framework and allowed more and more nations to market their goods and services across the world (Carnavale, 1991; Johnston & Packer, 1987). It was claimed that the developing "global economy" required that companies have the capability to be adaptable and responsive to particular technologies and particular markets if they were to be successful (Carnavale, 1991; National Center on Education and the Economy, 1990; Johnston & Packer, 1987). In addition, the "global economy" would favor companies that concentrated on high value production as opposed to the traditional high volume production (Reich, 1991).



Flexibility and responsiveness to a new form of production indicated that organizations and their governing nations needed a skilled workforce to be involved in the global economy. Reich (1991) claimed the adeptness of a nation's workforce and the quality of its infrastructure were what would make it unique and globally successful. The educational system of a nation would play a critical role in preparing its graduates to succeed in this environment (Berryman & Bailey, 1992; Marshall & Tucker, 1992). This type of vigorous educational system would need the best from both academic and vocational education programs. A strengthened vocational education through greater academic integration would be important.

The contribution of vocational education to preparing students to be a part of the nation's skilled workforce was repeatedly addressed in the Congressional hearings prior to the passage of the 1990 Perkins Act. Testimonies reflected the need for vocational programs to prepare students with advanced skills and knowledge. During the House of Representatives hearings in March, 1989, Paul Cole, vice president of the American Federation of Teachers, for example, claimed that "we understand in the AFT the vital role that quality vocational education can play in the economic development of this Nation" (p. 126). And in a prepared statement, Edwin D. Fessenden, President, National Association of State Councils on Vocational Education, wrote "Vocational-technical education is an integral part of America's educational system that must assure a first-rate work force if there is to be a first-rate economy" (Y4. Ed 8/1: 101-15. Hearing on H.R. 7, p. 643-644).

After the bill passed in the House, the Senate held its hearings on the reauthorization of the Perkins Act during the summer of 1989. During the Senate hearings, the meritorious role of vocational education was captured by the statements of two respected and highly ranked individuals. Lauro F. Cavazos, Secretary, U.S. Department of Education, emphasized that a "vital, progressive vocational education

sector is crucial to the future of our Nation" (Y4. L 11/4: S.hrg. 101-317, p. 2). At the July 7, 1989 hearings, Claiborne Pell, Chairman of the Subcommittee on Education, Arts and Humanities, set the tone for the hearing with an impressive opening statement, stating "there are several priorities to be reemphasized. First, we must recognize that vocational education is one of the keys to strengthening our role in the international marketplace. It is absolutely critical that our vocational programs are current, state-of-the-art programs, so that we remain on the cutting edge of the international competition in which we are engaged."( Y4. L 11/4: S.hrg. 101-317, p. 414). Clearly, vocational education was recognized in the highest levels of government for the important role it could serve in preparing graduates with valuable skills to compete, and ultimately help our nation compete, in the new global economy.

Yet another factor influencing the new direction of vocational education legislation was the emergence of a field called cognitive science. Theories from this field stressed that effective learning required a connection to events, people, and objects that have significance and relevance to the student's life (Resnick, 1987). In 1989, Collins, Brown, and Newman suggested "A critical element in fostering learning is to have students carry out tasks and solve problems in an environment that reflects the multiple uses to which their knowledge will be put to use in the future" (p.487). The connection of learning to the context in which learning is used was getting recognized for its significance and potential to impact curriculum development.

It was this mix of abstract and experiential learning, a combination of theoretical study with real-life applications and problem solving that was considered the foundation to learning. Formerly, problem-solving and reasoning skills had normally been associated with a highly academic or college preparation curriculum; now they were being associated with a vocational course of study. The Forgotten Half (Grant Foundation, 1988) suggested, for example, that "there are numerous avenues of

learning and that our expectations are too frequently tuned only to narrow, exclusively academically-oriented assumptions" (p. 129). Resnick (1987) claimed that it is a new challenge to make these higher-order skills a regular part of a school curriculum so that "all of the population, even minorities, even non-English speakers, even the poor . . . become competent thinkers" (p. 7).

MacLeod (1995) illustrated the importance of relevance to the learner in an ethnographic study of a low-income urban neighborhood and the aspirations of the middle to high school-aged students who lived there. In his conclusions, MacLeod discussed how a group of young teens produced a 30-page anthology called Behind Bars from interviews with residents who were former inmates. The students learned grammar and writing skills in the course of putting together their publication from these real-life experiences. These interactions were meaningful learning experiences and demonstrated "what can be gained . . . *when students are actively involved in thinking and doing rather than being passively exposed to textbook material.*" (p. 264, italics mine). MacLeod's research helped support the importance of cognitive science and relevance in the educational process.

Another source of significant support for integration came from the National Assessment of Vocational Education (Wirt, et al., 1989) study. This analysis of vocational education and federal legislation was mandated by earlier legislation and required for the reauthorization procedure. The study identified six major objectives for federal policy on secondary vocational education. The second objective was a call to "integrate high school academic and vocational curricula so that students come to vocational programs well-equipped with fundamental academic skills and that vocational courses provide an applied context, based on broad and specific job training, that reinforces and enhances academic skills and motivates students to excel in both academic and vocational courses" (NAVE, vol. 1, 1989, p.xiv). The report

also stated that expanding "its academic potential should be a major objective of federal policy" (NAVE, vol. 1, 1989, p. 51).

The cumulative effect of education reform literature, the emerging global economy, and growing support for key components of vocational education had built a strong case for reconsideration of vocational education's role in the current educational system. Clearly, according to supporters, vocational education had the essential components and the untapped potential to fill and serve a necessary and crucial role in the nation's educational system. However, it also became clear that the basic, outdated theoretical underpinnings needed a fundamental overhaul if vocational education was to continue to effectively serve students in the next century.

This overhaul, in the form of revamped vocational programs with higher academic components, was supported during the Congressional hearings with testimony from various local, state and national representatives from business, education, civic and government organizations. Rosenstock (1991) commented that the integration of the academic and the vocational curricula was considered blasphemous in earlier legislation, but by the 1989 Senate hearings, "virtually every commentator noted the need to bring together these two parts of our education system" (p. 434). Others moved a pedagogical step further and urged the retraining of both academic and vocational staff and counselors. Gordon Ambach, Executive Director of the Council of Chief State School Officers, for example, believed that integrating the respective teaching strategies and curricula would work "toward a goal of preparing all students for full participation in society, the economy, and the democratic process" (Y4. Ed 8/1: 101-15, 1989. Hearing on H.R. 7, p. 343). Following the positions taken during the hearings, it was obvious that the format for the new federal vocational education legislation would be changed from its prior tradition.

## Carl D. Perkins Vocational and Applied Technology

### Education Act of 1990

Both the social circumstances and educational discourse of the late 1980s were significant to the concept of integration. The cumulative event, however, was the passing of the Carl D. Perkins Vocational and Applied Technology Education Act of 1990. With the signing by President George H. W. Bush on September 25, 1990, the concept of integration had the support, both politically and financially, of the federal government. It became effective on July 1, 1991 and was to remain in effect until June 30, 1996. The Act expanded the Federal government's role in vocational education and placed an increased emphasis on technology and basic academic education.

As discussed previously, the emphasis on integration was significant because federal vocational education legislation had historically supported the separation of vocational and academic programs. The 1990 Perkins Act mandated that eligible program recipients of federal funds were to use the funds for program improvement (i.e., to support the integration of vocational and academic education). The Act stated:

Funds made available under a grant under this part shall be used to provide vocational education in programs that . . . integrate academic and vocational education in such programs through coherent sequences of courses so that students achieve both academic and occupational competencies. [Perkins Act, 1990, Section 235 (c) (1) (B)]

The individual states shouldered the responsibility for assuring that integration was accomplished. Each state was required to submit a State Plan that responds to 23 separate requirements under Title 1, Part A - Allotment and Allocation. The State Plan would include an analysis of the integration efforts at the local level. In addition, state programs and leadership activities needed to include the development,

dissemination, and field testing of curricula to "integrate vocational and academic methodologies" [Perkins Act, 1990, Section 201(b)(2)(A)]. The requirements of the mandate needed to be met by any local education agencies that wanted financial assistance, and they were required to submit to their respective state a description that included how the vocational program "integrates academic and occupational disciplines..." [Perkins Act, 1990, Section 240(l 1)(A)]. However, the type of integration activities pursued at the local level was left open and flexible.

Implicit in the Perkins Act were four outcomes or intents that would result from the integration of academic and technical subjects as stressed in the Act. The first was that the passage of the legislation would engender increased interest in the integration of vocational and academic curricula. The heightened interest would result in an increase in the total number of students in integrated curricula.

The second expected outcome was a greater diversity of students in the new integrated curriculum. This is demonstrated in the requirement that the State Plan must assure that members of special populations will be "provided with equal access to recruitment, enrollment, and placement activities" [Perkins Act, 1990, Section 118 (a)(1)]. Also, any recipient of funds under the general uses of funds must give priority to programs that serve special populations [Perkins Act, 1990, Section 235 (b) and Section 240 (2, 3, 4, 5,)]. The act also directly addresses special populations in the context of integration. Programs that integrate academic and vocational education so that students achieve both academic and occupational competencies must "provide equitable participation . . . for the special populations...." [Perkins Act, 1990, Section 235 (c)(1)(C)].

The third was that students participating in the integrated curriculum would demonstrate a higher level of academic achievement than vocational students had demonstrated in the past. Local programs were to provide vocational education

students with "strong development and use of problem-solving skills and basic and advanced academic skills (including skills in the areas of mathematics, reading, writing, science, and social studies) in a technological setting" [Perkins Act, 1990, Section 113(3)(B)(ii)]. The 1990 Perkins Act also mandated that each state receiving funds should develop and implement local standards and measures for programs. Any system developed must include "student progress in the achievement of basic and more advanced academic skills" [Perkins Act, 1990, Section 115(b)(1)]. The intent of the Act, then, was to improve the academic component of vocational programs so that vocational students could achieve academic levels comparable to students in the college preparation curriculum.

The fourth and final expected outcome was that students from the integrated curriculum would plan to pursue post-secondary education opportunities at higher rates than in the past. To help achieve this outcome, the 1990 Perkins Act required that each State Board of Education conduct an assessment to assess the quality of any vocational program receiving funds. Part of the criteria for receiving funding was to increase "linkages between secondary and postsecondary educational institutions" [Perkins Act, 1990, Section II 6 (a)(4)]. In addition, the 1990 Perkins Act has sources of revenue for eligible postsecondary institutions and adult programs within each State (Section 232). A third way to increase postsecondary participation was the introduction of the concept of technical preparation, or Tech Prep as it was referenced (Title III, Part E).

Tech-Prep supported the creation of articulation agreements between secondary schools and post-secondary institutions, frequently a local community college. Students in tech prep would select a career field in a technical area and take two years of related courses in high school and two years of more specific courses at the community college. This was also referenced as a 2 + 2 model; in some cases the

programs continued at a four-year institution and the process was then called a 2 + 2 + 2 model. Although the section did not directly address integration, its purpose was to provide "strong, comprehensive links between secondary schools and post-secondary educational institutions" [Perkins Act, 1990, Section 342(b)(2)]. The articulation programs that would link the two types of educational institutions would result in a strong academic component in the vocational programs.

The terms of the legislation made it clear that the federal government intended to play a larger role at the local and state level in encouraging the integration of vocational and academic programs. Federal legislators believed terms of the Act would attract and retain a larger and more diverse number of students in school. In addition, the Perkins Act wanted to help improve academic achievement and encourage additional postsecondary options.

The 1990 Perkins Act was not only the most expensive and expansive act in the history of support for federal vocational education, but many considered it the most innovative as well. Jennings (1991) said that Perkins provided "a strategy that adds up to a winning combination" and that vocational education can "be a dynamic force in improving all kinds of skills" (p. 19 & 18). Some even believed the effect of the Act would go well beyond vocational education programs. Gray (1991) claimed "The integration of academic and vocational education is a movement to reform not just vocational education but the entire secondary education curriculum" (p. 443). Rosenstock (1991) added that the Perkins was "an important step in redirecting vocational education and, ultimately, in restructuring our high schools for the 21st century" (p. 434).

Others saw additional benefits in an integrated curriculum. McMillan (1993) believed that developing a curriculum incorporating the strengths of vocational and academic programs would (1) provide a richer, more coherent curricula, (2) create



active learning in classrooms with authentic problems, (3) enable coordination and cooperation between academic and vocational teachers, and (4) generate more attention and improve the transition to college or work.

Plihal et al. (1992) believed the value of integration could be reported by viewing it through the lens of the groups who would benefit from its implementation. The motivating factors of the benefactors and the ultimate gains realized by each group were the discriminating features in this approach. Society as a whole would benefit as integration would help create a skilled workforce, assist the United States in the global economy, and build a responsible citizenry. In addition, integration would address and improve the circumstances of those adversely effected by curriculum tracking and high school dropouts.

The second group to benefit from integration would be teachers. The new curriculum had the potential to provide intellectual stimulation, prestige and stability, and even security to those whose current programs may be suffering. The third group who would and should benefit from integration were the students themselves. They would gain from exposure to more heterogeneous groups of peers, more relevance of their academic courses to real life, enhanced skill acquisition, and expanded career exploration opportunities. Finally, administrators would benefit as integration was seen to have the potential to improve graduation rates, raise academic achievement, and increase the number of graduates attending post-secondary institutions. Improvement in any of these highly publicized areas is associated with successful and effective schools and reflects positively on the administrators.

Rather than recognizing the benefits of integration through specific groups, Stasz, Kaganoff, and Eden (1998) identified the gains realized from the perspective of the school system. Combining vocational and academic programs had the potential to

cause a systemic shift in three areas of the school system. Each area had its own group of supporters.

The first was a curricular change and was meant to improve critical thinking skills. Integration would improve the academic content of vocational classes and address the concern over "higher order thinking skills" while academic courses would take a more applied character. The improvements in curriculum, whether vocationally or academically, were viewed favorably by legislators and employers. The pedagogical gains were the second change and supported by educators. Integration would be more conducive to vocational and academic teachers sharing their respective teaching methods. It was believed that more collaboration would lead to improved teaching and learning in each program. The final positive change resulting from integration would be organizational. An integrated curriculum had the potential to increase social justice as it improved opportunities for a growing and more diverse student population. Favored by reformers, this approach gave all students access to improved programs and minimized or avoided tracking. Regardless of how one views the effect of integration, it is capable of making a significant and decided impact on schools.

### Models of Integration

Although integration was addressed and promoted by the 1990 Perkins Act, this legislation made no formal attempt to define, clarify, or describe how to bring together academic and vocational programs. The responsibility of carrying out the mandate was given to the individual states, as previously discussed. What eventually developed was a series of models or approaches based on the abundance of opinions and goals held by those interested in dovetailing the academic and vocational curriculum.

In the following discussion, the proposed models have been organized by the scale of participation or degree of impact on the school. The first level of participation or impact occurs at the individual classroom level and normally involves one teacher and/or one course. The second is the department level, but this reference goes beyond size. It differs from the classroom level in that there is an actual coming together of academic and vocational programs. The department level also encompasses a larger number of teachers, courses and/or students. It ranges from a few teachers working together on one course to a whole program where many teachers, a variety of courses, and hundreds of students are involved. The final level of integration involves the whole school.

#### Integration at the Classroom Level

The first level or degree of integration involves changes made in an individual academic course or vocational/technical lab. For academic courses, the academic teacher incorporates some degree of vocational content into the existing course. This could range from the academic teacher making a committed effort to enhance an existing unit with a vocational component to making the whole course more vocationally relevant. It could also mean establishing academic prerequisites for certain vocational sequences.

From the vocational class perspective, vocational teachers could alter their courses to include more academic material. Individual teachers within their classrooms could carry out this approach as they enhanced the technical assignments with more academic concepts. This enhancement could be for certain units or a complete course. Examples include the incorporation of writing assignments or the review of mathematical theory if the concepts were applied in the vocational unit.

Whereas the two previous examples dealt with existing courses, new courses may integrate academic and vocational content by using an "applied academic" curriculum. This "off-the-shelf" curriculum was developed by two organizations: the Center for Occupational Research and Development (CORD) and the Alliance for Instructional Technology (AIT).

The applied curriculum takes the theory and concepts from an academic course and places them in the context of personal, societal, and/or occupational situations. Hull (1993) reported that the concept was developed out of a consortium that was formed to finance and organize a physics course that would "teach solid academic content by means of hands-on and vocational applications" (p. 57). This process was later used to develop courses in applied physics, applied biology/chemistry, applied mathematics, applied communication, and applied academics curricula in humanities and economics. It has frequently been associated with the 2+2 Tech-Prep program, although it has also been used by schools as a first step "off-the-shelf" approach to integration.

Although this curriculum is "packaged," Grubb (1995a) reported that schools used the applied academics materials in a variety of ways. The state of South Carolina, for example, formed a hybrid course by utilizing the Applied Communications course with existing literature units. Another school organized the math, English, and science courses around a Principles of Technology course.

For teachers, the exposure to additional fields of study can be a valuable personal and professional learning experience. It can also be an inexpensive and easy way to expand and build on their curriculum. On a larger scale, incorporating diverse concepts into a program or using an applied academic course can be an important and crucial first step in the integration process. Change often must be accomplished at the classroom level, before it can be applied to a department or school.

Although integration at this level is a move in the right direction, it does little to address the larger problem of the division between the courses and students. In addition, the degree of integration depends on the efforts of the individual teacher and the vocational program. This may lead to inconsistency because of variations in teacher commitment, effort, and turnover.

#### Integration at the Department Level

The department level differs noticeably from the classroom level in that vocational and academic programs and their instructors are brought together in some fashion. This level ranges from a few teachers working together on one course to a whole program where many teachers, a variety of courses, and hundreds of students are involved. Because of the wide spectrum of models that fit into this category, it has been divided into two sections. The smaller section would involve no more than three to four teachers and only a few courses. The larger section would involve at least four teachers and include any number of courses at any grade level.

Four or fewer teachers from different subject areas working together define the smaller department. Each teacher has a direct impact on the curriculum but his or her roles vary from model to model. They could be working on a vocational or academic class, trying to enhance an existing class or creating a new one. After this initial step, instructors could stay involved by teaching particular units, offering specialized or individualized help, and refining the course.

Martinez and Badeaux (1992) report how vocational and academic teachers collaborated to enhance academic competencies in a vocational welding class. The teachers worked together to determine which English and math skills students needed for their respective grade level. Welding assignments were then developed with these goals in mind. For example, English tasks involved writing about safety issues while

math skills were bolstered by calculating amounts of materials, job costs, and time. In another example, Bodilly et al. (1992) reported on one school where English classes were matched with certain occupational areas. Assignments in English moved away from literature toward technical writing, with the grading done jointly by the English and technical teachers.

Plihal et al. (1992) identified three models of integration that could occur at the classroom level. Their models rely heavily on the work of curriculum theorists, specifically Tanner and Tanner (1980). The first, a correlated curriculum, brings two or more subject areas together to develop a common topic or theme of study. The previous paragraph illustrated a correlated curriculum. The second model, called a fused curriculum, fuses or merges related subjects in the same field; for example, a new course or subject emerges from certain aspects of each subject. The Rindge School of Technical Arts created a technology education science lab where students were able to engage in hands-on learning of key science principles. This class was not a perceived "easy" science credit since the curriculum was created and overseen by a science-certified faculty member. It has a one-year science prerequisite and has been influential in helping move the science department in a more technical, project-based direction (Berman and Steinberg, 1997).

The last model Plihal et al. (1992) formulated was called a broad fields curriculum. Instead of coupling related subjects like the fused curriculum, the broad fields curriculum blended or unified branches of knowledge from numerous subjects; humanities is a common example. (See Andrew et al.'s (1997) report on McKinley Penn Senior High School where they integrated English, social studies, and media technology into a program with a real-world context.) For example, world history was integrated into the program via the study of communications that began with ancient Egypt and ranged through Europe, America, and eventually the present society. At the

end of the first year, students needed to know at least five forms of media, including the inventors/developers of each medium, the country of origin, and the medium's impact on society.

Like the classroom level, this can be a valuable first step. However, the fact that only a small number of courses are affected has advantages and disadvantages. It can be a positive experience as these programs can serve as models within the school and be replicated for other subject areas. Issues and concerns can be addressed at this level before the concept is expanded. However, the disadvantages of integration at this level are that it can be a time consuming task and requires the commitment of all the teachers involved. This is a serious concern for teachers in small departments since much of their effort must be applied on their own time. The problems associated with the small scale begin to diminish as more of the school embraces the integration concept.

Whereas the first half of integration at the department level was on a smaller scale, integration in larger departments extends the integration of vocational and academic programs to a greater portion of the school. The larger department would involve at least four teachers and at least three courses at any grade level. Also, many programs in this section have a degree of vertical and/or horizontal alignment (Grubb, 1995a). Vertical alignment has vocational and academic teachers cooperating to modify and integrate specific courses, as already discussed. Horizontal alignment refers to integrated courses that are aligned and coordinated over a set period of time.

Another point that differentiates the larger department integration is that programs are accepted as part of the school. Teachers' roles are more structured and organized. The classes they teach and their positions are more formally defined. Not only are the teachers' roles more defined, but the programs are "officially recognized" to a greater degree. Integrated programs at this level frequently have a higher profile

within the school and the school district. This brings a degree of not only verbal but financial support from administrators at various levels. This support also helps the school reach out and form relationships with the community to develop and expand internships and partnerships.

Grubb (1995a) gave an example of a program at the larger department level where all eighth graders take an "Introduction to Technology" course with lessons on new and emerging technologies in four broad industrial clusters. The introductory course was designed to help them make informed choices on their high school curricula. If they chose a technical vocational program, they would then take Algebra I in the ninth grade and Principles of Technology in tenth grade. Their junior and senior years would include their vocational program and additional applied math and English courses.

Another variation for larger departments takes place when schools incorporate the use of student projects. Learning and the school environment are constructed to allow students to pursue topics that are centered on personal interests. A project is selected that integrates knowledge and skills from both vocational and academic courses. Although these projects are associated with, and culminate during, their senior year, they affect other grade levels as well.

Grubb (1995a) reported on one school where teachers worked together and identified the skills students would need to successfully complete their project. Skills like techniques for research, experimentation, and problem solving were incorporated into a reconfigured curriculum to prepare students for their senior projects. Although the projects may not have a specific occupational focus, they have the potential to tap into the strengths of vocational and academic courses and foster collaboration between teachers.



Another example of how the project approach was used to integrate a curriculum was conducted at the Paul M. Hodgson Vocational-Technical High School in Delaware (Tsuzuki, 1995). Students selected their own ideas and completed three components or requirements related to the topic: (1) A shop-based research paper; (2) the design/creation of a product; and (3) a public, formal, oral presentation. To facilitate the process, changes in the curriculum to a more integrated approach have been implemented school-wide. Underclass English courses included a research paper unit while senior level courses were revised to include more technical writing. Also, math teachers were given a period to work in the technical labs teaching theory in application. These curricular changes have increased the diversity within classrooms and reduced tracking.

One of the most common variations of integration at this level is the academy. An academy is a school-within-a-school where the program is centered around certain occupational themes. Frequently, a partnership is established with businesses from the occupational area and they will provide expertise and resources to the program. The original academy concept brought together teachers from math, English, science, and one or two from the vocational subject related to the academy theme. For the duration of the program, students take most of their courses from this core group of teachers. Charner (1996) reported on the Graphics Arts Academy of Pasadena, California, which is a partnership between the school and the Printing Industry Association of Southern California. Sophomores and juniors took nearly all their course work within the academy while seniors took advanced courses at a nearby college. Academic subjects were modified to complement lab sessions and reinforce the relationship of those subjects to printing.

The final example of a model of integration for a large department blended the project and academy approach. The Integrated Design and Electronics Academy

(IDEA) at Phelps Career Senior High School organized learning and knowledge around the problems and needs of the students. In this case, students wanted to enter a contest that required the design and construction of an electric car. Academic teachers of English, social studies, and mathematics joined with the technical teachers from electronics and automotive media to construct a curriculum that would prepare students for the competition. This integrated approach resulted in the production of papers, videos, research on the history of electric cars, schematic drawings, as well as the ultimate construction and repair of an electric car (Andrew et al., 1997)

There are distinct advantages to large department integration programs. First, teachers have the benefit of working with teachers from other subject areas and participating in a valuable learning experience. Working on a common project provides an opportunity for personal and professional growth. In addition, broader corroboration normally means more acceptance and leverage when trying to improve a program. Second, programs have the potential to develop and improve because of their size and greater access to a variety of resources. Better programs can be customized to serve the needs of the school, the student population, and the community. Finally, because larger programs have more visibility and presence, they are more likely to be able to develop and foster links with business partners and post-secondary institutions.

Unfortunately, size does have its disadvantages. Because of the commitment and length of time required for some programs, students need additional assistance to help make educated decisions. This can make it difficult for students who are not accustomed to such a degree of responsibility. Also, some academies target "at risk" students and this can lead to a stigma placed on the program and the perception that it is just another form of tracking.

### Integration at the School Level

Integration at the school level is defined by the entire school participating in some type of integrated curriculum. This means that every administrator, teacher, and student is associated at some level with an integrated program. As with the other levels discussed earlier, schools have accomplished integration in a range of ways. At one end of the range, and the most common, are occupational high schools and magnet schools which tend to have a narrow occupational theme or focus. At the other end are schools that are organized around a series or variety of occupational clusters or careers.

Programs at a magnet school or occupational high school are similar to the academy model in their focus on a particular occupational or subject area. The distinguishing feature of these programs is that they are larger and the whole school is involved. For example, the Manhattan Center High School for Science and Mathematics has a high academic focus, in addition to preparing students for a broad occupational area. The school offers students the opportunity to participate in a number of special occupational programs such as the collaboration with Mount Sinai Medical Center. In this program, students must complete a specific sequence of science courses, which qualifies them to participate in a summer of medical research with second-year medical student mentors (Katz et al., 1995).

The occupational high school is more common to larger cities and is more specialized and career-oriented. The content and skills within the curriculum are focused around certain careers, a particular industry, or subject. Katz et al. (1995) reported on Aviation High School where students could specialize in aviation mechanics and engineering and graduate with a license from the Federal Aviation Administration (FAA) and/or the Federal Communications Commission (FCC). Half

of the curriculum is regulated by industry skill standards (FAA and FCC); the other half is regulated by a college prep program.

Schools that have used the occupational cluster concept share attributes of both academies and magnet schools. Certain occupational groups or clusters are selected and a curriculum is developed for each particular group. Staff and resources are organized around the selected occupational clusters and students who desire to come to the school must elect one. Grubb (1995a) reported that Dauphin County Technical School reorganized the traditional academic departments into four occupational clusters: service, technical, construction, and communications and transportation. Each course has its complement of vocational courses as well as the academic courses required for graduation. Teachers of academic subjects are assigned to a particular cluster and tailor their instruction to the content of the cluster.

Because of the scale of the whole school level of integration, the advantages and disadvantages are also magnified. The main advantage for schools at this level is that they have a definite and distinct focus or mission. This narrow objective can make the decision process easy, because most decisions need to be made with the school mission in mind. In addition, the school is less susceptible to the whims of individual teachers or administrators. Finally, the limited focus can create natural links to the community, business and post-secondary programs. Students at these schools benefit from a concentrated curriculum directed to their personal interests. Because the grouping has been done by interest as opposed to ability, the problem of tracking is minimized.

Because of the scale of the programs, there are distinct disadvantages. The specialized instruction makes many of the programs expensive. Most programs require a greater degree of commitment of time and resources than are needed with the classroom or department level. Because many schools require students to complete an

application procedure, it is difficult for students to move in and out of these schools. Finally, a district or individual school considering this level must realize it is a total restructuring of the whole school environment.

#### The 1990 Perkins Act and the Local Education Agency (LEA)

Campbell, Orth, and Seriz (1981), Grubb et al. (1991) and Plihal et al. (1992) claim that researching integration at the local level is difficult given the vagueness of the legislation, the various interpretations, the dynamics of implementation, and local needs and traditions. These are all valid concerns and applicable to this study. The size and administrative structure of the district add to the task.

The district contains twenty-three high schools with each school having a degree of autonomy regarding their technical programs. However, these programs fall under the jurisdiction of the career and technical division within the district's central administrative structure. This division has one director and approximately six program coordinators who have significant control over the direction of the individual programs. These coordinators serve their programs in any number of capacities but specifically play a leading role as curriculum representatives. Their role is critical in the disbursement of federal or state funds, in particular the Perkins legislation; much of the decision-making power as to how the funds are spent rests not only with the director, but with coordinators as well.

The 1990 Perkins Act limited the use of funds to locations with high concentrations of special populations. This was a change from previous years, in which federal funds were used to support programs at all high schools. In order to comply with the legislative mandates, the technical division undertook a process of identifying the special populations at each high school and prioritizing certain schools

as "limited sites." This process is re-evaluated regularly to assure compliance and verify that the populations are getting served.

Because Perkins funding is tied to special populations, the LEA developed a formula to ensure adequate staffing to meet the needs of the identified populations. Special technical support teams are used to help students succeed. These teams are located at the designated sites and attempts are made to match team members with the needs of the student population.

Members of the support team are not teachers' assistants but provide direct student service. They make accommodations in curriculum, arrange adaptive equipment or work closely with the teacher in the classroom. They serve the students who are having difficulties fulfilling, or who are facing some type of obstacle that will prevent them from, their career development. These obstacles could be academic, language, or some form of disability.

The support teams helped to create a unique model or approach to integration. Although this LEA does not closely resemble any of the previously discussed models, it brings together components found at each level. The classroom level was where the most common integration efforts occurred.

Funds from the Perkins Act were used to bring together academic and technical educators and develop curriculum for the technical area. This was orchestrated by the program coordinators within the career and technical division but included input from other academic coordinators in the system. These efforts resulted in learning activities, curriculum and units aiming to integrate academic concepts into technical courses.

Besides the specific curriculum component, the integration work strongly targeted applied academics. The Perkins funds enabled the LEA to get the staffing and equipment to incorporate the hands-on application of math and reading concepts

into technical programs. Rather than a large-scale commitment to off-the-shelf applied academic materials, this was intended to incorporate the theoretical with the practical.

Most of the efforts just described were carried out at the classroom level and varied from school to school as well as from program to program. However, the overall impact of integration not only touched the classroom level but also reached the department level, the technical high school and the division within central administration.

Fortunately, the integration component of Perkins matched up well with the LEA's academic goals. With the objective that every student experience success, the LEA used an assortment of initiatives to improve reading and math skills. The Perkins funding and the district's integration efforts allowed career and technology programs to remain current and an integral part of the school.

The terms of the legislation were also key to increasing collaboration with other departments. Since funding was no longer designated for certain populations, teachers and administrators could now work together with other offices such as guidance. Combining forces allowed them to focus on the actual needs of individual students and determine the best way to leverage resources to meet those needs.

Although separate, Tech Prep programs were directly related to integration. Perkins funds were used to create formal partnerships between the local community college and the district. The articulation agreements between similar programs enabled secondary and post-secondary staff to communicate and build their programs together. These arrangements helped to increase the academic rigor and quality of the Tech Prep programs. In addition, the influence of these programs raised the academic component of the other technical programs.

## Summary

Within this school district, the 1990 Perkins Act led to an emphasis on integration of technical and academic subjects, increased collaboration between teachers of different subjects, and the establishment of new programs. Although most of the changes occurred at the classroom level, the impact and benefits of the legislation were felt across departments and the entire district. Finally, funds from the legislation served as "seed money" and helped to leverage additional resources from other state and local sources.



## CHAPTER III

### METHODOLOGY

The 1990 Perkins Act contained a notable departure from traditional vocational education legislation when it called for the integration of vocational and academic subjects after 70 years of separation. The integration of academic and technical subjects was a key objective as the Act heralded the end of the duality established by the Smith-Hughes Act of 1917. The Statement of Purpose for the Perkins Act notes the legislation's commitment to integration to develop "...more fully the academic and occupational skills of all segments of the population" (Sec. 2).

The purpose of this study was to examine the integration of vocational and academic programs in one local school district in response to the Perkins Act of 1990. Changes in student composition, achievement, and post-secondary plans from 1993 to 2000 were analyzed to determine the extent and influence of the integration. This chapter provides an overview of the research methodology.

#### Methodological Overview

In order to study the outcomes identified from the Perkins Act, all members of each graduating class, 1993 and 2000, were divided into one of four curriculum categories: (a) an integrated technical and academic curriculum, (b) a technical curriculum, (c) an academic curriculum, or (d) a general curriculum. Gross counts of students and the percentage of change in the number of students were analyzed for each of the curriculum categories.

This analysis was expected to indicate the extent to which there is a shift toward the integrated curriculum. The assumption was that the new hybrid would draw from the group of students who would have otherwise been enrolled in either the strictly vocational, strictly academic, or general curriculum. The first expected outcome was an increase in the number of students in the integrated curriculum. This may indicate a weakening of the rather rigid dual organizational pattern that has existed in the American educational system since the Smith-Hughes Act of 1917.

A greater diversity in the integrated curriculum was the second expected outcome of the Perkins Act of 1990. It was assumed that integrated programs would attract students from all segments of the population and depart from historical enrollment trends in vocational and technical education. To assess changes in the diversity of the student population in the new, integrated curriculum, four student demographic characteristics were examined: (a) gender, (b) student ethnicity, (c) family income level, and (d) linguistic background. Data on gender and ethnicity were available from the student record; family income level is represented by participation in Free and Reduced Price Meals (FARMS), and the linguistic background is measured by participation in English for Speakers of Other Languages (ESOL). Gross counts of students and percentage of change in the number of students with each characteristic were calculated over the time frame of the study.

The Perkins Act of 1990 assumed a larger and more diverse student population would be attracted to the integrated program. It also assumed improved academic performance, the third element of the study. To analyze academic performance, the student's un-weighted Grade Point Average (GPA), Academic Grade Point Average (AGPA), and Scholastic Aptitude Test (SAT) scores were analyzed.

The major assumption is that the comparable achievement of students in the integrated curriculum to students in the academic curriculum indicates a movement

away from the duality in the American educational system. The perception that students taking vocational education are less intellectually capable than those in an academic curriculum is no longer valid. Rather than being something less, the integrated program with its academic component enables students to succeed in a "technologically advanced society" and help the "United States remain competitive in the world economy" (Sec. 2, Perkins Act, p. 49). In addition, the academic component helps position students for post-secondary education.

The fourth implicit outcome of the Act was examined through the post-secondary plans of each group of students. With a greater number and diversity of students taking an academically rich and technically oriented curriculum, the Perkins Act of 1990 expected more of these students would plan to continue their education after graduating from high school. To study the relationship between each of the curriculum categories and post-secondary plans, students' responses regarding post-secondary plans were taken from a senior exit survey. Post-secondary plans are important as a technical education has been perceived as only preparing a student for a job, hence, hindering the continuation of her or his post-secondary education. The Perkins Act of 1990 believed the integrated curriculum would attract a large and diverse population. These students would experience academic success and be positioned to continue their education past graduation.

#### Time Frame and Data Source

Two sampling time frames were used for the study: the graduating class of 1993 and the graduating class of 2000. The school system began collecting data on technical education in 1993 in order to qualify for federal technical education funding through the Perkins Act of 1990. The 2000 class was used since this was the most recent year data was available in a compiled form. Although seven years elapsed

between the collection of the first and second data sets, the data in both sampling frames was comparable. In addition, the time span between the two samples was large enough to reflect change in the integrated curriculum.

Data were collected by the school system in response to State Department of Education reporting requirements for the 1990 Carl D. Perkins Vocational and Applied Technology Act. Although the main administrative office for the school system collected the student data, the data used for this study were obtained from a special division. This division is responsible for collecting, compiling, and reporting data to meet the needs of the public, the superintendent, and federal, state, and local mandates. It also produces reports on performance standards and results; reports results of functional tests, new initiatives and trends; and researches topics in conjunction with curriculum needs.

The steps and procedures to acquire these data included:

1. Preliminary discussions were conducted with members of the technical education division. This resulted in a referral to the accountability department within the LEA.
2. Discussions about the study were held with key members of the accountability department. The director shared reports produced by the department.
3. Review of reports revealed that one report in particular had data related to the study.
4. Additional discussions ensued regarding the availability of these data for the study.
5. Upon clarification that the study would not identify individual students or use other sensitive material, the director gave his approval to use certain components.

6. The application to acquire the data was completed and submitted.
7. The processing of the application went smoothly and can be attributed to:
  - (a) the approval of the director,
  - (b) the familiarity of the study by other divisions within the district's administration,
  - (c) the broad use of the data, i.e., there was no way to identify individual students, programs, or schools, and
  - (d) the researcher being employed in the school district where the study was conducted.
8. Final approval to acquire data was given.
9. Data were released to the researcher for analysis.

The data for this study were specific personal and scholastic information from the student record. The personal information was gender, FARMS participation, ESOL participation and ethnicity. The scholastic information included highest level of math course, participation in technical programs, student GPA and student SAT score.

Finally, the study used the compiled responses from a senior exit survey. The survey collected information on the graduate's view of his or her high school experience, post-secondary plans, and information regarding college applications. The study specifically used the responses to post-secondary plans for analysis across the four curriculums.

### Research Questions

Table 2 displays the expected outcomes of the 1990 Perkins Act. It matches these outcomes to the data sources used with the five research questions.

Table 2

1990 Perkins Act Expected Outcomes and Research Questions

Outcomes - 1990 Perkins Act	Applicable Research Questions
A. Increased number of students in an integrated curriculum	1. What were the changes between 1993 and 2000 in the number and percentage of students who completed: (a) a technical curriculum, (b) an academic curriculum, (c) an integrated technical and academic curriculum, or (d) a general curriculum?
B. Increased diversity of students in an integrated curriculum	2. What were the gross number and percentage of change in gender, ethnicity, family income, and linguistic background between each curriculum category from 1993 and 2000?
C. Improved academic achievement of students in an integrated curriculum	3. When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the groups' Grade Point Average (GPA) and Academic Grade Point Average (AGPA) between the four curriculum categories in 1993 and 2000? 4. When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the students' SAT mean score between curriculum categories from 1993 and 2000?
D. Increased post-secondary participation for students in an integrated curriculum	5. Was there a statistically significant independence in the post-secondary educational plans between students in the technical, academic, general, or integrated technical and academic curriculum in 1993 and 2000??

Research Question One

What were the changes between 1993 and 2000 in the number and percentage of students who completed: (a) a technical curriculum, (b) an academic curriculum, (c) an integrated technical and academic curriculum, or (d) a general curriculum?

One expected outcome of the Perkins Act was to increase participation in the integrated curriculum. This was addressed with research question one. The integrated technical and academic curriculum represents an emerging path while the technical, academic, and general categories represent the traditional paths in American education. An increase in the students in the combined curriculum would indicate the success of the integrated concept encouraged by federal vocational education legislation.

This study used all 6,145 graduates from the class of 1993 and all 7,011 graduates from the class of 2000. Based on criteria described below, the students from each graduating class were divided into one of four curriculum categories.

- Technical students followed a course of study which was career focused and prepared the student for immediate entry in an occupational group or specific job. Students in this group had completed the state approved sequence of courses for a particular program and received a technical certificate in addition to their high school diploma. This program was completed either at a separate career center or through an identified program at his or her comprehensive high school.
- Academic or college preparation students followed a course of study that prepared students to meet standard college entrance requirements. Students in this group had completed at least four credits of math (including algebra 2), four credits of English, three credits of social studies, and three credits of science. [Note: algebra 2 was used as a defining characteristic of the college path. This was the collective opinion of the researcher, other teachers, counselors, and administrators].
- Integrated technical and college preparation students followed a course of study that integrated technical education and academics. Students in this group met both the college and vocational criteria as identified. Although the student characteristics, academic achievement and post-secondary plans of all groups were studied, the students in this category were the focus of this study. The school system has worked to comply with the mandates and qualify for the financial incentives available with the Perkins Act of 1990. Therefore, it was expected that there would be an increase from 1993 to 2000 in the number of students who graduated

from the integrated curriculum. In addition, the Perkins Act of 1990 sought to increase the academic component and increase the post-secondary options for students in technical education.

- General education students met the county standards to graduate but did not complete enough credits to earn the technical certificate and did not take Algebra 2. The Perkins Act of 1990 targeted students in the general education curriculum by providing alternatives and options in the technical area. It was believed there would be a decline in the general education curriculum enrollment category as more students opted for the integrated curriculum.

Research question one examined the change in the number of students in the curriculum categories across the sampling time frame. Gross counts of students and percentage of change in enrollment for each curriculum category were compared between the two sampling years. It was expected that both figures would show an increase in enrollment in the integrated curriculum and a corresponding decline in participation in the technical, academic, and general curricula.

### Research Question Two

What were the gross number and percentage of change in gender, ethnicity, family income, and linguistic background between each curriculum category from 1993 and 2000?

A second expected outcome was the increased appeal of technical education to a more diverse audience. Vocational education was historically perceived to target specific students, including certain ethnic groups, low income students, and/or students whose English was not fluent. Research question two examined the change in these demographic characteristics across the time frame.



The analysis for question two required the curriculum divisions from research question one to remain intact: (a) technical curriculum, (b) academic curriculum, (c) integrated technical and academic curriculum, and (d) general curriculum. Additionally, select student demographic characteristics were identified within each curriculum category: (a) gender, (b) ethnicity, (c) family income level, and (d) linguistic background. The gender and ethnicity data were taken from the student record where five options were available: (a) African-American, (b) Asian-American, (c) Hispanic-American, (d) European-American, or (e) Native American. Family income was represented by participation in FARMS and linguistic background was represented by ESOL participation. Analysis compared the gross counts and the percentage of change of each demographic category over the time frame.

### Research Question Three

When students were grouped by ethnicity, family income, or linguistic background, were there statistically significant differences in the groups' Grade Point Average (GPA) and Academic Grade Point Average (AGPA) between the four curriculum categories in 1993 and 2000?

A third expected outcome of the Act focused on the academic achievement of students in the integrated curriculum. Historic perceptions are that technical students started out less intellectually capable and were placed in a less demanding curriculum or "training" that confined them to a specific occupation. This limited curriculum prevented them from participating in an academically rigorous program, hence, preventing upward mobility.

Research question three analyzed academic achievement in regard to the gender, ethnicity, family income and linguistic background identified in research

question two. The five ethnic categories were (a) African-American, (b) Asian-American, (c) Hispanic-American, (d) European-American, or (e) Native American. In addition, FARMS participation remained an indicator of family income, and ESOL participation remained a determination of linguistic background. It was expected that there would be no statistically significant differences in academic achievement across the four curriculum categories. The statistical analysis employed two-way analysis of variance and independent t-tests.

#### Research Question Four

When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the students' SAT mean score between curriculum categories from 1993 and 2000?

Analysis of SAT scores served as a useful link between research question three and research question five. Analysis of the SAT score was valuable from two perspectives. It provided an additional measure of academic achievement, the third expected outcome of the 1990 Perkins Act. Secondly, the SAT score served as an indicator of interest in attending a college or university. More definitive post-secondary plans were explored with research question five.

The Perkins Act stressed that technical programs should not be terminal. Analysis of SAT scores were expected to indicate how many students from each curriculum took the exam and their relative scores. The assumption was that the number of students from the combined curriculum, along with their scores, would be similar to those in the academic preparation curriculum. Also, the scores on the SAT test may be similar for students in the combined curriculum when compared to the academic curriculum.

Research questions three and four analyzed the academic achievement of students in four curriculum categories. Analysis was conducted across a time frame; 1993 to 2000, and between demographic variables—gender, ethnicity, income and linguistic background. Two-way and one-way analyses of variance were used, followed by independent t-tests.

#### Analysis of Variance (ANOVA)

Analysis of Variance (ANOVA) was used to determine if there were significant statistical differences in the mean final GPA, AGPA, and SAT scores. The analysis of variance is a parametric statistic that tests for differences in means between two or more groups. When ANOVA is used, there is an assumption that the numbers are of integral quality and that the distribution of scores is normal. The one-way ANOVA is used when the research involves one independent variable—curriculum category (Sprinthall, Schmutte, & Sirois, 1991).

Shavelson (1988) adds that the purpose of the one-way ANOVA is to compare the means in order to decide whether the observed difference between them represents chance or a systematic effect. ANOVA accomplishes this by comparing the variability within a curriculum category with the variability between the categories. If the variability between the curriculum categories was significantly greater than the variability within the category, the result was attributed to the independent variable (curriculum category).

Two-way Analysis of Variance - A two-way ANOVA was used for a comparison of GPA, AGPA and SAT scores between student demographics and curriculum categories and between 1993 and 2000. Shavelson (1988) states that the use of two-way ANOVA presupposes that the data have been collected where:

(a) there are two independent variables, each with two or more levels; (b) the levels of

the independent variables may differ either qualitatively or quantitatively; (c) a subject may appear in one and only one cell of the design; and (d) the subject represents a random sample from the population defined by that cell.

#### Research Question Five

Was there a statistically significant independence in the post-secondary educational plans between students in the technical, academic, general, or integrated technical and academic curriculum in 1993 and 2000?

The graduates' plans are important to this study as technical education has been perceived as only preparing a student for a job, hence, hindering the continuation of her or his education past high school. The Act sought to expand opportunities by increasing the academic component in technical programs in order to make some type of post-secondary education a viable option for all students. Given the assumption that a greater number of students in the integrated curriculum will take the SAT exam, it is expected that more will plan on attending post-secondary education as intended by the Perkins Act of 1990.

The data for research question five were obtained from a senior exit survey. This survey of graduating seniors was collected by the school system as a reporting requirement to the Maryland State Department of Education (MSDE) under the 1990 Carl D. Perkins Vocational and Applied Technology Act of 1990. This survey was administered to students just prior to graduation. Schools were required to give the survey, but they decided the time and location. The survey asked questions about a student's high school experience, status of post-secondary school applications, and plans for the future. The school system used the results of the survey for local reporting and compliance with state and federal regulations. The survey had been adapted to meet the needs of the system since it was first administered in 1993. These

changes included questions dealing with technology and an increased number of response choices. A comparison of the two responses showed that the 2000 survey had increased the number of response choices to the question of post-secondary plans.

The researcher used chi-square to analyze research question five and test for independence between plans and curriculum category. In order to use chi-square for the analysis, the 2000 survey response choices were condensed to match the 1993 responses. Surveys with more than one response were discarded. Copies of the two exit surveys are included in Appendixes A and B.

When the objective is to test for "frequency differences between two or more groups, the appropriate statistical test is chi-square" (Sprinthall, Schmutte, & Sirois, 1991, p. 153). The chi-square test is a nonparametric statistic and used to "describe and analyze data that are not assumed to be distributed in accordance with the normal curve" (Charles, 1995 p. 126). Shavelson (1988) outlined the circumstances where the chi-square statistic can be used: (a) when observed frequencies are compared to expected frequencies, (b) the data is in the form of counts, (c) the independent variable is in the form of discrete categories, (d) the data may be collected in a one-way design or in a two-way design, and (e) responses fall in only one cell of the design.

### Summary

The purpose of this study was to examine the integration of vocational and academic programs in one local school district in response to the Perkins Act of 1990. Implicit in the legislation were four expected outcomes, which would result from this integration. The first was that more students would be expected to enroll in a combined vocational and academic program. Secondly, diversity of students in the new integrated program would reflect the general student population. Thirdly, students participating in the integrated curriculum would demonstrate a higher level of

academic achievement than vocational students had demonstrated in the past. Finally, students from the integrated curriculum would plan to pursue post-secondary education opportunities at higher rates than expected from technical students in the past. These expected outcomes were analyzed by using changes in student composition, achievement, and post-secondary plans from 1993 to 2000.

## CHAPTER IV

### FINDINGS

With the passage of the Smith-Hughes Act of 1917, the role of vocational education in America's secondary schools was validated. The Act created an alternative to the strictly academic curriculum and focused on preparing students to enter an occupation. The structure of the federal legislation, however, enabled state and local education agencies to create and administer a dual system. Students planning to continue with post-secondary education were on one curriculum track, while students who planned to directly enter the workforce were on another path. This division was supported by ensuing federal vocational education legislation and continued to exist through most of the twentieth century.

Problems emerged from the division. Critics of vocational education were concerned that any type of non-academic education would attract disproportionate numbers of ethnic or low-income students, or target specific students such as those with substandard academic achievement or a limited mastery of English. These students would be exposed to an inferior education of narrowly defined training. This would hinder a student's upward mobility by preparing them only for specific occupations (Ravitch, 2000; Spring, 1976).

Because some vocational education programs lacked a strong academic component, they were perceived as limiting the students' occupational and post-secondary opportunities. However, this view began to change in the latter part of the twentieth century when prevailing social and educational factors helped alter the

perception of vocational education. These factors included: (a) educational reform literature, (b) an emerging global economy, (c) a greater appreciation for the contribution of vocational education, and (d) new research on the learning process. Vocational education, with its practical and hands-on approach, was recognized for its potential contribution to a well-rounded education.

The passage of the Carl D. Perkins Vocational and Applied Technology Education Act of 1990 was an attempt to support a "new" kind of vocational education. This legislation was important as it departed sharply from the earlier and more traditional vocational education legislation. It called for vocational education, now more commonly referenced as technical education, to play an enhanced new role in the nation's education arena by including greater emphasis on the integration of academics and vocational-technical studies. This study addressed how this new direction affected one local education agency (LEA).

The district where this study was conducted is one of the most affluent and educated in the country. For example, 54.6% of individuals over 25 have a bachelor's degree or higher, which is over twice the national average (quickfacts.census.gov, June 30, 2003). The community prides itself on academic achievement and this is reflected in the schools. All students are required to complete a curriculum designed to qualify graduates to enter the state universities. Even with the academic emphasis, technical programs have a place in this community. The district supports one technical high school where students attend for half a day, attending their "home" school for the other half. In addition, all 23 comprehensive high schools offer anywhere from two to eleven technical programs.

The existence of these programs prompted the LEA to secure funding from the 1990 Perkins Act. With the LEA receiving a significant source of funds for technical programs, the researcher believed it would be valuable to study the effect of



integrating technical and academic subjects in an LEA with a heavy emphasis on academic achievement.

From the terms of the Act, the researcher identified four expected outcomes. They were: (a) an increase in the total number of students in integrated curriculums, (b) a greater diversity of students, (c) a higher level of academic achievement than technical students had demonstrated in the past, and (d) an increase in the number of technical students who plan to pursue postsecondary education opportunities.

### Statement of the Problem

This study compared selected characteristics of students who completed an integrated technical-academic curriculum with students who completed one of three other courses of study: an academic, a technical, or a general curriculum. Eight groups of high school graduates were studied. Four groups graduated in 1993 and were identified by completion of an academic, a technical, an integrated technical-academic, or a general curriculum. The other four groups graduated in 2000 and were also identified by completion of one of the four curriculums. The change over the seven years in the number and percentage of students in the integrated curriculum and the change in the demographic characteristics of each curriculum were analyzed.

The outcomes, or changes, were measured by comparing information from the graduating class of 1993 against that of the graduating class of 2000. Each class was divided into four curriculum categories: (a) technical, (b) academic, (c) integrated technical and academic, and (d) general education. The academic achievement and post-secondary plans of students with different demographic characteristics were studied within each curriculum category.

## Research Questions

The following research questions guided this study.

1. What were the changes between 1993 and 2000 in the number and percentage of students who completed: (a) a technical curriculum, (b) an academic curriculum, (c) an integrated technical and academic curriculum, or (d) a general curriculum?
2. What were the gross number and percentage of change in gender, ethnicity, family income, and linguistic background between each curriculum category from 1993 and 2000?
3. When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the groups' Grade Point Average (GPA) and Academic Grade Point Average (AGPA) between the four curriculum categories in 1993 and 2000?
4. When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the students' highest SAT mean score between curriculum categories from 1993 and 2000?
5. Was there a statistically significant independence in the post-secondary educational plans between students in the technical, academic, general, or integrated technical and academic curriculum in 1993 and 2000?

The issue of enrollment that research question one addressed was important because participation in vocational programs had suffered through the 1980s. Many believe this was attributed to the fallout from the academic emphasis stressed by A Nation at Risk ((National Commission, 1983). This academic push resulted in an increase in graduation requirements, which reduced participation in vocational-related

programs (Douglass, 1989, Lonza, 1988; Tuma et al., 1989). Besides the increased graduation requirements, the perception still persisted that vocational courses would not prepare students for college (Rossetti, 1989). Finally, interest in and support for vocational programs may have dropped because employers wanted to provide their own training due to rapidly changing job skills (Lonza, 1988).

Regardless of the speculation about the drop in enrollment, participation in vocational programs was important to legislators as they crafted the 1990 Perkins Act. Legislators believed one outcome of the 1990 Perkins Act would be an increased number of students in an integrated curriculum. This was the first of four expected outcomes previously identified by the researcher and led to the development of research question one.

### Research Question 1

What were the changes between 1993 and 2000 in the number and percentage of students who completed: (a) a technical curriculum, (b) an academic curriculum (c) an integrated technical and academic curriculum, or (d) a general curriculum?

Table 3 displays the number of graduates for each time frame, 1993 and 2000, divided into one of the four curriculum categories.

Table 3

### Number of Graduates in Each Curriculum and Percent Change

1993 and 2000 Graduates Divided by Curriculum and the Percentage of Change														
Technical			Academic			Integrated Technical and Academic			General			Grand Total		
1993 total	2000 total	% chge	1993 total	2000 total	% chge	1993 total	2000 total	% chge	1993 total	2000 total	% chge	1993 total	2000 total	% chge
355	281	-20.9	4468	5530	23.8	263	402	52.9	1059	798	-24.7	6145	7011	14.1

Results from Table 3 show that the number of graduates in the system increased from 6145 in 1993 to 7011 in 2000, an increase of 866 students or 14.1%.

Table 3 shows that the academic category was the largest and displayed the greatest increase in raw numbers, a gain of 1062 students or 23.8%. The integrated category had an increase of 139 students, a gain of 52.9%, the greatest percentage of increase of students from 1993 to 2000. The general category and the technical curriculum both lost students between 1993 and 2000.

This study revealed that the first expected outcome of the Perkins Act, an increased number of students in the integrated curriculum, was achieved. Although the low raw numbers may display the newness of the concept, the integrated curriculum had the greatest percentage of increase (52.9%) across the time frame. This reflects that an integrated curriculum can succeed and attract students, even in a community that places a premium on a college preparation curriculum.

With the results from research question one confirming that an increasing number of students were attracted to the integrated curriculum, the question of the demographics of these students needed to be addressed. The demographics of students involved in a program with a vocational component have been an issue since the Smith-Hughes Act of 1917. The dualism in education that evolved from the act resulted in vocational students being separated from academic students and programs. This separation led to a degree of alienation and the perception that vocational students were outside the educational mainstream. They were too often viewed as students of below-average ability, or from disadvantaged families, or perhaps recent immigrants.

Legislators recognized this state of affairs as they created the 1990 Perkins Act. The importance of diversity is reflected in the statement of purpose when it indicated that the intent was to develop ". . . the skills of all segments of the population" [Section 2]. The expectation was that an integrated technical and academic curriculum would attract a demographically diverse group of students. This

was the second of the four outcomes identified by the researcher and it led to the development of research question two.

### Research Question 2

What were the gross number and percentage of change in gender, ethnicity, family income, and linguistic background between each curriculum category from 1993 and 2000?

Gender. Table 4 displays the changes in the number and percentage of students in the curriculum categories across the time frame, based on gender. For females, the academic curriculum experienced the greatest change in overall enrollment across the time frame, a gain of 675 students, a 30.6% increase. However, the integrated category showed the greatest percentage gain, 69.8%, or a net enrollment gain of 107 female students. Both the general and the technical curricula experienced drops in female participation.

For males, the results are similar to the females, although not as dramatic. The academic curriculum increased by 387, or 17.1%. The largest percentage increase for males was the integrated curriculum with a 29.1% gain. Student enrollment in both the general and technical curricula dropped.

Table 4

### Graduates Divided by Curriculum and Gender

1993 and 2000 Graduates Divided by Curriculum, Then Subdivided by Gender												
	Technical			Academic			Integrated Technical and Academic			General		
Gender	1993 total	2000 total	% chge	1993 total	2000 total	% chge	1993 total	2000 total	% chge	1993 total	2000 total	% chge
Female	170	146	-14.1	2205	2880	30.6	153	260	69.9	493	377	-23.5
Male	185	135	-27.0	2263	2650	17.1	110	142	29.1	566	421	-25.6

This study showed that the second expected outcome of the Perkins Act, to attract a demographically diverse group of students, particularly females, was attained. Females in the integrated curriculum had the largest percentage increase, 69.9%, of either gender in any curriculum category. This compares to an increase of females in the general population of only .3% from the 1990 census until the 2000 census. (The 1990 source was <http://factfinder.census.gov> on October 24, 2003, while the 2000 source was <http://www.mc-mncppc.org> on October 18, 2003.)

The significant increase for the integrated curriculum reflects that it can succeed in attracting female students. This is an important point as an education with a vocational or technical component was previously thought to be more appropriate or applicable to male students.

Ethnicity. Although the Perkins Act only mentions ethnicity tangentially, the researcher believed it was important to look at this demographic component. The statement in the 1990 Perkins Act to reach "all segments of the population" and the desire of the local education agency to have "success for every student" implied greater ethnic diversity.

The researcher divided the students into five ethnic groups: African-American, Asian-American, Hispanic-American, European-American, and Native American. Table 5 displays the changes in the number and percentage of students in the curriculum categories across the time frame, based on ethnicity. The integrated curriculum gained the greatest percentage from 1993 to 2000 in four out of the five ethnic divisions: African-Americans, a 157.8% gain; Hispanic-Americans, a 129.2% gain; Native Americans, a 100% gain; and European-Americans, a 47.5% gain. The general curriculum saw the greatest gain for Asian-Americans, 47.4%; the integrated curriculum was a close second with a gain of 40.5%. Because of low enrollment of Native Americans, they were dropped from further analysis.

Table 5

Graduates Divided by Curriculum and Ethnicity

1993 and 2000 Graduates Divided by Curriculum, Then Subdivided by Ethnicity												
Ethnicity	Technical			Academic			Integrated Technical and Academic			General		
	1993 total	2000 total	% chge	1993 total	2000 total	% chge	1993 total	2000 total	% chge	1993 total	2000 total	% chge
African American	67	107	59.7	45	822	82.3	45	116	157.8	241	326	35.3
Asian American	19	11	-42.1	750	1008	34.4	37	52	40.5	38	56	47.4
Hispanic American	53	55	3.7	206	412	100.0	24	55	129.2	149	204	45.7
European American	145	107	-26.2	2390	3276	37.1	120	177	47.5	390	211	-45.9
Native American	0	1	100.0	11	12	9.1	1	2	100.0	1	1	0.0

Census data revealed that from 1990 to 2000, the percentage of African-Americans within the general population increased 43.4%. This compares to an increase of 157.8% within the integrated curriculum. In other words, African-Americans in the integrated curriculum had a net gain of 114.4% over their change in the general population. The same census data showed that the percentage of Hispanic-Americans within the general population went up by 80.7%. This compares to an increase of 129.2% within the integrated curriculum. Hispanic-Americans in the integrated curriculum had a net gain of 48.5% over their change in the general population. Census data displayed the fact that European-Americans had a drop of 2.6% in the general population. This compares to a 47.5% gain within the integrated curriculum. European-Americans in the integrated curriculum had a net gain of 50.1% over their change in the general population. The census data for Asian-Americans in the general population showed a gain of 59.8% from 1990 to 2000. Their gain within the integrated curriculum was 40.5%, which placed it second to the general curriculum. Asian-Americans in the integrated curriculum had a net loss of 19.3%

over the change in the general population. Native Americans had a 100% gain but the gain in the general population was not available. (The 1990 source was <http://factfinder.census.gov> on October 24, 2003, while the 2000 source was <http://www.mc-mncppc.org> on October 18, 2003.)

In sum, the integrated curriculum demonstrated that it could attract a diverse ethnic group of students. This was established by the high gains in African-American enrollment when compared to their growth within the general population over the same period (+114.4%). The gains were not as dramatic but Hispanic-Americans and European-Americans also showed gains over and beyond their increases within the general population (+48.5% and +50.1%, respectively). The gain by Asian-Americans in the integrated curriculum was lower than their change in the general population and represents a net loss of students (-19.3%).

Free and Reduced Price Meals (FARMS). The 1990 Perkins Act targeted low-income students as a population for inclusion in the integrated programs.

"Economically disadvantaged" is specifically mentioned as a special population to be included in local applications to the state. To assure the inclusion of these students, the application by local education agencies must describe how access to programs of good quality will be provided to these students [Section 240(4)]. This study used participation or non-participation in FARMS as an indicator of family income.

Table 6 displays changes in the number and percentage of students in the curriculum categories across the time frame, based on FARMS participation. For FARMS participants, the academic curriculum and the integrated curriculum had the greatest increases, 548 (89.7%) and 75 (87.2%) respectively. The general curriculum increased 18.53% while the technical curriculum had the lowest increase in FARMS participation at 1.97%. For the non-FARMS participants, the greatest increase was in



the integrated curriculum, 36.2%, while the academic curriculum increased by 13.3%. There were relatively sharp drops in both the technical and general curricula.

Table 6

Graduates Divided by Curriculum and FARMS Participation

1993 and 2000 Graduates Divided by Curriculum, Then Subdivided by FARMS Participation												
Status	Technical			Academic			Integrated Technical and Academic			General		
	1993 total	2000 total	% chge	1993 total	2000 total	% chge	1993 total	2000 total	% chge	1993 total	2000 total	% chge
FARMS Participant	152	155	2.0	611	1159	89.7	86	161	87.2	394	467	18.5
Non-participant	203	126	-37.9	3857	4371	13.3	177	241	36.2	665	331	-50.2

In terms of FARMS participation, the study showed that the second expected outcome of the Perkins Act was attained. Census data revealed that related children under 18 years old and below the poverty level rose from 4.9% of the population in 1989 to 5.9% in 1999, a net increase of 1%. This compares to students in the integrated curriculum and participating in the FARMS program where there was an 87.2% increase, well above the poverty indicator for the LEA. The 87.2% increase for the integrated curriculum was right behind the 89.7% increase of FARMS students enrolled in the academic curriculum. (1990 source was <http://factfinder.census.gov> on October 24, 2003, while the 2000 source was <http://www.mc-mncppc.org> on October 18, 2003.) The significant increase of FARMS students in the integrated curriculum reflects that it can succeed in attracting students from lower economic levels.

The relatively low increase of FARMS participants in the technical curriculum is counter to the conventional wisdom that lower socio-economic class students tend to be directed into technical programs. This finding is similarly reinforced by the 89.7% enrollment increase in FARMS students in the academic curriculum. Results indicate that lower SES students are heavily attracted to the academic and integrated

curriculum (net gains of 88.7% and 86.2%, respectively) rather than the technical and general programs (net gains of 1.0% and 17.5%, respectively). Net gains reflect the 1.0% rise in the poverty level from 4.9% to 5.9% across the time frame.

ESOL. The same logic used for the inclusion of FARMS participants in an integrated curriculum applies to ESOL students. To assure the inclusion of "students of limited English proficiency," the application by local education agencies must describe how access to programs of good quality will be provided [Section 240(4)]. This study uses participation in ESOL programs as an indicator of limited English proficiency.

Table 7 presents the changes in the number and percentage of students in the curriculum categories across the time frame, based on ESOL participation. The integrated curriculum experienced an increase between 1993 and 2000 for both ESOL participants (35.9%) and non-participants (58.3%). The academic curriculum increased by 27.3% and 23.2% respectively, while the general category increased by 11.6% for ESOL participants, but declined for non-participants. The technical curriculum decreased for both participants and non-participants.

Table 7

Graduates Divided by Curriculum and ESOL Participation

1993 and 2000 Graduates Divided by Curriculum, Then Subdivided by ESOL Participation												
ESOL Status	Technical			Academic			Integrated Technical and Academic			General		
	1993 total	2000 total	% chge	1993 total	2000 total	% chge	1993 total	2000 total	% chge	1993 total	2000 total	% chge
ESOL Participant	90	60	-33.3	620	789	27.3	64	87	35.9	232	259	11.6
Non-participant	265	221	-16.6	3848	4741	23.2	199	315	58.3	827	539	-34.8

In terms of ESOL participation, the study showed that the second expected outcome of the Perkins Act was attained. Students participating in the ESOL program

and the integrated curriculum had the largest increase in percentage for all categories with 35.9%. This compares with a gain of 10.4% from 1990 to 2000 for people who spoke a language other than English in the home in the general population. ESOL participants in the integrated curriculum had a net gain of 25.5% when compared to their change in the general population. When the net gain for ESOL students in the general population is considered for the other curricula, the academic category had a net gain of 16.8%, the general curriculum had a net gain of 1.2%, and the technical curriculum had a net loss of 44.2%. (The 1990 source was <http://factfinder.census.gov> on October 24, 2003, while the 2000 source was <http://www.mc-mnceppc.org> on October 18, 2003.)

The results for ESOL students across the curriculum categories follow the same pattern as the results for FARM students. ESOL students are attracted to the integrated and academic programs in greater numbers than the general or technical curricula. This runs counter to the traditional belief that students with limited English proficiency are directed away from academic studies.

To summarize research questions one and two, the findings showed that the integrated curriculum attracted a growing number of students, and in particular, students from diverse backgrounds. More students across all demographic categories appear to value the integrated in greater numbers over the general or technical programs. The greatest loss of students is from the general curriculum followed by the technical. The academic curriculum, on the other hand, continues to be highly attractive to students.

Research question three addressed the issue of the students' academic achievement in various curricula. Historical perceptions were that technical students started out less intellectually capable and were placed in a less demanding curriculum or "training" that confined them to a specific occupation. This limited curriculum

prevented them from participating in an academically rigorous program, hence preventing upward mobility.

Legislators wanted to increase the academic component of vocational education so that vocational students would be encouraged to achieve academic levels comparable to students in the college preparation curriculum. The 1990 Perkins Act was written to persuade local programs to provide vocational education students with "strong development and use of problem-solving skills and basic and advanced academic skills (including skills in the areas of mathematics, reading, writing, science, and social studies) in a technological setting" [Section 113(3)(B)(ii)]. It also mandated that each state implement local standards that include ". . . student progress in the achievement of basic and more advanced academic skills [Section 115(b)(1)].

It was hoped that a strong academic element in conjunction with the technical portion would provide an instructional combination that would enhance the academic interest and achievement of students in the integrated curriculum. This focus on academic achievement for students in the integrated curriculum was the third expected outcome of the act. It led to the development of research questions three and four.

### Research Question 3

When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the groups' Grade Point Average (GPA) and Academic Grade Point Average (AGPA) between the four curriculum categories in 1993 and 2000?

### Statistical Hypothesis 3

There is no statistically significant difference in Grade Point Average or Academic Grade Point Average means based on gender, ethnicity, family income, or linguistic background between the four curriculum categories in 1993 and 2000.

Given the complexity of research question three, the analysis for each of the four demographic groups (gender, ethnicity, FARMS participation and ESOL participation) by curriculum is presented individually for years 1993 and 2000. This is followed by analysis across the time period, 1993-2000. Individual two-way and one-way analyses of variance were computed followed by independent t-tests. Because there were so many means to be computed, the statistical significance level was set at .01 to avoid errors. The reason for setting the significance level at .01 as opposed to the conventional level of .05 was that there were so many tests of significance done that by chance, a variable might have been identified as being significant when by using the higher level of .01, it would not have been.

Curriculum and Gender. The statistical hypothesis was tested using two-way analysis of variance (ANOVA) with GPA, then AGPA, on curriculum and gender. The results on curriculum and gender are presented in Table 8 for 1993.

Table 8

Two-Way Analysis of Variance, GPA and AGPA, by Curriculum and Gender, 1993

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
<u>GPA</u>					
Curriculum	158.52	3	52.84	244.84	.001
Gender	.58	1	.58	2.70	.10
2-Way Interactions	1.83	3	.61	2.83	.06
<u>AGPA</u>					
Curriculum	236.69	3	78.90	261.96	.001
Gender	1.22	1	1.22	4.04	.04
2-Way Interactions	2.07	3	.69	2.29	.08

The data presented in Table 8 for GPA and AGPA for 1993 show that there was a statistically significant difference in means based on curriculum. There was no statistically significant difference based on gender and there was no statistically significant interaction effect.

In order to determine the source of the statistically significant difference in curriculum, the researcher computed a one-way analysis of variance for both GPA and

Table 9

One-Way Analysis of Variance on GPA and AGPA by Curriculum Type - 1993

GPA					
Source of Variation	DF	Sum of Squares	Mean Square	F Ratio	F Probability
Between Groups	3	506.30	168.77		
Within Groups	6141	1407.47	.23	736.35	.0001
Total	6144	1913.77			

G G G G  
r r r r  
p p p p  
1 3 4 2

1 = Technical  
3 = General  
4 = Integrated  
2 = Academic

<u>Mean</u>	<u>CTEALG2</u>
2.35	Group 1
2.44	Group 3
2.82	Group 4
3.05	Group 2

\* \*  
\* \* \*

AGPA					
Source of Variation	DF	Sum of Squares	Mean Square	F Ratio	F Probability
Between Groups	3	725.05	241.68		
Within Groups	6141	1943.45	.32	763.68	.0001
Total	6144	2668.50			

G G G G  
r r r r  
p p p p  
1 3 4 2

1 = Technical  
3 = General  
4 = Integrated  
2 = Academic

<u>Mean</u>	<u>CTEALG2</u>
2.06	Group 1
2.07	Group 3
2.53	Group 4
2.88	Group 2

\* \*  
\* \* \*

AGPA for 1993. As shown in Table 9, the results for GPA show that there was a statistically significant difference between the academic group and the general, technical and integrated curricula. There was also a statistically significant difference between the integrated curriculum and the general and technical groups. Similar results were found for AGPA.

These findings support the intention of the policy makers involved in creating the Perkins Act. The data indicate that the students in the integrated curriculum earned higher mean grades than the students in the technical or general curricula. However, students in the integrated curriculum earned lower mean grades than students enrolled in the academic curriculum. These findings indicate that the statistical hypothesis for curriculum is rejected. There were statistically significant differences in the curricular means. The statistical hypothesis on gender is accepted since there was no statistically significant difference.

The analysis of curriculum and gender for 2000 used the same process as 1993, a two-way analysis of variance followed by a one-way analysis of variance. The results on curriculum and gender are presented in Table 10.

Table 10

Two-Way Analysis of Variance, GPA and AGPA, by Curriculum and Gender, 2000

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
GPA					
Curriculum	206.06	3	68.67	260.91	.001
Gender	7.32	1	7.32	27.82	.001
2-Way Interactions	1.71	3	.57	2.17	.09
AGPA					
Curriculum	260.43	3	86.81	252.71	.001
Gender	10.32	1	10.32	30.03	.001
2-Way Interactions	1.55	3	.52	1.51	.21

The data presented in Table 10 for 2000 indicate that for gender and across the four curriculum categories, there were statistically significant differences in means for both GPA and AGPA. There was no statistically significant interaction effect.

To determine the source of the statistical difference in curriculum, the researcher next computed a one-way analysis of variance for both GPA and AGPA for 2000. The results, displayed in Table 11, indicated that for GPA, there was a statistically significant difference between the academic group and the general, technical and integrated curricula. There was also a statistically significant difference between the integrated curriculum and the general and technical groups. Similar results were found for AGPA.

These results, presented in Table 11 for 2000, reflect the same findings presented in Table 9 for 1993. The integrated curriculum group rose to the challenge and out-performed the students in the technical and general curricula. It is also worth noting that the mean score of the students in the integrated curriculum was much closer to the mean of the students in the academic track in 2000 than it was in 1993. This indicates that the students in the integrated curriculum are closing the gap with the academic group. The statistical hypothesis is rejected for both curriculum and gender.

The data displayed in the two-way analysis of variance in Table 10 show that there was a statistically significant difference between males and females on both GPA and AGPA in 2000. To identify where the statistically significant differences lay, the researcher conducted a series of independent t-tests on each curricular area. This may indicate if the statistically significant differences are based on curriculum between 1993 and 2000.



Table 11

One-Way Analysis of Variance on GPA and AGPA by Curriculum Type - 2000

GPA					
Source of Variation	DF	Sum of Squares	Mean Square	F Ratio	F Probability
Between Groups	3	896.24	298.75		
Within Groups	7007	2262.91	.32	925.05	.0001
Total	7010	3159.15			

G G G G      1 = Technical  
 r r r r      3 = General  
 p p p p      4 = Integrated  
                  2 = Academic  
 1 3 4 2

<u>Mean</u>	<u>CTEALG2</u>
2.01	Group 1
2.23	Group 3
2.86	Group 4
3.06	Group 2

\* \*  
 \* \* \*

AGPA					
Source of Variation	DF	Sum of Squares	Mean Square	F Ratio	F Probability
Between Groups	3	1074.99	358.33		
Within Groups	7007	2850.81	.41	880.74	.0001
Total	7010	3925.80			

G G G G      1 = Technical  
 r r r r      3 = General  
 p p p p      4 = Integrated  
                  2 = Academic  
 1 3 4 2

<u>Mean</u>	<u>CTEALG2</u>
1.78	Group 1
1.90	Group 3
2.60	Group 4
2.90	Group 2

\* \*  
 \* \* \*

The results are presented by curriculum type in Table 12. The statistically significant differences in gender for 2000 can be attributed to the fact that females had higher means than males for all curriculum categories. Although females were higher

than males for both 1993 and 2000, the difference only became statistically significant in 2000.

Table 12

Independent t-tests for GPA and AGPA by Curriculum and Gender for 1993 and 2000

Gender	1993 Mean	2000 Mean	t-Value	2-Tail Significance
General Curriculum - GPA				
Male	2.29	1.89	14.36	.001
Female	2.40	2.14	8.04	.001
General Curriculum - AGPA				
Male	2.00	1.65	11.65	.001
Female	2.13	1.93	5.63	.001
Academic Curriculum - GPA				
Male	2.96	2.95	.51	.61
Female	3.15	3.15	.42	.67
Academic Curriculum - AGPA				
Male	2.77	2.77	.03	.97
Female	3.00	3.02	.96	.34
Technical Curriculum - GPA				
Male	2.42	2.18	4.95	.001
Female	2.45	2.28	3.43	.001
Technical Curriculum - AGPA				
Male	2.05	1.80	4.46	.001
Female	2.09	1.99	1.87	.06
Integrated Curriculum - GPA				
Male	2.81	2.71	1.54	.13
Female	2.84	2.94	2.16	.03
Integrated Curriculum - AGPA				
Male	2.51	2.39	1.51	.13
Female	2.54	2.70	2.96	.01

Further analysis of the data shown in Table 12 documents the fact that there was a statistically significant difference in the general curriculum area between 1993 and 2000 for both GPA and AGPA. In the technical curriculum, there were statistically significant differences for both males and females in GPA and males in AGPA. For both curricula, the means for both males and females were statistically significantly lower in 2000. The means declined for female AGPA in the technical

curriculum but the change was not statistically significant. These data support the idea that students who do the least well academically, regardless of gender, seem to opt for the general curriculum.

In the academic curriculum, there were no statistically significant differences in GPA and AGPA between 1993 and 2000. Each gender within the academic curriculum had the highest means of any curriculum group and showed no change or very little positive or negative change across the time frame. In the integrated curriculum area, there were no statistically significant differences in GPA. For AGPA females, there was a statistically significant difference, but not for males.

Additional analysis of the integrated curriculum reveals that when change across the time frame was considered, females in the integrated curriculum had gains of .10 in GPA and .16 for AGPA. These gains are of consequence because they reflect the greatest net gain and greatest percentage gain by females in any curriculum category. Except for the AGPA in the academic curriculum where it remained unchanged, the GPA and AGPA for males declined by .01 and the integrated curriculum had the next two smallest declines of .10 for GPA and .12 for AGPA.

To sum curriculum and gender, the statistically significant difference for curriculum for each year is documented by the fact that the means of the academic and the integrated curricula were higher than the means for the general and technical curricula. In addition, the year 2000 had a statistically significant difference in means for gender for GPA and AGPA that was not found for 1993. This is because females had higher means than males in all curriculum categories. This suggests that the integrated curriculum is attracting females who do well academically.

Curriculum and Ethnicity. The 1990 Perkins Act did not specifically address the academic success of certain ethnicities. However, the terminology and references

to all segments of the population imply that all ethnic groups experience a sense of accomplishment and achievement with their education.

Statistical hypothesis 3 was tested on curriculum and ethnicity using two-way ANOVA with GPA, then AGPA. The results on curriculum and ethnicity are presented in Table 13 for 1993. These data show that there was a statistically significant difference in means based on the curriculum and the ethnicity of the students in 1993. It was not possible to compute an interaction effect because there were some empty cells in the analysis caused by low counts for Native Americans.

Table 13

Two-Way Analysis of Variance, GPA and AGPA, by Curriculum and Ethnicity, 1993

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
GPA					
Curriculum	92.38	3	30.79	150.23	.001
Ethnicity	58.03	4	14.51	70.78	.001
2-Way Interactions	*	*	*	*	*
AGPA					
Curriculum	147.11	3	49.04	168.98	.001
Ethnicity	72.76	4	18.19	62.68	.001
2-Way Interactions	*	*	*	*	*

\*Not computed because of empty cells.

The statistically significant differences in curriculum in Table 13 confirm what was documented in the gender-curriculum analysis and will not be pursued in detail. However, to summarize, Table 9 and Table 11 identified that the statistically significant differences in curriculum were between the academic group and the general, technical, and integrated curricula. There was also a statistically significant difference between the integrated curriculum and the general and technical curricula. The integrated curriculum group performed better than the general or technical group and it is closing the gap with the academic group.

In addition, Table 13 indicates that there was a statistically significant difference based on ethnicity. To find out where the difference existed, the researcher computed a one-way analysis of variance on ethnicity. The results in Table 14 show

Table 14

One-Way Analysis of Variance on GPA and AGPA by Ethnicity - 1993

GPA					
Source of Variation	DF	Sum of Squares	Mean Square	F Ratio	F Probability
Between Groups	3	189.37	47.34		
Within Groups	5124	1379.53	.27	175.85	.0001
Total	5128	1568.90			

G G G G  
r r r r  
p p p p  
3 1 4 2  
3 = Hispanic-American  
1 = African-American  
4 = European-American  
2 = Asian-American

<u>Mean</u>	<u>Ethnicity</u>
2.55	Group 3
2.68	Group 1
2.97	Group 4
3.14	Group 2

\* \*  
\* \* \*

AGPA					
Source of Variation	DF	Sum of Squares	Mean Square	F Ratio	F Probability
Between Groups	3	240.64	60.16		
Within Groups	5124	1971.72	.38	156.34	.0001
Total	5128	2212.36			

G G G G  
r r r r  
p p p p  
3 1 4 2  
3 = Hispanic-American  
1 = African-American  
4 = European-American  
2 = Asian-American

<u>Mean</u>	<u>Ethnicity</u>
2.30	Group 3
2.39	Group 1
2.76	Group 4
2.99	Group 2

\* \*  
\* \* \*

that Asian-Americans out-performed European-Americans, African-Americans, and Hispanic-Americans on both GPA and AGPA. The data also show that the European-Americans out-performed African-American and Hispanic-American students.

The researcher next computed a two-way analysis of variance for the year 2000. The results, presented in Table 15, again show that there were statistically significant differences based on curriculum and ethnicity.

Table 15

Two-Way Analysis of Variance, GPA and AGPA, by Curriculum and Ethnicity, 2000

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
GPA					
Curriculum	118.49	3	39.50	159.08	.001
Ethnicity	132.75	4	33.19	133.67	.001
2-Way Interactions	*	*	*	*	*
AGPA					
Curriculum	148.92	3	49.64	151.66	.001
Ethnicity	159.14	4	39.78	121.54	.001
2-Way Interactions	*	*	*	*	*

\*Not computed because of empty cells.

To identify the difference between ethnic groups, the researcher computed a one-way analysis of variance for both GPA and AGPA for 2000. Table 16 displays these results. The data show that in both GPA and AGPA, the Asian-Americans out-performed the African-American and Hispanic-American students. The European-American students also out-performed the African-American and Hispanic-American students. The data presented on ethnicity show that statistical hypothesis 3 is rejected. There were statistically significant differences in the means across ethnic groups both in 1993 and in 2000.

Having identified the differences based on ethnicity in 1993 and 2000, the researcher examined the differences that existed between 1993 and 2000. Table 17 presents the results of an independent t-test computed to identify where the

Table 16

One-Way Analysis of Variance on GPA and AGPA by Ethnicity - 2000

GPA					
Source of Variation	DF	Sum of Squares	Mean Square	F Ratio	F Probability
Between Groups	3	527.95	131.98		
Within Groups	7009	2631.25	.38	351.58	.0001
Total	7013	3159.20			

G G G G  
r r r r  
p p p p  
3 1 4 2

3 = Hispanic-American  
1 = African-American  
4 = European-American  
2 = Asian-American

<u>Mean</u>	<u>Ethnicity</u>
2.45	Group 3
2.81	Group 1
3.06	Group 4
3.09	Group 2

\* \*  
\* \*

AGPA					
Source of Variation	DF	Sum of Squares	Mean Square	F Ratio	F Probability
Between Groups	3	608.13	152.03		
Within Groups	7009	3318.05	.47	321.15	.0001
Total	7013	3926.19			

G G G G  
r r r r  
p p p p  
3 1 4 2

3 = Hispanic-American  
1 = African-American  
4 = European-American  
2 = Asian-American

<u>Mean</u>	<u>Ethnicity</u>
2.23	Group 3
2.67	Group 1
2.89	Group 4
2.96	Group 2

\* \*  
\* \*

statistically significant differences occurred between 1993 and 2000. The data on the general curriculum for both GPA and AGPA show a statistically significant difference between the performance of the different ethnic groups in 1993 and 2000. All students

in the general curriculum performed statistically significantly more poorly in 2000 than in 1993. In both years Asian-American and European-American students out-performed African-American and Hispanic-American groups.

In the academic curriculum for GPA and AGPA, there were statistically significant differences for Hispanic-American and European-American students. The Hispanic students' performance was statistically significantly poorer in 2000 than in 1993. The European-Americans' scores were higher in 2000 than in 1993. Asian-Americans and European-Americans out-performed Hispanic American and African-American students in both GPA and AGPA in both years.

In the technical curriculum for GPA and AGPA there were three statistically significant differences. The African-American students performed statistically significantly more poorly in 2000 than in 1993 for both GPA and AGPA. The Hispanic-American students performed statistically significantly more poorly in technical education as measured by their GPA. The Asian-Americans out-performed all the other ethnic groups in both years for both GPA and AGPA.

In the integrated curriculum there were no statistically significant differences between ethnic groups between 1993 and 2000. Although the integrated curriculum showed no statistically significant differences across the time frame, it is important to note that three out of the four ethnic divisions had increases in their mean GPA and AGPA. The academic and technical curricula had only one demographic group with an increase (European-Americans and Asian-Americans, respectively). The general curriculum had no ethnic groups with an increase. The data suggest that the integrated curriculum appears to offer the best opportunity for students to improve their GPA, regardless of ethnic group.



Table 17

## Independent t-tests for GPA and AGPA by Curriculum and Ethnicity - 1993 and 2000

Ethnicity	1993 Mean	2000 Mean	t-Value	2-Tail Sig.
General Curriculum - GPA				
AA	2.25	1.92	9.13	.001
AsA	2.59	1.95	6.07	.001
His	2.36	2.01	6.41	.001
EA	2.41	2.15	6.46	.001
General Curriculum - AGPA				
AA	1.96	1.68	7.39	.001
AsA	2.36	1.73	5.39	.001
His	2.16	1.83	5.46	.001
EA	2.06	1.88	4.21	.01
Academic Curriculum - GPA				
AA	2.72	2.69	1.43	.15
AsA	3.19	3.16	.91	.35
His	2.88	2.75	2.55	.01
EA	3.11	3.15	3.62	.001
Academic Curriculum - AGPA				
AA	2.52	2.49	.90	.36
AsA	3.06	3.04	.60	.54
His	2.70	2.58	2.23	.01
EA	2.93	2.99	3.81	.001
Technical Curriculum - GPA				
AA	2.39	2.04	5.24	.001
AsA	2.61	2.73	.64	.55
His	2.53	2.30	2.63	.01
EA	2.43	2.33	1.78	.08
Technical Curriculum - AGPA				
AA	2.03	1.72	4.23	.001
AsA	2.30	2.43	.60	.55
His	2.20	2.04	1.54	.13
EA	2.01	1.94	1.25	.21
Integrated Curriculum - GPA				
AA	2.61	2.68	.86	.32
AsA	2.92	2.99	.64	.52
His	2.84	2.77	.53	.60
EA	2.88	2.96	1.48	.14
Integrated Curriculum - AGPA				
AA	2.30	2.41	1.39	.16
AsA	2.68	2.78	.76	.44
His	2.59	2.53	.42	.67
EA	2.55	2.68	1.95	.05

AA - African-American; AsA - Asian-American; His - Hispanic-American; EA - European-American

To summarize the data presented on ethnicity and curriculum, it shows that statistical hypothesis 3 for ethnicity is rejected. There were statistically significant differences in means based on ethnicity and curriculum for both 1993 and 2000. Regarding ethnicity, Asian-Americans and European-Americans in general outperformed African-Americans and Hispanic-Americans. However, African-Americans showed the greatest improvement in GPA and AGPA across the time frame. For curriculum, student mean scores in the general curriculum declined between 1993 and 2000. Mean scores for students in the other three tracks were similar in 1993 and 2000.

The analysis across the time frame reveals that there were statistically significant differences in the ethnic group and curriculum. All but one of these differences was attributed to a decline in GPA and AGPA across the time frame. The exception was a statistically significant increase in GPA and AGPA by European-Americans in the academic curriculum.

Family Income. Statistical hypothesis 3 was tested on curriculum and family income using two-way ANOVA with GPA, then AGPA. The results on curriculum and family income are presented in Table 18 for 1993 and in Table 19 for 2000.

Table 18

Two-Way Analysis of Variance, GPA and AGPA, by Curriculum and FARMS, 1993

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
GPA					
Curriculum	87.83	3	29.28	132.27	.001
Family Income	.11	1	.19	.53	.47
2-Way Interactions	1.29	3	.43	1.94	.12
AGPA					
Curriculum	132.45	3	44.15	142.64	.001
Family Income	.05	1	.05	.16	.69
2-Way Interactions	2.12	3	.71	2.29	.07

The data on curriculum track and family income presented in Table 18 show that for both GPA and AGPA, there was a statistically significant difference in the means across the different curricula in 1993. The statistically significant differences in curriculum shown in Table 18 confirm what was documented in the gender-curriculum analysis and will not be pursued in detail. However, to summarize, Table 9 and Table 11 showed that the statistically significant differences in curriculum were between the academic group and the general, technical, and integrated curricula. There was also a statistically significant difference between the integrated curriculum and the general and technical curricula. The integrated curriculum group performed better than the general or technical groups and it is closing the gap with the academic group. There was no statistically significant difference based on family income (FARMS) in 1993.

In Table 19, the data show a statistically significant difference for both GPA and AGPA across the different curricula for 2000. For FARMS, there was a statistically significant difference on GPA, but not on AGPA. For both GPA and AGPA, there was a statistically significant interaction effect.

Table 19

Two-Way Analysis of Variance, GPA and AGPA, by Curriculum and FARMS, 2000

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
GPA					
Curriculum	161.21	3	53.74	203.89	.001
Family Income	1.47	1	1.47	5.56	.01
2-Way Interactions	3.61	3	1.20	4.57	.01
AGPA					
Curriculum	199.54	3	66.12	192.43	.001
Family Income	.68	1	.68	1.98	.16
2-Way Interactions	6.55	3	2.18	6.32	.001

Table 20 presents the results of the independent t-tests computed to document where the statistically significant differences occurred between 1993 and 2000. The results show that the academic and integrated curricula means were statistically significantly greater than those for the technical and general curricula. It also showed that the non-FARMS participants had statistically significantly higher means than did the FARMS participants. These results agree with other publicized research in that students from families with higher incomes do better academically than students from lower-income families.

Analysis for the four curriculum categories reveals that the general and technical curricula had similar results for FARMS participants across the time frame. For both GPA and AGPA, there were statistically significant differences for both participants and non-participants in the FARMS program. In both cases, the statistically significant difference reflects a drop in the means between 1993 and 2000. Regardless of FARMS participation, the general or technical programs did not do well academically.

In the academic curriculum for both GPA and AGPA, there was a statistically significant difference in the means between 1993 and 2000 for the FARMS participants, reflecting a decrease in their mean scores. For non-participants, in contrast, there was a statistically significant increase in the mean scores.

For the integrated curriculum, for GPA and AGPA, there were no statistically significant differences except for non-participants' AGPA score. It was statistically significant and reflected an increase in the means from 1993 to 2000. It is noted that the means declined for all FARMS participants in every curriculum category over the time frame. However, the integrated curriculum was the only one that was not significant and had the smallest decline (.02 for AGPA) and second smallest decline (.04 for GPA) of the four curriculum categories. In addition, non-participants in the

integrated category had the greatest increase in GPA and AGPA of any curriculum (.09 and .14, respectively).

Table 20

Independent t-tests for GPA and AGPA by Curriculum and FARMS - 1993 and 2000

FARMS	1993 Mean	2000 Mean	t-Value	2-Tail Significance
General Curriculum - GPA				
Participant	2.35	1.96	11.99	.001
Non-Partic.	2.34	2.06	8.54	.001
General Curriculum - AGPA				
Participant	2.11	1.75	10.06	.001
Non-Partic.	2.03	1.81	6.21	.001
Academic Curriculum - GPA				
Participant	2.91	2.79	4.73	.001
Non-Partic.	3.07	3.12	4.69	.001
Academic Curriculum - AGPA				
Participant	2.74	2.61	4.19	.001
Non-Partic.	2.90	2.97	5.09	.001
Technical Curriculum - GPA				
Participant	2.45	2.22	4.25	.001
Non-Partic.	2.42	2.24	3.78	.001
Technical Curriculum - AGPA				
Participant	2.12	1.92	3.54	.001
Non-Partic.	2.02	1.88	2.74	.01
Integrated Curriculum - GPA				
Participant	2.80	2.76	.63	.52
Non-Partic.	2.83	2.92	1.93	.05
Integrated Curriculum - AGPA				
Participant	2.52	2.50	.41	.68
Non-Partic.	2.52	2.66	2.46	.01

To summarize FARMS participation and curriculum, the results show that the academic and integrated curricula means were statistically significantly greater than those for the technical and general curricula. It also showed that the non-FARMS participants had statistically significantly higher means than FARMS participants. The lower GPA and AGPA of the general and technical programs and for students from lower-income families correspond to publicized research. When achievement

across the time frame was analyzed, the study shows that FARMS participants did not increase their GPA or AGPA. It should be noted that the integrated curriculum had the best results of any curriculum category. The societal and educational factors that influence the curricular and income differences continue to be investigated. However, this study suggests that the effect of these factors was minimized with the integrated curriculum.

Linguistic Background. Statistical hypothesis 3 was tested on curriculum and linguistic background (ESOL) using two-way ANOVA with GPA, then AGPA. The results on curriculum and linguistic background are presented in Table 21 for 1993 and in Table 22 for 2000.

The data shown in Table 21 indicate that for both GPA and AGPA, there was a statistically significant difference based on the curriculum. For linguistic background, there was no statistically significant difference for GPA for 1993, but there was a statistically significant difference for AGPA. There was a statistically significant interaction effect.

Table 21

Two-Way Analysis of Variance, GPA and AGPA, by Curriculum and ESOL, 1993

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
GPA					
Curriculum	38.10	3	12.70	57.12	.001
Linguistic Background	.59	1	.59	2.64	.10
2-Way Interactions	2.02	3	.67	3.03	.01
AGPA					
Curriculum	53.26	3	17.75	57.24	.001
Linguistic Background	2.45	1	2.45	7.91	.01
2-Way Interactions	5.02	3	1.67	5.39	.001

Table 22 shows that there was a statistically significant difference based on curriculum for both GPA and AGPA. For linguistic background, there was no statistically significant difference in GPA, but there was for AGPA. There was a statistically significant interaction effect.

Table 22

Two-Way Analysis of Variance, GPA and AGPA, by Curriculum and ESOL, 2000

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
GPA					
Curriculum	90.09	3	30.03	110.46	.001
Linguistic Background	.65	1	.65	2.39	.12
2-Way Interactions	2.61	3	.87	3.20	.01
AGPA					
Curriculum	108.24	3	36.08	101.48	.001
Linguistic Background	1.84	1	1.84	5.16	.01
2-Way Interactions	4.44	3	1.48	4.17	.01

The significant differences in curriculum in Tables 21 and 22 confirm what was documented in the gender-curriculum analysis and will not be pursued in detail. However, to summarize, Table 9 and Table 11 showed that the statistically significant differences in curriculum were between the academic group and the general, technical, and integrated curricula. There was also a significant difference between the integrated curriculum and the general and technical curricula. The integrated curriculum group performed better than the general or technical group and it is closing the gap with the academic group. There was also a statistically significant difference between ESOL participants and non-participants for AGPA but not for GPA.

The data in Table 23 present a series of independent t-tests for GPA and AGPA for both curriculum track and ESOL participants and non-participants. In the general curriculum for both GPA and AGPA, there are statistically significant

differences in the means between 1993 and 2000. In both cases the mean is lower in 2000 than in 1993. In the academic curriculum, there were no statistically significant differences for either GPA or AGPA. In the technical curriculum, there are no statistically significant differences for participants; for non-participants, there is a statistically significant difference. The means are lower in 2000 than in 1993. For the integrated curriculum, there were no statistically significant differences.

Table 23

Independent t-tests for GPA and AGPA by Curriculum and ESOL - 1993 and 2000

ESOL	1993 Mean	2000 Mean	t-Value	2-Tail Significance
General Curriculum - GPA				
Participant	2.46	2.09	8.05	.001
Non-Partic.	2.31	1.97	13.59	.001
General Curriculum - AGPA				
Participant	2.27	1.91	7.15	.001
Non-Partic.	2.00	1.71	10.72	.001
Academic Curriculum - GPA				
Participant	3.00	2.94	2.05	.04
Non-Partic.	3.06	3.08	1.35	.17
Academic Curriculum - AGPA				
Participant	2.83	2.78	1.52	.13
Non-Partic.	2.89	2.91	1.90	.06
Technical Curriculum - GPA				
Participant	2.55	2.40	1.90	.06
Non-Partic.	2.39	2.18	5.42	.001
Technical Curriculum - AGPA				
Participant	2.25	2.13	1.25	.21
Non-Partic.	2.00	1.83	4.12	.001
Integrated Curriculum - GPA				
Participant	2.89	2.88	.16	.86
Non-Partic.	2.80	2.85	1.23	.22
Integrated Curriculum - AGPA				
Participant	2.66	2.65	.21	.83
Non-Partic.	2.48	2.58	2.06	.04

In the technical curriculum, there were no statistically significant differences for participants in either GPA or AGPA. For non-participants, there was a statistically



significant difference, reflecting a decrease in mean scores for both GPA and AGPA. For the integrated curriculum, there were no statistically significant differences for GPA or AGPA.

When only ESOL participants are considered, the integrated and academic curriculum did not show statistically significant differences. It is important to note that ESOL participants in the integrated curriculum had only a fractional drop, .01 for both GPA and AGPA, across the time frame. All other ESOL participants showed much larger drops in both GPA and AGPA. This is a considerable accomplishment for these students, given the demands of the integrated curriculum and the fact that many do not use English as a first language.

Research question three addressed the academic success of selected demographic groups within the four curriculum areas, but focused on the integrated curriculum. The researcher identified gender, ethnicity, family income and linguistic background for the groups and GPA and AGPA for measures of academic success. The individual demographic groups participating in the integrated curriculum had greater gain scores in GPA and AGPA when compared to the other curricula.

Females in the integrated curriculum had gains of .10 in GPA and .16 for AGPA, the greatest net gain and percentage gain by females in any curriculum category. Ethnicity was subdivided into four categories and three out of the four ethnic divisions had increases in their mean GPA and AGPA. Other curriculum categories had only one or no ethnic groups with an increase. Participants in the FARMS program did not do well with their GPA or AGPA in this study. Their means declined in every curriculum category over the time frame; however, the integrated curriculum had the smallest decline (.02 for AGPA) and second smallest decline (.04 for GPA). Participants in the ESOL program mirrored those in the FARMS program.

Their means declined in every curriculum category over the time frame; however, the integrated curriculum had the smallest decline of .01 for both GPA and AGPA.

#### Research Question 4

When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the students' highest SAT mean score between curriculum categories from 1993 and 2000?

#### Statistical Hypothesis 4

There is no statistically significant difference in highest SAT mean score based on gender, ethnicity, family income, or linguistic background between the four curriculum categories in 1993 and 2000.

Research question four continues to explore the academic success of students in an integrated curriculum. Instead of a grade point average, this question analyzed SAT scores. This analysis is valuable from two perspectives. It provides an additional measure of academic achievement, the third expected outcome of the Perkins Act. Second, SAT scores will serve as an indicator of interest in attending a college or university. More definitive post-secondary plans are explored with research question five.

Given the complexity of research question four, the analysis for each of the four demographic groups (gender, ethnicity, FARMS participation and ESOL participation) is presented individually. Because there were so many means to be computed, the statistical significance level was set at .01 to avoid errors. The reason for setting the significance level at .01 as opposed to the conventional level of .05 was that there were so many tests of significance done that by chance, a variable might have been identified as being significant when by using the higher level of .01, it

would not have been. To answer research question four, separate analysis of variance was conducted followed by independent t-tests.

Gender. The statistical hypothesis was tested using two-way analysis of variance (ANOVA) with highest SAT total (HISATTO) on curriculum and gender. The results on curriculum and gender are presented in Table 24 for 1993 and in Table 25 for 2000.

Table 24

Two-Way Analysis of Variance, HISATTO, by Curriculum and Gender, 1993

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig. of F
HISATTO					
Curriculum	39016373	3	13005457.81	351.16	.001
Gender	320718	1	320718.36	8.66	.01
2-Way Interactions	70880	3	23626.56	.64	.59

The data presented in Table 24 for HISATTO for 1993 show that there were statistically significant differences in means based on curriculum and gender. There was no statistically significant interaction effect.

Table 25 presents the results of the two-way analysis of variance on curriculum and gender for 2000. The results on curriculum are the same as those mentioned directly above; they indicate that the statistical hypothesis is rejected for curriculum.

Although the researcher computed a one-way analysis of variance on curriculum for HISATTO for 1993, the results were identical to the findings in research question three on curriculum: there was a statistically significant difference between the academic group and the general, technical and integrated curricula. There was also a statistically significant difference between the integrated curriculum and the general and technical groups. As noted earlier, the mean score of the students in the integrated curriculum was much closer to the mean of the students in the academic

track than it was in 1993. Note: There continue to be statistically significant differences computed for curriculum for each subsequent component of research question four. Because the results have been identical each time it has been computed, the findings will only be briefly summarized.

Table 25

Two-Way Analysis of Variance, HISATTO, by Curriculum and Gender, 2000

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig. of F
HISATTO					
Curriculum	36044171	3	12014723.80	307.52	.001
Gender	230545	1	230545.22	5.90	.01
2-Way Interactions	80594	3	26864.64	.69	.56

The data presented in Table 25 for 2000 indicate that for gender, there were statistically significant differences in means. There was no statistically significant interaction effect.

The data displayed in Tables 24 and 25 show that there was a statistically significant difference between males and females on HISATTO. To identify where the statistically significant difference existed based on gender between 1993 and 2000, the researcher conducted a series of independent t-tests on each curricular area. The results are presented by curriculum type in Table 26.

The data in Table 26 indicate that for 1993 and 2000, there were statistically significant differences based on gender. These differences in all curriculum areas favored males over females. This surprising finding may be attributed to the fact that the dropout rate for males is much higher than for females. Therefore, the number of males taking SAT tests is about half the number of females taking the SAT test. The males are a more selective group with a higher percentage of high academic achievers taking the test. The data on gender indicate that statistical hypothesis 4 is rejected.

The analysis across the time frame shows that there were no statistically significant differences. Although not statistically significant, females in the integrated curriculum had a gain of 39 points across the time frame; the largest gain in mean SAT scores for either gender or any curriculum category. They were 30 points greater than females in the academic curriculum who improved by 9 points over the years. These results agree with the GPA results from research question three where females in the integrated curriculum also had the highest gains. In addition, females in the integrated curriculum had the most success of any curriculum in closing the gap between their mean score as compared to the mean score of males in the integrated curriculum.

Table 26

Independent t-tests for HISATTO by Curriculum and Gender for 1993 and 2000

Gender	1993 Mean	2000 Mean	t-Value	2-Tail Significance
<u>General Curriculum - HISATTO</u>				
Male	812	807	.25	.80
Female	779	752	1.37	.17
<u>Academic Curriculum - HISATTO</u>				
Male	1144	1149	.65	.51
Female	1115	1124	1.54	.12
<u>Technical Curriculum - HISATTO</u>				
Male	800	808	.19	.85
Female	738	723	.42	.67
<u>Integrated Curriculum - HISATTO</u>				
Male	993	982	.40	.69
Female	924	963	2.06	.04

Ethnicity. Statistical hypothesis 4 was tested on curriculum and ethnicity using two-way ANOVA with HISATTO. The results on curriculum and ethnicity are presented in Table 27 for 1993 and in Table 28 for 2000. These data show that there were statistically significant differences in means based on the curriculum and the ethnicity of the students in 1993 and in 2000. It was not possible to compute an

interaction effect because there were some empty cells in the analysis caused by low counts for Native Americans.

Table 27

Two-Way Analysis of Variance, HISATTO, by Curriculum and Ethnicity, 1993

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig. of F
HISATTO					
Curriculum	25240109	3	8413369.67	249.26	.001
Ethnicity	12222051	4	3055512.79	90.53	.001
2-Way Interactions	*	*	*	*	*

\*Not computed because of empty cells.

Table 28

Two-Way Analysis of Variance, HISATTO, by Curriculum and Ethnicity, 2000

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig. of F
HISATTO					
Curriculum	21144879	3	7048292.84	207.37	.001
Ethnicity	28770218	4	7192554.38	211.61	.001
2-Way Interactions	*	*	*	*	*

\*Not computed because of empty cells.

The researcher computed one-way analysis of variance on ethnicity for 1993 and 2000. The results are presented in Tables 29 and 30. The researcher found that European-Americans out-performed African-Americans and Hispanic-Americans. The only exception was found in the technical curriculum where the number of Asian-Americans was too small to compute a mean.

Table 29

One-Way Analysis of Variance on HISATTO by Ethnicity - 1993

Source of Variation	DF	Sum of Squares	Mean Square	F Ratio	F Probability
Between Groups	3	21617102.22	5404275.55		
Within Groups	3746	151578901.00	40464.20	133.56	.0001
Total	3750	173196003.20			

G G G G                    3 = Hispanic-American  
 r r r r                    1 = African-American  
 p p p p                    4 = European-American  
                                   2 = Asian-American  
 3 1 4 2

<u>Mean</u>	<u>Ethnicity</u>
923.46	Group 3
1034.29	Group 1
1135.13	Group 4
1135.81	Group 2

\* \*  
 \* \*

Table 30

One-Way Analysis of Variance on HISATTO by Ethnicity - 2000

Source of Variation	DF	Sum of Squares	Mean Square	F Ratio	F Probability
Between Groups	3	46826961.07	11706740.27		
Within Groups	5467	206861181.90	35838.15	309.39	.0001
Total	5471	253688143.00			

G G G G                    3 = Hispanic-American  
 r r r r                    1 = African-American  
 p p p p                    4 = European-American  
                                   2 = Asian-American  
 3 1 4 2

<u>Mean</u>	<u>Ethnicity</u>
930.22	Group 3
1140.51	Group 1
1165.46	Group 4
1166.00	Group 2

\*  
 \* \*  
 \* \*

Table 31 presents the results of an independent t-test computed to identify where the statistically significant differences occurred between 1993 and 2000.

Results from Table 31 indicate that there were no statistically significant differences based on ethnicity between 1993 and 2000 for the general, technical, and integrated curricula. There was one statistically significant difference in the academic curriculum between 1993 and 2000 for European-Americans. The European-American mean was higher in 2000 than in 1993.

Although the integrated curriculum had no statistically significant differences, it should be noted that the mean SAT score improved across the time frame for each ethnic group in the integrated curriculum. The integrated curriculum was the only category where each ethnic group showed an increase. In addition, the greatest increase in mean SAT score for African-Americans, European-Americans, and Hispanic-Americans occurred within the integrated curriculum. The increase for Asian-Americans in the integrated curriculum was second behind the academic curriculum. These increases confirm that all ethnicities can be successful and benefit from a curriculum that combines academics and technical subjects.



Table 31

Independent t-tests for HISATTO by Curriculum and Ethnicity - 1993 and 2000

Ethnicity	1993 Mean	2000 Mean	t-Value	2-Tail Sig.
General Curriculum - HISATTO				
AA	755	743	.62	.52
AsA	777	889	1.10	.29
His	753	725	.60	.55
EA	835	865	1.41	.14
Academic Curriculum - HISATTO				
AA	980	973	.54	.59
AsA	1149	1149	.05	.96
His	1044	1022	1.13	.25
EA	1162	1178	3.37	.001
Technical Curriculum - HISATTO				
AA	708	733	.62	.53
AsA	*	*	*	*
His	751	670	1.09	.38
EA	822	784	.86	.39
Integrated Curriculum - HISATTO				
AA	851	902	2.16	.03
AsA	926	983	1.16	.25
His	888	897	.13	.90
EA	994	1033	1.94	.05

Family Income. Statistical hypothesis 4 was tested on curriculum and family income using two-way ANOVA with HISATTO. The results on curriculum and family income are presented in Table 32 for 1993 and in Table 33 for 2000.

Table 32

Two-Way Analysis of Variance, HISATTO, by Curriculum and Family Income, 1993

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig. of F
HISATTO					
Curriculum	18453204	3	6151068.09	177.46	.001
Family Income	944004	1	9440040.10	27.24	.001
2-Way Interactions	792792	3	264263.97	7.62	.001

Table 33

Two-Way Analysis of Variance, HISATTO, by Curriculum and Family Income, 2000

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig. of F
HISATTO					
Curriculum	25836040	3	8612013.32	246.95	.001
Family Income	1594336	1	1594336.08	45.72	.001
2-Way Interactions	736578	3	245525.92	7.04	.001

The data on curriculum track and family income presented in Tables 32 and 33 show that for HISATTO, there was a statistically significant difference in the means based on family income in both 1993 and 2000. There was also a statistically significant interaction effect.

To identify the source of the differences in the curriculum, the researcher computed a one-way analysis of variance on curriculum for HISATTO for 1993. The results were identical to the findings in research question three on curriculum: there was a statistically significant difference between the academic group and the general, technical and integrated curricula. There was also a statistically significant difference between the integrated curriculum and the general and technical groups.

For family income, the researcher computed independent t-tests, looking for differences. Table 34 presents the results of the independent t-tests computed to document where the statistically significant differences occurred in 1993 and 2000. The data show that in both years, the students who were non-participants in the FARMS program out-performed the participants. Both participants and non-participants in the academic and integrated curricula out-performed the students in the technical and general tracks. In the general and technical curricula, there were no statistically significant differences in either the participants' or non-participants' performance between 1993 and 2000. In the academic and integrated curricula, non-participants had statistically significantly higher means in 2000 than in 1993. This

finding is not surprising since it is well known that there is a weak to modest correlation between family income and achievement in school. In addition, other factors such as exposure to additional SAT courses may attribute to the difference.

Table 34

Independent t-tests for HISATTO by Curriculum and Family Income - 1993 and 2000

FARMS	1993 Mean	2000 Mean	t-Value	2-Tail Significance
<u>General Curriculum - HISATTO</u>				
Participant	732.07	730.43	.06	.95
Non-Partic.	812.68	815.73	.19	.85
<u>Academic Curriculum - HISATTO</u>				
Participant	978.26	991.55	1.18	.23
Non-Partic.	1148.47	1167.37	4.27	.001
<u>Technical Curriculum - HISATTO</u>				
Participant	737.00	706.00	.73	.47
Non-Partic.	784.69	771.79	.38	.71
<u>Integrated Curriculum - HISATTO</u>				
Participant	908.91	900.27	.30	.77
Non-Partic.	967.28	1011.49	2.50	.01

The data presented on SAT scores and family income indicate that statistical hypothesis 4 is rejected for family income. There were statistically significant differences across the four curricula. Non-participants in the FARMS program obtained the highest scores for both 1993 and 2000. Although the integrated curriculum had no significant differences, participants in an integrated curriculum had the second highest mean SAT score. This is encouraging because of the new push toward the integration of academic and technical programs. It is important to note two trends. First, more students in the integrated curriculum are being encouraged to take the SAT course than ever before. Second, more students are enrolled in the integrated curriculum than previously.

Linguistic Background. Statistical hypothesis 4 was tested on curriculum and linguistic background using two-way ANOVA with HISATTO. The results on

curriculum and linguistic background are presented in Table 35 for 1993 and in Table 36 for 2000.

Table 35

Two-Way Analysis of Variance, HISATTO, by Curriculum and ESOL, 1993

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig. of F
HISATTO					
Curriculum	13213964	3	4404654.63	125.66	.001
Linguistic Background	1064667	1	1064666.91	30.37	.001
2-Way Interactions	78665	3	26221.71	.75	.52

Table 36

Two-Way Analysis of Variance, HISATTO, by Curriculum and ESOL, 2000

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig. of F
HISATTO					
Curriculum	18763536	3	6254512.02	167.04	.001
Linguistic Background	650246	1	650246.02	17.37	.001
2-Way Interactions	40589	3	13529.58	.36	.78

The data on curriculum track and linguistic background (ESOL) presented in Tables 35 and 36 show that there was a statistically significant difference in the means across the different curricula as well as a statistically significant difference based on ESOL in both 1993 and 2000.

To identify the source of the differences in the curriculum, the researcher computed a one-way analysis of variance on curriculum for HISATTO for 1993. The results were identical to the findings in research question three on curriculum: there was a statistically significant difference between the academic group and the general,

technical and integrated curricula. There was also a statistically significant difference between the integrated curriculum and the general and technical groups.

Because the researcher found statistically significant differences in linguistic background, he computed independent t-tests. Table 37 presents these results. The data show that in all cases, the non-participants out-performed the participants in both 1993 and 2000 in terms of highest SAT total score. These results are not surprising, given the emphasis on comprehension demanded of the SAT and the fact that many ESOL participants are still learning to read English. Table 37 also provides information on the performance of the students in the different curricula between 1993 and 2000. In all cases, there was no statistically significant difference in the means in 1993 and 2000.

Table 37

Independent t-tests for HISATTO by Curriculum and ESOL - 1993 and 2000

ESOL	1993 Mean	2000 Mean	t-Value	2-Tail Significance
<u>General Curriculum - HISATTO</u>				
Participant	664.35	697.30	.80	.43
Non-Partic.	807.93	795.64	.86	.39
<u>Academic Curriculum - HISATTO</u>				
Participant	996.47	1022.38	1.97	.05
Non-Partic.	1147.06	1151.20	.94	.35
<u>Technical Curriculum - HISATTO</u>				
Participant	630.00	680.00	.61	.56
Non-Partic.	784.13	751.86	1.17	.24
<u>Integrated Curriculum - HISATTO</u>				
Participant	875.00	868.31	.19	.85
Non-Partic.	969.16	995.17	1.56	.12

Although the integrated curriculum had no statistically significant differences, ESOL participants in an integrated curriculum had the second highest mean SAT score of all curriculum categories. This seems to indicate that the high-achieving ESOL students are opting to enroll in the integrated curriculum. This is encouraging because

of the relatively new push toward the integration of academic and technical programs. In addition, it is important to remember that the integrated category had the largest percentage increase in ESOL students. More students bring a greater range of academic ability; therefore, it is not surprising that there was no statistically significant increase in the means.

Research question four continued to address the academic success of selected demographic groups within the four curriculum areas that research question three started. Question four, however, used SAT score instead of GPA but had similar successful results.

Females in the integrated curriculum had a gain of 39 points across the time frame, the largest gain in mean SAT scores for either gender or any curriculum category. When ethnicity was analyzed, the integrated curriculum was the only category where each ethnic group showed an increase. In fact, African-Americans, European-Americans, and Hispanic-Americans in the integrated curriculum had the greatest increase in mean SAT score of any category. For Asian-Americans, it was second. Finally, FARMS and ESOL participants in the integrated curriculum had the second highest mean averages, right behind the academic curriculum.

Research questions three and four established that the integrated curriculum can be academically challenging and can prepare students for post-secondary education. This is an important outcome and puts to rest the perception that an education program containing a technical component is only useful for job preparation.

### Research Question 5

Was there a statistically significant independence in the post-secondary educational plans between students in the technical, academic, general, or integrated technical and academic curriculum in 1993 and 2000?

### Statistical Hypothesis 5

The post-secondary educational plans of students were statistically significantly independent of the curricula (technical, academic, general, or integrated technical and academic) in which the students were enrolled in 1993 and 2000.

The data for research question five were obtained from a senior exit survey. This annual survey of graduating seniors was collected by the school system under a mandate to the state department of education from the Carl D. Perkins Vocational and Applied Technology Act of 1990. The responses analyzed for this study are listed below and are identical to the responses that appeared on the 1993 survey. The 2000 survey had the same basic questions but some of the selections were expanded. When the LEA released the data to the researcher, the responses that had been expanded for the 2000 survey were compressed to match the 1993 responses. Appendixes A and B include the complete responses as well as the complete survey.

The response numbers and corresponding description were:

0 = No plans reported

1 = Four year college with no work

2 = Two year college or special training with no work

3 = Four year college with some work or military

4 = Two year college or special training with some work or military

5 = Work with no school or military

6 = Military with no school but possible work

7 = Other (no school, work, military)

The researcher used chi square to test the independence of statistical hypothesis 5. The results of that analysis are presented in Tables 38 and 39. The data shown indicate that the statistical hypothesis of independence is rejected for 1993 and for 2000. Post-secondary plans are related to the curriculum track followed in high school. There was a modest to strong relationship between the students' curricular choices and their post-secondary plans. Students enrolled in the academic curriculum chose four-year no-work post-high school enrollments far more commonly than expected. In both 1993 and 2000, 400 to 500 more students in the academic curriculum chose four-year college - no work than were expected to do so. These results are not surprising, given the level of education and economic status of the general population and the strong emphasis on post-secondary education by the school district. Students in the other three curricula were observed to choose this option less frequently than expected. The students in the integrated curriculum were observed to choose the option of two-year no work almost twice as often as expected in both 1993 and 2000.

The students in the general and technical curricula also chose the two-year no-work option more often than they might be expected to do, in both 1993 and 2000. The option of four years plus work was observed to be the choice of students in the academic curriculum more often than expected. The students in the integrated curriculum chose four years plus work in numbers almost matching their expected numbers in 1993. In 2000 the observed value was a little lower than the expected value.

For the choice of two years plus work, the academic group chose the option less often than expected. The other three curricular groups were observed to choose this option more frequently than expected in both 1993 and 2000. The higher than expected numbers for the non-academic student choosing the two-year option may be



linked to the presence of a nationally recognized community college in the county. It has offered many students the opportunity for post-secondary education who may not have considered it previously. For the options of work or military, the students in the academic group were observed to choose those options less frequently than expected, while the students in the general and technical curricula were observed to select these options twice to three times as often as expected in both 1993 and 2000. The integrated group chose work or the military about as often as would be expected.

The choices of post-high school experience observed and expected as shown in Tables 38 and 39 show that students in the academic curriculum were choosing to go to two-year or four-year colleges with no work far more often than any other group. The integrated students were observed to choose the option of two years and no work with greater frequency than expected. These findings support the rejection of the hypothesis of independence and acceptance of the fact that curriculum is related to post-high school plans.

Additional analysis can be done on survey responses one, two, three, and four: plans to attend either a two-year or four-year institution. When totaling responses for questions one through four, the integrated and academic curriculum had very similar percentages of students planning to continue their education. In 1993 the percentage for the integrated curriculum was 92.1% and in 2000 it was 96.3%. The academic curriculum had 95.5% of its 1993 graduates and 95.2% of the 2000 graduates planning to attend post-secondary education. When considering questions one and three, plans that include a four-year college, the academic curriculum had the highest percentage of response, 79.3% in 1993 and 78.1% in 2000, a decrease of 1.2 over the time frame. The integrated curriculum went from 44.1% in 1993 to 55.1% in 2000, or 11.0%, the largest increase of the four curriculum categories.

Both of these observations suggest that the integrated curriculum is a strong choice for students with post-secondary plans. In fact, the integrated curriculum had the most students planning to attend a post-secondary institution in 2000. The technical component of the program did not hinder their tentative plans.

Table 38

Chi Square of Observed and Expected Post-Secondary Education Plans and Chi Squared Computations - 1993

	General		Academic		Technical		Integrated		Total
	Observed	Expected	Observed	Expected	Observed	Expected	Observed	Expected	
	No Plans	34	12	34	57	8	4	1	
4-yr., no work	143	474	2,736	2,227	35	166	86	133	3,000
2-yr., no work	262	129	392	604	96	45	64	36	814
4-yr. + work	30	53	283	249	9	19	14	15	336
2-yr. + work	139	74	236	346	56	26	45	21	466
Work	107	35	41	163	61	12	10	10	219
Military	51	19	52	90	14	7	4	5	121
Other	44	15	44	71	5	5	3	4	96
<b>Total</b>	<b>810</b>	<b>810</b>	<b>3,808</b>	<b>3,808</b>	<b>284</b>	<b>284</b>	<b>227</b>	<b>227</b>	<b>5,129</b>

Chi Squared Computation - 1993

39	9	3	2	
231	116	103	16	
139	75	58	22	
10	5	5	0	
58	42	35	29	Chi square = 1,526
152	91	197	0	Significant - .0001
53	16	8	0	
55	10	0	0	

Table 39

**Chi Square of Observed and Expected Post-Secondary Education Plans and Chi Squared Computations - 2000**

	General		Academic		Technical		Integrated		Total
	Observed	Expected	Observed	Expected	Observed	Expected	Observed	Expected	
	No Plans	37	14	71	96	10	5	3	
4-yr., no work	126	416	3,371	2,911	30	148	161	213	3,688
2-yr., no work	240	103	522	725	78	37	78	53	918
4-yr. + work	52	110	860	769	14	39	48	56	974
2-yr. + work	193	87	409	611	94	31	78	45	774
Work	62	21	84	150	31	8	13	11	190
Military	50	18	87	128	11	6	14	9	162
Other	14	4	16	31	7	2	2	2	39
<b>Total</b>	<b>774</b>	<b>774</b>	<b>5,420</b>	<b>5,420</b>	<b>275</b>	<b>275</b>	<b>379</b>	<b>397</b>	<b>6,866</b>

**Chi Squared Computation - 2000**

40	6	5	2	Chi square = 1,381 Significant - .0001
202	73	94	13	
180	57	46	12	
30	11	16	1	
128	67	128	25	
77	29	72	0	
55	13	3	2	
21	7	19	0	



## CHAPTER V

### FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

The setting for this study was a large suburban school district in the mid-Atlantic region. The district is well above the national average in terms of median income and level of education. The school system for this highly affluent and educated population prides itself on academic achievement. Graduates are required to take an academic curriculum that will prepare them for entrance into the state universities.

Technical programs are also offered in the 23 comprehensive high schools and the one technical high school. The courses range from traditional vocational subjects of automotive technology to emerging technologies such as biotechnology. The technical programs have received funding from the federal government through the years. However, federal technical education legislation took a new direction when Congress passed the Carl D. Perkins Vocational and Applied Technology Education Act of 1990.

This act was important as it departed sharply from previous and more traditional vocational education legislation. It called for vocational education to play an enhanced new role in the nation's education arena by including greater emphasis on the integration of academics and additional academic achievement. This study addressed how this new direction affected one local education agency (LEA).

### Statement of Purpose

The purpose of this study was to examine the integration of technical and academic programs in one school system through an analysis of change in student demographic characteristics, academic achievement, and post-secondary plans over seven years. In addition, this study examined the long-held perception that the postsecondary options of students in a technical curriculum were limited by the courses that they took. This study also collected information on the percentage of students in each type of curriculum, and identified the gender, ethnicity, and economic and linguistic background of these students as well as their academic performance and post-secondary plans.

### Statement of the Problem

Selected characteristics of students who completed an integrated curriculum of technical and academic studies were compared with characteristics of students who completed one of three other courses of study: an academic, technical or general curriculum. Eight groups of high school graduates were studied. Four groups graduated in 1993 and were identified by completion of an academic, a technical, an integrated technical-academic, or a general curriculum. The other four groups graduated in 2000 and were also identified by completion of one of the four curricula. The change over the seven years in the number and percentage of students in the integrated curriculum and the change in the demographic characteristics of each curriculum were analyzed.

### Research Questions

The research questions that were chosen to guide this study are displayed in Table 40. The questions are matched against the expected outcomes of the 1990 Perkins Act that have been identified by the researcher.

Table 40

Perkins Act Expected Outcomes and Research Questions

Outcomes of 1990 Perkins Act	Applicable Research Questions
A. Increased number of students in an integrated curriculum	1. What were the changes between 1993 and 2000 in the number and percentage of students who completed: (a) a technical curriculum, (b) an academic curriculum, (c) an integrated technical and academic curriculum, or (d) a general curriculum?
B. Increased diversity of students in an integrated curriculum	2. What were the gross number and percentage of change in gender, ethnicity, family income, and linguistic background between each curriculum category from 1993 and 2000?
C. Improved academic achievement of students in an integrated curriculum	3. When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the groups' Grade Point Average (GPA) and Academic Grade Point Average (AGPA) between the four curriculum categories in 1993 and 2000?  4. When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the students' highest SAT mean score between curriculum categories from 1993 and 2000?
D. Increased post-secondary participation for students in an integrated curriculum	5. Was there a statistically significant independence in the post-secondary educational plans between students in the technical, academic, general, or integrated technical and academic curriculum in 1993 and 2000?

Statistical Procedures and Analysis

Research question one sought information on the change in the number of students in the curriculum categories across the sampling time frame. Gross counts of students and percentage of change in enrollment for each curriculum category were compared between the two sampling years.



Research question two examined the change in the number of students in the selected demographic characteristics within the curriculum categories and across the sampling time frame. Analysis was accomplished by comparing the gross counts and percentage change of each demographic category over the time frame.

Research questions three and four studied student achievement across the time frame in regard to the curriculum categories and demographic characteristics.

Research question three used grade point average (GPA) while research question four used student Scholastic Aptitude Test (SAT) scores to measure student achievement.

Initially, the statistical hypothesis was tested using two way analysis of variance on curriculum and each demographic category for each year of the study. This was followed by a one-way analysis of variance to determine the source of any significant difference. Finally, independent t-tests were computed to identify where the statistically significant difference existed based on curriculum between 1993 and 2000.

Research question five reviewed postsecondary plans between the students in the curriculum categories and across the time frame. Student responses from a senior exit survey dealing with intentions after high school were analyzed by chi-square.

## Findings and Conclusions

### Research Question 1

What were the changes between 1993 and 2000 in the number and percentage of students who completed (a) a technical curriculum, (b) an academic curriculum, (c) an integrated technical and academic curriculum, or (d) a general curriculum?

This study confirmed that the goal of increasing the number of students in an integrated curriculum was realized. When adjusted for gains in the general population, there was a net increase in the number of students enrolled in an integrated

curriculum. The integrated category grew by 139 students, or a gain of 52.9%. This represented the greatest percentage increase of students from 1993 to 2000 of the four curriculum categories. Although the academic curriculum had the greatest increase in raw numbers, a gain of 1062 students, in terms of percentage increase the gain was only 23.8%. This was less than half than the gain experienced by the integrated curriculum. The general category and the technical curriculum both lost students between 1993 and 2000, 24.7% and 20.9%, respectively.

The increase in the percentage of students in the integrated curriculum is particularly notable, given the intense emphasis within the community on postsecondary education. Parents strongly believe in the value of a post-secondary education and want the local schools to prepare their children for this logical next step. Business and industry echo this belief and are strong supporters of sound academic programs. The significant increase of students in the integrated curriculum may indicate that the value of an education with a technical component is being recognized within the community. Perhaps the plea in the report, The Forgotten Half (1988), by the William T. Grant Foundation, that integrated vocational technical and academic instruction deserves "far greater recognition . . ." (p. 129) is finally being recognized.

Within the context of this particular school district, the integrated curriculum had a surprising degree of success. Whether this can be brought to scale and generalized to other districts is an issue that would need to be addressed with additional research. However, it should be noted that it has thrived in a community and district that does not place much value on any type of technical education. The advantage of this integrated curriculum, and a critical feature to any school district considering it, has been the strong academic component. It is this piece that may have been missing from earlier integration attempts. (See Education for ALL American Youth—A Further Look, 1944, revised 1952, and the career education movement.)

As discussed in chapter two, the enrollment gain reported in this study is important because participation in vocational/technical programs was stable until the early 1980s when public perception and professional recognition began to wane. This decline in interest was fueled by the changing social climate and an increasing emphasis on academics. These factors resulted in a declining number of students in technical programs.

Although overall enrollment in technical education had significantly dropped, the subject field, nevertheless, retained considerable political support. The subject was perceived as important for helping the economy as well as providing educational opportunities to students. As documented in chapter two, much of this support for technical education was a result of various social, political, and educational sources reporting its benefits. When policy makers crafted the 1990 Perkins Act, they wanted to attract an increasing number of students to the integrated curriculum. Results from this study confirmed that for this particular LEA, the goal was realized. This success may contribute to the demise of the divisions in the nation's educational system that was instigated by the Smith-Hughes Act of 1917. Additional information regarding student demographics was addressed with research question two.

### Research Question 2

What were the gross number and percentage of change in gender, ethnicity, family income, and linguistic background between each curriculum category from 1993 and 2000?

Research question one focused on whether or not the integrated curriculum would attract students. Research question two focused on the demographics of these students. As documented in chapter two, it was expected that an integrated technical and academic curriculum would attract a demographically diverse group of students.

To determine the broad-based interest in the program, the study examined enrollment in terms of the gender, ethnicity, income level and linguistic background.

Gender. When gender was considered, the integrated curriculum had the greatest percentage increase from 1993 to 2000 for both females and males, 69.9% and 29.1%, respectively. The academic curriculum increased 30.6% for females, or less than half the gain in the integrated curriculum, and 17.1% for males. The percentage of females and males declined in the technical and general curriculum.

The large percentage of females suggests that the integrated curriculum can attract females to an area that has traditionally been dominated by males. Females apparently recognize the value of the combination of a challenging academic and technical program. Also, the surprising increase may be a result of greater opportunities for females in the workforce and their interest in gaining additional skills.

The gain, however, does not reflect a major shift by the school system to attract females to technical programs. There were no new programs introduced that would have an overwhelming majority of females enrolled. The local education agency did have some minor promotional campaigns to attract females to nontraditional careers but nothing on the scale that the results indicate.

Ethnicity. When changes in participation by ethnic groups were considered, the integrated curriculum had the greatest percentage gain from 1993 to 2000 in four out of the five ethnic divisions. The general curriculum had the greatest percentage gain for Asian-Americans but the integrated curriculum was a close second. The academic curriculum had gains in each ethnic division but none as great as the integrated category. The general and technical curriculums showed gains in three ethnic divisions but either no change or significant losses in the other groups.

The notable percentage gains of African-Americans (114.4%) and Hispanic-Americans (48.5%) over and above the general population gain in the integrated curriculum are very encouraging. These two groups have been under-represented in academically oriented programs and their participation in the integrated curriculum is significant. As with gender, the school system did not have a large-scale diversity emphasis held in association with the development of the integrated curriculum. It did take steps to encourage all under-represented ethnicities to participate in programs but specific groups were not targeted. It appears that the merits of the programs were the attraction. Regardless of one's ethnicity, students found value in an education with an academic and technical emphasis.

FARMS and ESOL. As the findings for both FARMS and ESOL participants were similar, the results will be presented differently than gender and ethnicity. A joint discussion will follow the individual presentation of the findings.

FARMS - Free and Reduced-priced Meals (FARMS) was used as an economic indicator to represent income level. When participation in the FARMS program was considered, the results were very encouraging. The academic curriculum had the greatest percentage increase for FARMS participants with a net gain of 88.7% while the integrated curriculum had a net gain of 86.7%. (Note: net gains account for the 1.0% rise in the poverty level over the time frame). The technical and general curriculum had net gains of 1.0% and 17.5%, respectively. For students from families with higher income, the integrated curriculum had the greatest net percentage gain of 35.2%. The academic curriculum had a net gain of 12.3% and the general and technical curricula had losses.

ESOL - English Speakers of Other Languages was used as an indicator of linguistic background. The integrated curriculum had a net gain of 25.5%, the largest increase over the time frame. (Note: net gains account for the 10.4% rise over the

time frame for people who spoke a language other than English in the home). Net gains for the academic category were 16.9% and for the general curriculum, 1.2%. The technical curriculum had a loss of 44.2%. For non-ESOL participants, the integrated curriculum had the greatest net gain of 47.9% with the academic curriculum second, a net gain of 12.8%. Both the general and technical curriculum had significant losses of students.

The significant increase of students in the FARMS and ESOL programs within the academic and integrated curricula runs counter to traditional perceptions. Whereas the general or technical programs were thought to be the place these students would gravitate, this study revealed otherwise. Students from lower income families or whose command of English was not fully developed were starting to take the more academically challenging programs in greater numbers.

The overall increase in participation in the integrated curriculum by the selected demographic categories is very encouraging. Whereas education with a technical or vocational component was originally thought to be populated by targeted populations, this study refutes that thinking. The integrated curriculum had significant gains across all student characteristics and, in many instances, exceeded the results of the academic curriculum. These results were not dominated or skewed by any one group but reflected gains by all categories.

Although a major factor in the increases in the integrated curriculum may be the greater emphasis on college today, more students see post-secondary education as a necessity and perceive the general curriculum as having little to offer and most technical programs as too exclusive or specific. The academic curriculum is strong but the integrated curriculum has the substantive material that may have been the attraction for students in this LEA.

The appeal of the integrated curriculum may be that it combines the practical, technical instruction with the academic. This combination has attracted students from ethnic, income and linguistic backgrounds that may not have chosen an option conducive to furthering their education. The integrated curriculum may have provided them the opportunity to succeed and feel they have an investment in their education, learning and making a contribution to society. It supports the statement by Goodlad (1984) that "...vocational education is for all students." (p. 147).

Finally, the apparent success of the integrated curriculum may be attributed to the way the district was allowed to develop its own plan and adapt the federal resources to its particular needs. The legislation contained requirements regarding certain segments of the population but allowed local school systems to determine how those would be met. The LEA did not follow any specific integration model or program in this process. Instead, it used components of models discussed in chapter two to create its own successful approach to integration.

The fact that the legislation allowed the LEA to act independently and not rely on a federally developed plan may have been critical to its success. The act gave school districts some freedom in using the funding and the schools in this study used most of the resources for members of the technical support team. These were people who worked directly with teachers and students to ensure the success of the students. The results may not have been as favorable had a particular integration model been developed or specific mandates legislated to target specific groups of students.

#### Research Questions 3 and 4

For the purpose of reporting findings and discussion, research questions 3 and 4 have been combined. While both were concerned with academic achievement, each used a different measure. Research question 3 analyzed grade point average (GPA)

and academic grade point average (AGPA) while research question 4 used Scholastic Aptitude Test (SAT) scores.

Research Question 3 - When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the groups' Grade Point Average (GPA) and Academic Grade Point Average (AGPA) between the four curriculum categories in 1993 and 2000?

Research Question 4 - When students were grouped by gender, ethnicity, family income, or linguistic background, were there statistically significant differences in the students' highest SAT mean score between curriculum categories from 1993 and 2000?

To answer questions 3 and 4, the study examined academic achievement within the demographic categories identified with question 2: gender, ethnicity, income level and linguistic background. In addition, statistical analysis was conducted to determine differences between curriculum categories. The findings for research questions three and four support the third outcome identified by this researcher in the Carl D. Perkins Vocational and Technology Education Act of 1990. As documented in Chapter 2, it was hoped that students who completed an integrated technical and academic curriculum would have academic achievement comparable to those in the academic curriculum. The findings from each of these categories have been presented individually.

Curriculum. A curriculum analysis was included each time the statistical analysis for each demographic category was conducted. For all four demographic categories, the results for curriculum were the same. There was a significant difference between the academic group and the general, technical and integrated curricula as well as a significant difference between the integrated curriculum and the general and technical groups. The academic curriculum had the highest mean GPA,



AGPA and SAT score, the integrated curriculum was second, the general curriculum was third and the technical curriculum finished fourth.

The order that each curriculum placed was not surprising when it is considered that an upper-level math class (Algebra 2) was used as a sorting mechanism for inclusion in the academic or integrated curriculum. It should be noted that this separation had the effect of removing the higher achieving students from the greater technical group and resulted in a lower mean for those left in the technical group. If the technical group had been left intact, the means of those students would have been greater than the mean of the general curriculum.

Closer analysis of the means of the integrated curriculum and the academic curriculum reveal that the gap between the two closed across the time frame. This may suggest that as the integrated curriculum increased its enrollment, more high academic achievers chose the integrated curriculum. It may also mean that students in the integrated curriculum are increasingly more motivated by their courses. Either way, the integrated curriculum is becoming more attractive to students and providing them the means to achieve academic success.

The closing of the gap between the integrated and academic curriculum should be noted by those who believe that any type of education with a technical component is inferior. It is not a few classes chosen at the student's discretion but a rigorous sequence of courses recognized by the state. Students who chose the integrated curriculum invested a significant amount of time and energy and demonstrated a level of commitment to complete this program. An example of this is the long distance many commuted to attend the technical high school for a half-day. The other half-day was spent at their "home" school for their academic classes.

Gender. Analysis revealed that females have higher means than males across all curriculum categories. This was consistent with other published research that they

are doing better than males on many academic measurements (Cole, 1997; Han & Hoover, 1994). The reasons for these differences continue to be researched but may be linked to motivation and the recent emphasis on achievement for females. Also, cultural and peer pressure for males may be a factor in their falling behind females (Cole, 1997).

The results were notably different when analysis was conducted on SAT scores. The significant differences for gender for 1993 and 2000 in all curricular areas favored males. The higher SAT scores for males were in contrast to the results for research question 3 where female GPA and AGPA were higher than males across all curriculum categories. It would seem logical that a higher GPA average would result in a higher SAT score.

This discrepancy may be attributed to fewer males taking the SAT test because they don't plan to attend college. Research supports the fact that males are pursuing and earning bachelor's degrees at lower rates than in the past (Fletcher, 2002). The GPA and SAT discrepancy may also suggest that more males are choosing to attend community colleges or other post-secondary institutions that do not require SAT scores for entry. This was supported with the results from research question five that found that attendance is greater than expected at two-year institutions for all students.

When additional analysis of females in the integrated curriculum was conducted, it revealed that they did very well in comparison to the other curriculum categories. They had the greatest improvement in means for GPA, AGPA and SAT across the time frame. These findings and the results that increasing numbers of females are enrolled suggest that the integrated curriculum is very attractive. Not only are large numbers registered, but they include a greater percentage of academically successful females. The integrated curriculum provides the environment for them to succeed academically.

Ethnicity. Analysis revealed that in both years, Asian-Americans and European-Americans have higher GPA, AGPA and SAT means than African-Americans and Hispanic-Americans. This study did not address the factors that may contribute to these differences but other documented research has offered reasons for the discrepancy (Laden, 1994; Mortenson, 1992). These include the socioeconomic status of the ethnicities, participation in ESOL or involvement in special education.

Results of the study showed that for the integrated curriculum, most ethnic groups improved their mean GPA, AGPA and SAT score across the time frame. The other curriculum categories had only one or no groups with an increase in any score. As with gender, the integrated curriculum provided the environment to attract academic-minded students who want to be successful. Regardless of ethnicity, it appears that the combination of the practical and the conceptual are helping all ethnicities improve on important academic benchmarks.

FARMS. The results of the analysis were not surprising; non-participants in the FARMS program had higher GPA, AGPA and SAT scores than participants. These findings agree with other research that there is a strong correlation between economic status and academic achievement (Dimitrov, 1999; Krasner, 1992). All FARMS participants experienced a drop in GPA or AGPA over the years of the study. However, the smallest declines in GPA or AGPA belonged to those involved in the integrated curriculum. For SAT scores, the academic category had the highest SAT average, the integrated category was second, the general was third and the technical finished fourth. However, all FARMS participants except those in the academic curriculum fell. The reasons for these across-the-board declines warrant further study but may suggest a growing economic imbalance within the school district.

As with gender and ethnicity, results indicate that the integrated curriculum attracted the highest performing students from lower income families. The fact that

they fared so well in the integrated curriculum runs counter to perceptions of programs with a technical component. These programs can be part of a challenging curriculum and attract students from lower income families who will do well academically.

ESOL. As with FARMS, any statistically significant differences in mean scores were attributed to non-participants achieving the highest scores. This follows conventional thinking as the more demanding academic courses normally need a greater understanding and grasp of the English language.

Of note is the fact that all ESOL students had a drop in GPA and AGPA across the time frame, but the integrated curriculum had the smallest decline. For SAT scores, all curriculum categories except the integrated curriculum had a gain. Although the integrated category had a small drop, it had the second highest average score behind the academic group. The overall success of ESOL students suggests that there is something about the combination of the practical and the conceptual that helps them academically. This could be attributed to their witnessing the functional aspect of the theoretical concepts. It may also suggest that their success with one program is helping to improve the grades for the other component.

As with the previous demographic categories, ESOL participants fared very well in the integrated curriculum. They did not match traditional perceptions that students whose English language skills are not fully developed should be directed to a curriculum with only a technical component. They can take the technical courses and the academic courses that constitute the integrated curriculum and do well.

The academic success of students in the academic or integrated categories does not counter conventional wisdom in that the higher achieving students are in a curriculum that will prepare them for college. What is notable is that academic benchmarks are comparable between the two curriculums, even when the enrollment for the integrated curriculum is outpacing enrollment for the academic curriculum.

There is something about the two programs together that is appealing to all students and allows them to succeed academically. These results help to counter the practice of separating technical and academic subjects that was formalized with the Smith-Hughes Act of 1917 and continued with subsequent federal vocational education legislation during the 1900s. Whereas these federal acts developed and maintained the division of the two curricula, the 1990 Perkins Act and the integration emphasis may provide additional opportunities. These prospects are important, especially in light of the current trend toward accountability and academic measurements. The academic success of the different demographic categories suggests that the integrated curriculum could provide the means toward student improvement. This would be an appealing alternative to the existing emphasis on testing as a means of advancing student and school performance.

In addition, the academic achievement of students is important from an economic viewpoint. The growing degree of technical expertise required by many jobs necessitates that graduates be skilled and educated. A broad base of knowledge will also be necessary as the trend grows for people to change jobs more frequently over their working lives.

Results from the first four research questions suggest that all students can participate in a curriculum that includes both academic and technical subjects and be academically successful. Research question 5 addressed the post-secondary plans of students within each curriculum category.

#### Research Question 5

Was there a statistically significant independence in the post-secondary educational plans between students in the technical, academic, general, or integrated technical and academic curriculum in 1993 and 2000?

Results from research questions 3 and 4 suggest that students from the integrated curriculum have academic success that is comparable to the academic category. Legislators wanted this academic success to translate to enhanced postsecondary options. The fourth and final implicit outcome was that students from the integrated curriculum would plan to pursue post-secondary education opportunities at higher rates than expected from technical students in the past.

Before discussing any conclusions, it should be noted that survey results need to be tempered with the fact that it was administered just prior to graduation, Responses may be influenced by the educational environment and culture that is heavily weighted toward the need for students to attend post-secondary education. With that caveat, results of the analysis indicated that post-secondary plans are closely related to the curriculum track followed in high school. This finding is not surprising, as most students will gravitate toward the curriculum that is suitable to their talents, motivation and intentions.

Analysis revealed that significantly greater numbers of students from the academic curriculum plan to attend a four-year college. This is not surprising, given the high expectations of parents and the emphasis of the school system. What is worth noting is that students from the integrated, technical and general curriculum plan to attend a two-year institution in greater numbers. The desire by the school district that students continue their education is realized through different types of post-secondary options. This difference may be attributed to many things but the local presence of a nationally recognized community college and financial considerations are major factors.

In addition to the calculated statistical analysis, it is valuable to view the student's direct responses about post-secondary plans. When the responses for plans to attend a two-year or four-year institution are totaled and expressed as a percentage,

a more complete picture emerges. In 2000, the integrated curriculum had 96.3% of its students planning to attend a post-secondary institution, the greatest percentage of all categories. The academic curriculum was second with 95.2%, the general with 78.9% and the technical with 78.5%. When only those responses dealing with plans to attend a four-year institution were considered, the integrated curriculum had the largest increase of the four curriculum categories across the time frame. It increased 11 percentage points while the general curriculum went up 1.1%, technical went up .5% and the academic category had a 1.2% loss. The academic did have the greatest percentage planning to attend a four-year institution (79%) but the integrated is rapidly gaining.

The percentage of students in the integrated curriculum planning to continue their education is impressive. It counters the perception that technical education would limit the upward mobility of students and hinder their post-secondary education plans. Grasso and Shea (1979), for example, argued, "enrollment in a vocational program, among women as well as men, reduces the likelihood of high school graduates completing at least one year of college" (p. 156). In addition, Rosetti (1999) concluded that students who plan to go to college do not take vocational education because of the perception that it has nothing to offer.

Results from this study shatter the myth that an education with a technical component is "training" to enter a low-level job. The findings suggest that the post-secondary plans for students were not affected but were enhanced by the integrated curriculum. Even when one considers the elitism associated with four-year institutions, the integrated curriculum is closing the gap between the numbers of the academic program. It seems to validate the thinking of Dewey that an integrated curriculum would prepare students to be life-long learners. The combination would be

"truly liberalizing in quality" and give students the background needed for their future beyond high school.

Findings from this study suggest that the post-secondary plans for students were not affected but were enhanced by the integrated curriculum. Even when one considers the elitism associated with four-year institutions, the integrated curriculum is closing the gap between the numbers of the academic program.

### Summary

Results from this study suggest that the legislation and its goals regarding an integrated curriculum were met in this school district. When compared to the other three curricula, the combination of the technical and academic courses attracted a greater number and more diverse group of students. When academics were considered, graduates from the integrated curriculum are competitive with the academic students and narrowing the gap. Finally, students from the integrated curriculum have post-secondary aspirations that meet or exceed the academic curriculum. They were successful on standard academic measurements yet completed an education that combined theoretical and practical components. This combination will, arguably, prepare them more completely for their life after high school.

Although the integrated curriculum and the students involved were successful in this LEA, the debate continues over the content of the curriculum for the students. The local administration is changing the landscape of technical education with the only technical high school getting closed and its programs getting disbursed to other schools. Some support of technical programs is offered with the urging of individual schools to offer more career-oriented courses and programs that resemble the academy model discussed in Chapter 2. These tentative moves do not appear to strengthen the availability and presence of technical programs in this LEA. Given the encouraging



results from this study, a stronger and more direct plan to expand technical courses, in general, but the integrated curriculum specifically, would seem logical.

### Recommendations

This study was undertaken to analyze the academic achievement and demographics of students who completed an integrated academic and technical program against those who completed a strictly academic program, a strictly technical program, or a general course of study. Results indicate that students from a variety of demographic and ethnic groups were attracted to an integrated curriculum and performed well enough academically to plan to attend post-secondary education. Thus, based on the conclusions of this study, the following recommendations are offered.

1. Additional research studies should be conducted to determine why high-level students are attracted to the integrated curriculum. This study reported that they participated at relatively high levels but determining their motivation or reasons would be useful for future policy.
2. Additional research studies should be conducted to determine why lower-income or ESOL students continue to stay in the general or technical curriculum. This study found that the integrated curriculum was attractive but large numbers of these students continue to elect to stay in programs that may not provide the best opportunities.
3. Additional research studies should be conducted in other school districts to analyze the success of students completing an integrated program against those in other programs. Compiling what has worked in a number of different school systems will expand the body of

knowledge and assist schools that are considering the move toward integration. Results would be beneficial to schools and districts that are currently involved with integration.

4. Efforts should be directed at determining the present attitudes and perceptions held by educators, parents and students toward a technical education. It could be that many of the problems encountered by the integration concept stem from traditional beliefs and assumptions regarding technical courses. Research in this area may elucidate where these attitudes lie and help to begin a process to address the concerns.
5. Additional research studies should be conducted on the particular type of technical specialties completed by students in an integrated program. Research will indicate specialties are gaining students and which ones are losing students. It will also help to determine the demographic characteristics of those students involved. Answers to these questions will enable technical courses and programs to be responsive to the needs of the student, school, community, and the nation.
6. More longitudinal studies should be conducted on the relation between high school curriculum, college majors and adult career choices. Although the magnitude of these types of studies is significant, more information on this topic will enable secondary schools to offer a curriculum that will help students make better and more informed choices about their future.

Appendix A

High School Senior Exit Survey - 1993



1. How well has your education in MCPS prepared you for your future education, career, or job? MARK ONE ANSWER CHOICE.

A = Exceptionally well      B = More than adequately  
C = Less than adequately      D = Vary poorly

2. Which of the following did you like best about your education? MARK ALL ANSWER CHOICES THAT APPLY.

A = English (reading and writing) instruction      B = Math instruction      C = Grading  
D = Homework assigned      E = Flexibility to select courses      F = Variety of courses offered  
G = Textbooks and instructional materials      H = Opportunity to attend sports events  
K = Opportunity to participate in music, plays, etc.      I = Opportunity to participate in sports  
J = Opportunity to participate in hobby and academic clubs      L = My friends

3. Which of the following did you like least about your education? MARK ALL ANSWER CHOICES THAT APPLY.

A = English (reading and writing) instruction      B = Math instruction      C = Grading  
D = Homework assigned      E = Flexibility to select courses      F = Variety of courses offered  
G = Textbooks and instructional materials      H = Opportunity to attend sports events  
K = Opportunity to participate in music, plays, etc.      I = Opportunity to participate in sports  
J = Opportunity to participate in hobby and academic clubs      L = My friends

4. Looking back, to what extent did you do what you were capable of doing in high school? MARK ONE ANSWER CHOICE.

A = I worked my best      B = Tried to meet requirements (or "to get by")  
C = I didn't work my best

5. What will occupy the majority of your time next year? MARK ALL ANSWER CHOICES THAT APPLY.

A = Attend a 2-year college      B = Attend a 4-year college  
D = Attend trade/business/technical school      E = Do work related to school/vocational preparation  
E = Do work unrelated to school/vocational preparation      F = Enlist/military service  
G = Unaffiliated

6. How much schooling do you think you will complete? MARK THE HIGHEST DEGREE OR DIPLOMA.

A = High school diploma      B = Associate's or trade/business/technical degree  
C = Bachelor's degree      D = Master's degree      E = Doctorate (PhD) or professional degree (MD, JD)

7. What kind of work do you expect to be doing 7 years from now? MARK ONE ANSWER CHOICE.

A = Craftsperson (mechanic, plumber) or Technical (draftsperson, medical technician)  
B = Clerical/secretary, typist      C = Homemaker      D = Military      E = School teacher  
F = Operative (meat cutter, machinist, truck driver) or Laborer (construction worker)  
G = Professional I (physician, lawyer, professor, scientist)      H = Small business owner  
I = Professional II (accountant, business executive, nurse, engineer)  
J = Manager, Administrator (sales office, restaurant or government manager)  
K = Protective services (police officer, firefighter)  
L = Service (barber, household worker, food service)



Appendix B

High School Senior Exit Survey - 2000



### 3. Colleges and Universities applied to:

<b>1</b> School Code: _____ _____ _____ _____	<b>SCHOOL MOST LIKELY TO ATTEND:</b> Decision Status: (Mark one) <input type="checkbox"/> Application accepted <input type="checkbox"/> Application accepted after being on waiting list <input type="checkbox"/> Application rejected <input type="checkbox"/> Currently on waiting list <input type="checkbox"/> Have not heard Type: (Mark one) <input type="checkbox"/> Early decision/Early action <input type="checkbox"/> Regular application Financial Aid: (Mark all that apply) <input type="checkbox"/> Received aid based on need <input type="checkbox"/> Received aid not based on need <input type="checkbox"/> Received under \$5000 <input type="checkbox"/> Received \$5000 or more <input type="checkbox"/> Received no aid
<b>2</b> School Code: _____ _____ _____ _____	School Name: _____ Decision Status: (Mark one) <input type="checkbox"/> Application accepted <input type="checkbox"/> Application accepted after being on waiting list <input type="checkbox"/> Application rejected <input type="checkbox"/> Currently on waiting list <input type="checkbox"/> Have not heard Type: (Mark one) <input type="checkbox"/> Early decision/Early action <input type="checkbox"/> Regular application Financial Aid: (Mark all that apply) <input type="checkbox"/> Received aid based on need <input type="checkbox"/> Received aid not based on need <input type="checkbox"/> Received under \$5000 <input type="checkbox"/> Received \$5000 or more <input type="checkbox"/> Received no aid
<b>3</b> School Code: _____ _____ _____ _____	School Name: _____ Decision Status: (Mark one) <input type="checkbox"/> Application accepted <input type="checkbox"/> Application accepted after being on waiting list <input type="checkbox"/> Application rejected <input type="checkbox"/> Currently on waiting list <input type="checkbox"/> Have not heard Type: (Mark one) <input type="checkbox"/> Early decision/Early action <input type="checkbox"/> Regular application Financial Aid: (Mark all that apply) <input type="checkbox"/> Received aid based on need <input type="checkbox"/> Received aid not based on need <input type="checkbox"/> Received under \$5000 <input type="checkbox"/> Received \$5000 or more <input type="checkbox"/> Received no aid
<b>4</b> School Code: _____ _____ _____ _____	School Name: _____ Decision Status: (Mark one) <input type="checkbox"/> Application accepted <input type="checkbox"/> Application accepted after being on waiting list <input type="checkbox"/> Application rejected <input type="checkbox"/> Currently on waiting list <input type="checkbox"/> Have not heard Type: (Mark one) <input type="checkbox"/> Early decision/Early action <input type="checkbox"/> Regular application Financial Aid: (Mark all that apply) <input type="checkbox"/> Received aid based on need <input type="checkbox"/> Received aid not based on need <input type="checkbox"/> Received under \$5000 <input type="checkbox"/> Received \$5000 or more <input type="checkbox"/> Received no aid
<b>5</b> School Code: _____ _____ _____ _____	School Name: _____ Decision Status: (Mark one) <input type="checkbox"/> Application accepted <input type="checkbox"/> Application accepted after being on waiting list <input type="checkbox"/> Application rejected <input type="checkbox"/> Currently on waiting list <input type="checkbox"/> Have not heard Type: (Mark one) <input type="checkbox"/> Early decision/Early action <input type="checkbox"/> Regular application Financial Aid: (Mark all that apply) <input type="checkbox"/> Received aid based on need <input type="checkbox"/> Received aid not based on need <input type="checkbox"/> Received under \$5000 <input type="checkbox"/> Received \$5000 or more <input type="checkbox"/> Received no aid
<b>6</b> School Code: _____ _____ _____ _____	School Name: _____ Decision Status: (Mark one) <input type="checkbox"/> Application accepted <input type="checkbox"/> Application accepted after being on waiting list <input type="checkbox"/> Application rejected <input type="checkbox"/> Currently on waiting list <input type="checkbox"/> Have not heard Type: (Mark one) <input type="checkbox"/> Early decision/Early action <input type="checkbox"/> Regular application Financial Aid: (Mark all that apply) <input type="checkbox"/> Received aid based on need <input type="checkbox"/> Received aid not based on need <input type="checkbox"/> Received under \$5000 <input type="checkbox"/> Received \$5000 or more <input type="checkbox"/> Received no aid
<b>7</b> School Code: _____ _____ _____ _____	School Name: _____ Decision Status: (Mark one) <input type="checkbox"/> Application accepted <input type="checkbox"/> Application accepted after being on waiting list <input type="checkbox"/> Application rejected <input type="checkbox"/> Currently on waiting list <input type="checkbox"/> Have not heard Type: (Mark one) <input type="checkbox"/> Early decision/Early action <input type="checkbox"/> Regular application Financial Aid: (Mark all that apply) <input type="checkbox"/> Received aid based on need <input type="checkbox"/> Received aid not based on need <input type="checkbox"/> Received under \$5000 <input type="checkbox"/> Received \$5000 or more <input type="checkbox"/> Received no aid
<b>8</b> School Code: _____ _____ _____ _____	School Name: _____ Decision Status: (Mark one) <input type="checkbox"/> Application accepted <input type="checkbox"/> Application accepted after being on waiting list <input type="checkbox"/> Application rejected <input type="checkbox"/> Currently on waiting list <input type="checkbox"/> Have not heard Type: (Mark one) <input type="checkbox"/> Early decision/Early action <input type="checkbox"/> Regular application Financial Aid: (Mark all that apply) <input type="checkbox"/> Received aid based on need <input type="checkbox"/> Received aid not based on need <input type="checkbox"/> Received under \$5000 <input type="checkbox"/> Received \$5000 or more <input type="checkbox"/> Received no aid



**4. What will you do after high school graduation (Fall 2000)?**

**MARK ALL ANSWER CHOICES THAT APPLY.**

- Attend a 2-year college full-time
- Attend a 2-year college part-time
- Attend a 4-year college or university full-time
- Attend a 4-year college or university part-time
- Attend a trade, technical, or business school full-time
- Attend a trade, technical, or business school part-time
- Work full-time in job related to high school courses
- Work part-time in job related to high school courses
- Work full-time in job unrelated to high school courses
- Work part-time in job unrelated to high school courses
- Enter military full-time
- Enter military part-time
- Undecided
- Other, please specify: \_\_\_\_\_

**5. What is the highest degree you expect to receive?**

**MARK ONE ANSWER CHOICE.**

- High school diploma
- Association or trade/business/technical degree
- Bachelor's degree
- Master's degree
- Doctorate (Ph.D.) degree or professional degree (M.D., J.D.)

**6. Which of the following best describes your field of study or work that you will do after high school graduation? MARK ALL ANSWER CHOICES THAT APPLY.**

- Agriculture, forestry, or fishing
- Biotechnology
- Construction
- Education
- Engineering
- Finance, accounting, insurance, or real estate services
- Health services
- Information technology or computer services
- Legal services
- Manufacturing
- Public administration or government
- Social services
- Transportation, utilities, or communication services
- Wholesale or retail trade
- I have not decided on a specific field of study or work.

**7. When did you decide on this field of study or work?**

**MARK ONE ANSWER CHOICE.**

- Elementary school
- Middle school
- High school, before grade 12
- Within the last year
- I have not decided on a specific field of study or work.

**8. Who helped you decide on this field of study or work?**

**MARK ALL ANSWER CHOICES THAT APPLY.**

- Parents
- Family members other than parents
- Elementary school teachers
- Middle school teachers
- High school teachers
- Middle school counselor
- High school counselor
- High school career information coordinator
- Private career counselor
- Other students
- School or community adult
- Work supervisor
- Internship supervisor
- Youth group leader, e.g., scout leader
- Religious leader
- No one

**9. What information and/or activities helped you decide on this field of study or work?**

**MARK ALL ANSWER CHOICES THAT APPLY.**

- ASVAB (Armed Services Vocational Aptitude Battery) Interest Inventory (e.g., Skill-Related Search)
- Occupational Outlook Handbook
- High school internship
- Job outside school
- High school mentoring program
- Job shadowing (followed an employer at his/her work)
- Summer program
- Job or career fair at school
- Guest career speaker at school
- Course you took in high school
- Field trips to local businesses and industries
- Admiration of person in chosen field of study
- 4-year high school plan
- Having completed a college application
- Availability of financial aid to assist training in my chosen field of study
- Information I got about the availability of jobs in my chosen field of study
- Media event I saw or read about, e.g., television program
- Book like a biography I read
- Other, please specify: \_\_\_\_\_

10. In a typical week during the school year, how many hours do you work for pay?  
**MARK ONE ANSWER CHOICE.**

- I don't work for pay
- Less than 8 hours per week
- 8 to 16 hours per week
- 17 to 24 hours per week
- More than 24 hours per week

11. Rate how well your **high school program** prepared you to perform each of the following:  
**MARK ONE ANSWER CHOICE FOR EACH SKILL.**

	Excellent	Very Good	Good	Fair	Convenient
<b>Work Skills</b>					
Write so others understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Speak so others understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform number computations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Act appropriately in business settings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Come to work everyday	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Report to work on time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make good decisions at the work place	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creatively solve problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Working with Others</b>					
Accept supervision from others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Take the initiative to complete a task	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work as a team member	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work with others from diverse backgrounds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide structure and guidance to others in the workplace	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. MCPS coursework teaches you many different skills. Although you may have acquired many of the skills below on your own or through other activities, rate how well your **high school program** prepared you to perform each of the following:  
**MARK ONE ANSWER CHOICE FOR EACH SKILL.**

My high school program prepared me . . .	To do without any help	To do with some help	To do with a lot of help	Not able to do	Not applicable
<b>Computer/Termology Skills</b>					
Use a spreadsheet to analyze data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Locate, analyze, and sort information on a database	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Format documents using a word processor (e.g., inserting bullets, changing margins, changing fonts)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use multi-media software (e.g., PowerPoint) to create slide presentations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use e-mail for communication, including sending and receiving attachments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use the Internet to find information for a specific project	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assess the accuracy of information obtained from the Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Do you have a computer in your home?  
 Yes  No

14. Do you have Internet access at home?  
 Yes  No  Don't know

**THANK YOU FOR COMPLETING THIS SURVEY!**

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