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PROCESS EVALUATION OF A TECH-PREP PROJECT IN THIRTEEN SCHOOLS IN PUERTO RICO

DISSERTATION

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

by

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The Ohio State University

1995

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Approved by

Dr. N.L. McCaslin
Adviser
Graduate Program in Vocational Education
DEDICATION

This research study is dedicated

...to my father Ernesto Virella Díaz, who gave me the confidence and support to accomplish my goal;

...to my mother Marta R. Torres, who prayed and put in God's hands my own welfare;

and

...to my wife Zaida, my daughter, Zaida Ivette and my son Luis Ernesto for understanding my frequent absences.
ACKNOWLEDGMENTS

The completion of this dissertation has been possible because of advisor, committee members, professors, friends and family who have encouraged, and supported, me throughout my professional career.

I express sincere appreciation to Dr. N.L. McCaslin for his guidance and unconditional support throughout this research. I express sincere appreciation to the other members of my dissertation committee, Drs. Jamie Cano and Charles M. Loyd. Gratitude is expressed to Ana Falcón, Rubén Nieto and David Padilla for their technical assistance. Thank you to Raúl Soto and Idida Villanueva for their encouragement while I was working in this study. I offer sincere thanks to the panel of experts for their assistance during my dissertation. My sincere appreciation to my wife Zaida for your willingness to endure with me the vicissitudes of my endeavors.
VITA

December 5, 1954 ................... Born - Orocovis, Puerto Rico

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Fields of Study

Major Field : Vocational Education (Comprehensive)
Minor Field : Administration
The purpose of the study was to determine the processes under which the Tech-Prep Project was offered to the students that completed the first year of studies in 13 vocational high schools in Puerto Rico. The specific objectives of the study were to: a) determine the demographic characteristics of the students, b) determine the demographic characteristics of the teachers, c) ascertain the attitudes of students toward the project, d) ascertain the attitudes of teachers toward the project, e) assess the student level of agreement with program content, counseling services, and physical facilities, equipment and materials, f) assess the teacher level of agreement with program content, counseling services, physical facilities, equipment and materials, and business and industry linkages, g) determine the relationships between the students' demographic, attitude and selected variables of the Tech-Prep Project, and determine the relationships between the teachers
demographic, attitude and selected variables of the Tech-Prep Project.

The accessible population was the total of 65 teachers and 195 students involved in the project. A census was conducted and data were collected with a questionnaire in the school setting; the response rate for the teachers was 92% and for the students was 94%.

The attitudes of teachers and students toward the Tech-Prep Project were similar. Both agreed in their attitude toward the tech-prep project. The teachers and students also agreed with program content, counseling services and physical facilities, equipment and materials. Substantial and moderate positive relationships were found between program content, counseling services and physical facilities, equipment and materials. The data also revealed that teachers and students tended to have positive level of agreement toward the processes involved in the Tech--Prep Project.
# TABLE OF CONTENTS

Dedication .............................................. ii  
Acknowledgements ........................................ iii  
VITA ..................................................... iv  
Abstract ................................................ v  
List of Tables ........................................... ix  
List of Figures .......................................... xi  

## CHAPTER I: INTRODUCTION

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>4</td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td>5</td>
</tr>
<tr>
<td>Significance of the Study</td>
<td>6</td>
</tr>
<tr>
<td>Assumptions</td>
<td>8</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>8</td>
</tr>
<tr>
<td>Definitions of Terms</td>
<td>9</td>
</tr>
<tr>
<td>Summary</td>
<td>11</td>
</tr>
</tbody>
</table>

## CHAPTER II: REVIEW OF LITERATURE

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale of Tech-Prep</td>
<td>12</td>
</tr>
<tr>
<td>The Tech-Prep Model</td>
<td>14</td>
</tr>
<tr>
<td>Tech-Prep Evaluation</td>
<td>28</td>
</tr>
</tbody>
</table>

## CHAPTER III: METHODOLOGY

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Design</td>
<td>34</td>
</tr>
<tr>
<td>Population and Subject Selection</td>
<td>36</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>39</td>
</tr>
<tr>
<td>Data Collection Procedures</td>
<td>41</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>42</td>
</tr>
</tbody>
</table>

## CHAPTER IV: FINDINGS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender of Student</td>
<td>45</td>
</tr>
<tr>
<td>Age of Student</td>
<td>46</td>
</tr>
<tr>
<td>Ethnic Background</td>
<td>47</td>
</tr>
<tr>
<td>Father Education</td>
<td>48</td>
</tr>
<tr>
<td>Mother Education</td>
<td>49</td>
</tr>
<tr>
<td>Course Taught</td>
<td>50</td>
</tr>
<tr>
<td>Gender of Teacher</td>
<td>51</td>
</tr>
<tr>
<td>Years of Experience</td>
<td>52</td>
</tr>
<tr>
<td>Academic Preparation</td>
<td>52</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Tenure Status</td>
<td>53</td>
</tr>
<tr>
<td>Program (Academic or Vocational)</td>
<td>54</td>
</tr>
<tr>
<td>Attitudes of Students Toward the Electronics Tech-Prep Project</td>
<td>55</td>
</tr>
<tr>
<td>Attitudes of Teachers Toward the Electronics Tech-Prep Project</td>
<td>57</td>
</tr>
<tr>
<td>Student Level of Agreement with Program Content</td>
<td>61</td>
</tr>
<tr>
<td>Student Level of Agreement with Counseling Services</td>
<td>63</td>
</tr>
<tr>
<td>Student Level of Agreement with Physical Facilities, Equipment, and Materials</td>
<td>65</td>
</tr>
<tr>
<td>Teacher Level of Agreement with Program Content</td>
<td>67</td>
</tr>
<tr>
<td>Teacher Level of Agreement with Counseling Services</td>
<td>70</td>
</tr>
<tr>
<td>Teacher Level of Agreement with Physical Facilities, Equipment, and Materials</td>
<td>73</td>
</tr>
<tr>
<td>Teacher Level of Agreement with Business and Industry Linkages</td>
<td>76</td>
</tr>
<tr>
<td>Relationships Between the Students' Demographic and Selected Variables of the Tech-Prep Project</td>
<td>79</td>
</tr>
<tr>
<td>Relationships Between the Teachers' Demographics and Selected Variables of the Tech-Prep Project</td>
<td>82</td>
</tr>
<tr>
<td>CHAPTER V: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS</td>
<td></td>
</tr>
<tr>
<td>Background</td>
<td>86</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>87</td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td>88</td>
</tr>
<tr>
<td>Methodology</td>
<td>90</td>
</tr>
<tr>
<td>Summary of the Study</td>
<td>93</td>
</tr>
<tr>
<td>Conclusions</td>
<td>98</td>
</tr>
<tr>
<td>Recommendations</td>
<td>100</td>
</tr>
<tr>
<td>APPENDICES</td>
<td></td>
</tr>
<tr>
<td>A. English Version of the Study Instrument</td>
<td>105</td>
</tr>
<tr>
<td>B. Spanish Version of the Study Instrument</td>
<td>129</td>
</tr>
<tr>
<td>C. Panel of Experts</td>
<td>153</td>
</tr>
<tr>
<td>D. Study Authorization Letter</td>
<td>155</td>
</tr>
<tr>
<td>References</td>
<td>157</td>
</tr>
<tr>
<td>TABLE</td>
<td>PAGE</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>1. Gender of the Students</td>
<td>46</td>
</tr>
<tr>
<td>2. Age of the Students</td>
<td>47</td>
</tr>
<tr>
<td>3. Ethnic Background</td>
<td>48</td>
</tr>
<tr>
<td>4. Father Education</td>
<td>49</td>
</tr>
<tr>
<td>5. Mother Education</td>
<td>50</td>
</tr>
<tr>
<td>6. Course Taught by Teachers</td>
<td>51</td>
</tr>
<tr>
<td>7. Gender of Teachers</td>
<td>51</td>
</tr>
<tr>
<td>8. Years of Experience</td>
<td>52</td>
</tr>
<tr>
<td>9. Academic Preparation</td>
<td>53</td>
</tr>
<tr>
<td>10. Tenure Status</td>
<td>54</td>
</tr>
<tr>
<td>11. Program (Academic or Vocational)</td>
<td>54</td>
</tr>
<tr>
<td>12. Attitude of Student Toward the Electronics Tech-Prep Project</td>
<td>56</td>
</tr>
<tr>
<td>13. Attitude of Teacher Toward the Electronics Tech-Prep Project</td>
<td>59</td>
</tr>
<tr>
<td>14. Student Level of Agreement with Program Content</td>
<td>62</td>
</tr>
<tr>
<td>15. Student Level of Agreement with Counseling in the Tech-Prep Project</td>
<td>64</td>
</tr>
<tr>
<td>17. Teacher Level of Agreement with Program Content in the Electronics Tech-Prep Project</td>
<td>68</td>
</tr>
<tr>
<td>TABLE</td>
<td>PAGE</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>18. Teacher Level of Agreement with the Counseling Services in the Electronics Tech-Prep Project</td>
<td>71</td>
</tr>
<tr>
<td>19. Teacher Level of Agreement with the Physical Facilities, Equipment, Materials</td>
<td>74</td>
</tr>
<tr>
<td>20. Teacher Level of Agreement with Business and Industry Linkages</td>
<td>77</td>
</tr>
<tr>
<td>21 Intercorrelations Between the Student Demographic and Selected Variables</td>
<td>81</td>
</tr>
<tr>
<td>22 Intercorrelations Between the Teacher Demographic and Selected Variables of the Electronics Tech-Prep Project</td>
<td>85</td>
</tr>
</tbody>
</table>
List of Figures

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Work Incentive Model for Tech-Prep</td>
<td>15</td>
</tr>
<tr>
<td>2. Business and Industry Model</td>
<td>22</td>
</tr>
<tr>
<td>4. Population of Students by School and Educational Region</td>
<td>37</td>
</tr>
<tr>
<td>5. Population of Teachers by Schools and Educational Regions</td>
<td>38</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

Tech-prep is one of the most significant innovations in vocational education in years (Brown & Battist, 1992). Tech-prep promotes cooperation and communication between the secondary schools and postsecondary schools. It represents a trend in vocational education that employs strategies of articulation and integration in the secondary and postsecondary levels of education in order to improve the transition of students into the employment setting.

Team building between academic and vocational educators is one of the major strengths in Tech-Prep. Coorough (1992) argued that "for tech-prep to flourish, it must breed collaboration and team loyalty throughout the educational system" (p.34). The success of tech prep programs will depend on the support of everyone involved.

The main goal of tech-prep is to prepare an individual who possesses both theoretical knowledge and the capacity to translate this knowledge into tangible accomplishments. Under The Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990, Title III, Part E, sec. 342(a)(1), Congress indicated that the "rapid technological
advances and global academic competition demand has increased the need for levels of skilled technical education preparation and readiness on the part of youths entering the workforce" (p. 789).

The Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990, in Title III, Part E, sec 344(2), stated that tech-prep education programs should "consist of the two years of secondary school preceding graduation and two years of higher education, or an apprenticeship program of at least two years following secondary instruction with a common core of required proficiency in mathematics, science, communications, and technologies designed to lead to an associate degree or certificate in a specific career field" (p. 790).

Tech-Prep has been implemented in several states of the United States of America. In Puerto Rico, tech-prep was started during the school year 1992 - 93, with 13 electronic technology programs at the secondary level. These programs are to be coordinated with programs at four campuses of the Technological Institute of Puerto Rico. The Department of Education of Puerto Rico portends that basic skills will be strengthened at the high school level by focusing on mathematics, science, and communication. Emphasis is to be placed on the principles of electronic technology at the
secondary level. At the postsecondary level the student was to take advanced technology related to the field of electronics.

The Tech-Prep Project in Puerto Rico is a new alternative for students that want to continue studies at higher levels or enter into the world of work with more technical and academic skills. The Tech-Prep Project include a sequential program of studies starting in the 10th - grade and finishing with two years of postsecondary education. The Tech-Prep curriculum was responsive to the demands of new technology (Puerto Rico Department of Education, 1992). This study was designed to aid programs administrators in assessing the processes involved in the development of this Tech-Prep Project in the area of electronics during the first year of implementation in thirteen vocational schools in Puerto Rico. The study focused on the following aspects: a) program content, b) counseling services, c) physical facilities, equipment and materials, d) business and industries linkages, e) attitudes of teachers and students toward the program and, f) demographic characteristics. The study also ascertained how the students and teachers perceived the project in terms of their attitudes.

This process evaluation of the Tech-Prep Project was conducted after its first year of operation in 13 vocational high schools in Puerto Rico. It was designed to help ensure
that the project was of a high quality and that deficiencies were identified before they caused major problems.

Worthen & Sanders (1987) argued that some writers defined evaluation as the act of collecting and providing information to enable decision-makers to function more intelligently. Therefore gathering information for use in judging the merit of this Tech-Prep Project is important.

**Statement of the Problem**

Several studies have been conducted regarding the evaluation of the Tech-Prep Projects in the United States of America. The Carl D. Perkins Vocational and Applied Technology Act Amendments of 1990, Title III, Part E, sec.346, stated that "After grant recipients who receive grants in the first year in which grants are made under this part complete the eligibility under the program, the Secretary shall submit to the Congress a report evaluating the program under this part" (p.790).

In Puerto Rico the Tech-Prep Project began in 1992-93 school year. Therefore, information was needed regarding the conditions under which the program was offered. Furthermore, the study examined the attitudes of vocational and academic teachers in terms of teamwork, an essential element for the success of the program.
Purpose and Objectives

The purpose of the study was to determine the processes under which the Tech-Prep Project was offered to the students that completed the first year of the project in 13 vocational high schools in Puerto Rico. The specific objectives of the study were:

1. To determine the demographic characteristics of the students (gender, age, ethnic background, and level of education of the parents).

2. To determine the demographic characteristics of the teachers (course taught, gender academic preparation, program, gender, years of experience, academic preparation and tenure).

3. To ascertain the attitudes of students toward the Electronic Tech-Prep Project.

4. To ascertain the attitudes of teachers toward the Electronic Tech-Prep Project.

5. To assess the student level of agreement with:
   a. Program Content
   b. Counseling Services
   c. Physical Facilities, Equipment and Materials

6. To assess the teacher level of agreement with:
   a. Program Content
   b. Counseling Services
c. Physical Facilities, Equipment and materials

d. Business and industry linkages

7. To determine the relationships between the students' demographic, attitude and selected variables of the Tech-Prep Project (Program Content, Counseling, Physical Facilities, Equipment and Materials).

8. To determine the relationships between the teachers' demographic, attitude and selected variables of the Tech-Prep Project (Program Content, Counseling, Physical Facilities, Equipment and Materials).

Significance of the Study

Results of the study will provide evidence concerning the conditions and processes in the development of the program and the attitudes of those involved in the first year of implementation. The result of the study should be of value to several groups of educators, including vocational school administrators, staff members of the Area of Vocational and Technical Instruction in the Department of Education of Puerto Rico, vocational and academic teachers of the schools involved and staff and faculty of postsecondary institutions.
For vocational school administrators, the results of the study could help in the identification of the needs that should be taken into consideration in the implementation of Tech-Prep and/or for program improvement. The data collected in this study could be used by school administrators in the development of the strategic plan for the schools. The staff members of the Special Projects Office in the Area of Vocational and Technical Instruction of the Department of Education in Puerto Rico could also use the results of the study as a basis for decisions making and corrective actions to improve the effectiveness of the Tech-Prep Project. The vocational and academic teachers at the secondary level could use the results of the study to identify those behaviors that affected the teamwork between them.

Finally for the staff and faculty of the Technological Institute at Postsecondary Institution of the Department of Education in Puerto Rico, the study can help identify those areas that were covered in the first year by the student of the Tech-Prep Project. The faculty of the Technological Institute can use the results of the study to determine if, during the first year, there were some weaknesses or limitations that required to be reinforce at the post secondary level.
Assumptions

The researcher has made the following assumptions:

1. The teachers and students understood and responded to the questionnaires frankly.
2. The summation of each score indicated the total level of agreement which each part.
3. This document addressed the important conditions of the tech-prep processes (i.e. program content, counseling services, physical facilities, equipment and materials; and business and industry linkages).

Limitations of the Study

The study was limited to thirteen vocational technical schools that developed the Electronic Tech-Prep Project in Puerto Rico during the academic year 1992-93. Therefore, the study only apply to the thirteen vocational schools in which the questionnaires were administered. In addition, the study was limited to the vocational teachers in the field of electronic and the academic teachers that were teaching applied academics to the Electronics Tech-Prep students.
Definition of Terms

1. Academic Teacher:
Teacher that offers academic content in the basic skills of Mathematics, Physics, English or Spanish to the students in the Tech-Prep Project.

2. Applied Academics:
Those subjects of academic content like Mathematics, Science, English, and Spanish that are teaching with practical applications of a vocational course.

3. Area Vocational School:
A vocational school that provides vocational training on different occupational fields to secondary students from high schools in different geographical areas. The student usually takes the academic courses in the high school during the morning and the occupational courses in the area vocational school in the afternoon. (Puerto Rico Department of Education, 1992).

4. Articulation:
Is a process for coordinating different levels and/or systems of education. The purpose of educational articulation is to enable the learner to make a smooth transition from one level/system to another without experiencing delays, duplication of effort, or loss of credit.
5. **High School:**
   A school that provides the academic basic skills at secondary level in order to obtain the high school diploma. In our tech-prep program this school has the responsibility for the applied academic courses.

6. **Principles of technology:**
   A vocational course of electronics at secondary level in the Tech-Prep Project that includes the basic principles of this field.

7. **Students:**
   Those individuals enrolled in the Electronics Tech-Prep Project.

8. **Tech-Prep:**
   Is an articulation partnership between secondary vocational - technical schools and postsecondary institutions, is a model developed to help people prepare for careers in today's society careers that demand a technical knowledge unheard of 25 years ago.

9. **Vocational High School:**
   A comprehensive academic and vocational school that provides the high school diploma and the vocational certificate in specific occupation after the completion of the occupational training. (Puerto Rico Department of Education, 1992).
10. **Vocational Technical School:**
A school that provides vocational training at secondary and postsecondary level. At secondary level serves students from high school in different geographical areas with the purpose of a certificate. At the postsecondary level it offer associate degrees in different technologies. (Puerto Rico Department of Education, 1992).

11. **Vocational Teacher:**
Teacher that offers the vocational training of electronics to the students in the Electronics Tech-Prep Project.

**Summary**

This chapter presented an introduction to the study. Important aspects of Tech-Prep regarding to the mandates of the Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990 were discussed. The remainder of this study will include a review of the literature in chapter II, the methodology for the study in chapter III, the findings of the study in chapter IV, and the summary, conclusions and recommendations will be presented in chapter V. Finally appendices and references will be included in the last part of the study.
CHAPTER II

REVIEW OF LITERATURE

This chapter will present the review of literature. This review will include: (a) rationale for Tech-Prep, (b) the Tech-Prep model, and (c) the process evaluation of the Tech-Prep Project.

Rationale of Tech-Prep

Tech-prep is an educational concept whose time has come. It is built upon the theories and concepts of articulation between secondary and postsecondary educational systems (Hoerner, 1991).

The Congress of the United States of America has recognized the need for more relevancy in education by passing the Carl D. Perkins Vocational and Applied Technology Act of 1990. In Title III, Part E, sec.343(a), the discretionary amounts in any fiscal year is equal to or less than $50,000,000. With the passage of the Carl D. Perkins Act, Congress recognized Tech-Prep as a potential solution to some of the nation's educational problems. The Act establish some guidelines under sec.344(b). These guidelines were: (1) be carried out under an articulation
agreement between the participants in the consortium; (2) consist of the 2 years of secondary school preceding graduation and 2 years of higher education, or an apprenticeship program of at least 2 years following secondary instruction, with a common core of required proficiency in mathematics, science and communications, and technologies designed to lead to an associate degree or certificate in a specific career field; (3) include the development of tech-prep education program curricula appropriate to the needs of the consortium participants; (4) include in-service training for teachers that: (a) is designed to train teachers to effectively implement tech-prep education curricula; (b) provides for joint training for teachers from all participants in the consortium; and (c) may provide such training in weekend, evening, and summer sessions, institutes or workshops; (5) include training programs for counselors designed to enable counselors to more effectively: (a) recruit students for tech-prep education programs; (b) ensure that such students are placed in appropriate employment; (6) provide equal access to the full range of technical preparation programs to individuals who are members of special populations, including the development of Tech-Prep education program services appropriate to the needs of such individuals; and (7) provide for preparatory services which assist all participants in such programs" (p.790).
The Tech-Prep Model

Hull (1993) identified the needs that tech-prep address: "(1) need for better career opportunities for most American youth and adults, (2) need for a better (more capable) workforce and (3) need for a better/challenging/interesting educational experience for most secondary/postsecondary students" (P.F. 233). According to Hull (1993) Tech-Prep address these needs by "(1) career focus in education, (2) technical education with strong academic foundation (new curricula) and (3) emphasis beyond the high school in a different learning environment, articulation of secondary and post secondary and life long learners (P.F. 232). Dornisfe (1992) stated that "at the heart of the tech-prep programs is the development of articulated curriculum between secondary and postsecondary institutions" (p.32).

For many of our high school students there appears to be little relevance in their educational experiences at this level. Hoerner (1991) stated that "what seems to be lacking for our high school youth are incentives to stay in school" (p.19). According to Hoerner (1991) "Tech-Prep programs, by incorporating work incentive strategy, have the opportunity to involve business/industry and add relevancy to education for many of our youth" (p.19). Based on this, Hoerner
15

(1991), presented a typical 2+2 work incentive model for Tech-prep that is presented below:

<table>
<thead>
<tr>
<th>High School</th>
<th>Community Technical College</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 12</td>
<td>Vocational Programs</td>
</tr>
<tr>
<td>10-15 Hours Employment</td>
<td>BUSINESS/INDUSTRY</td>
</tr>
<tr>
<td>OJT/Co-op/Internship/Apprenticeship</td>
<td>Real-Time Employment</td>
</tr>
</tbody>
</table>

**Figure 1.** Work incentive model for Tech-Prep

In Hoerner's model the employers assume an important role in Tech-Prep programs throughout the four years. The employability competencies required at both the secondary and post-secondary levels enable the student to enter entry-level employment at the completion of the 12th grade and the completion of the post-secondary program.

It is very important that the needs of the majority of high school students are met. Parnell (1992) argued that "If the sole purpose of education is to prepare students for college degrees and graduate studies, our educational system is a failure by design, learning the majority of students unprepared for the jobs of the future or even for the next
step in education" (p.24). Few communities, school systems and colleges are recognizing and enhancing the talents of students who will work with their hands as well as their heads (Parnell, 1982). Tech-Prep combine competency based teaching, articulated programs between secondary and postsecondary institutions and an excellent foundation of applied academics. Parnell (1992) argued that "the largest volume of high school dropouts occurs between grades 10 and 11. This volume can be reduced if students see a focused and respected alternative learning opportunity that connects high school and college curricula with real-life issues" (p.25).

Tech-Prep encourages students to stay in high schools because it combines a common core of applied academics (mathematics, science and communications) with principles of technology at high school level and advanced skills at postsecondary level bringing the opportunity to the students in real work settings. Another important contribution of Tech-Prep is the integration of academic (mathematics, science and communication) and vocational education (principles of technology and advanced technology). Rosenstock (1991) indicated that teachers work together with no division between those that are vocational and those that are academic. Students engage in experimental and applied learning, with the opportunity to learn how to pose and solve problems by using creative thinking.
Hoerner (1992) stated that "by the year 2000, 70% of our high school students and 70% of our community and technical college students should be enrolled in work-based, Tech prep type programs. The Commission on the Skills of the American Workforce (1990), stated the importance of guaranteeing the right to a good education for every young American and providing positive links between educational achievement and jobs, essential to the creation of an educated nation. According to America's Choice (1990), more than 70% of the jobs in America will not require a 4 year college education by the year 2000.

Tech-Prep programs should be based on industry standards and principles of apprenticeship programs. Hamilton & Hamilton (1992) mentioned the principles of apprenticeship program generated for twenty one high school juniors entered in an apprenticeship program in Broome County New York. Among principles most related to the tech-prep programs are: "(1) Apprenticeship's structure learning through work Apprentice's learning at school and at work includes goals, competencies, sequencing and assessment. The new workplace basics include problem solving, teamwork, communication, and learning to learn skills. The employer's increasing emphasis on such higher order skills ensures that apprenticeship contributes to a broad general education rather than narrow job training. (2) Employers develop a learning environment for apprentices. The employers take a
long view of human resource development, providing the planning and support required by apprenticeship and offering reasonable prospects of future employment. The students share with adults in the workplace. They share with the training director, area coordinators, coaches, and mentors. (3) Schools adapt instruction to take maximum advantages of apprentice's work experience. (4) Apprenticeships lead youth toward academic diplomas and certification. Students can continue through two years of community college because they completed high school. (5) Employers and schools assume operating costs for the apprenticeship program. (Hamilton and Hamilton, 1992)

Tech-prep program development provide for partnership between educational institutions and business. Task forces are formed to bring together business and industry representatives, school counselors and academic and vocational teachers. According to Block (1992), the task forces defines student entrance requirements, academic and vocational student outcomes needed to meet industry performance standards, employability skills and course sequences for the programs" (p.31).

The Tech-Prep Project in Puerto Rico was designed to address the technological changes and the global economy which requires a new employees with applied academics, technical, and critical thinking skills. The industrial and the business sectors need capable employees to solve complex
problems, particularly in science, mathematics and communication. (Puerto Rico Department of Education, 1992)

Norton (1982) stated that "rapid technological change represents a major training problem for development, as well as developing countries. Not only is initial training required but frequent retraining is also required as the average number of career changes made by workers accelerates at an unprecedent rate. Traditional methods of training are unsatisfactory by themselves because they can provide neither the quantity nor quality of instructors required. Our training systems have to be more productive and more responsive to rapidly changing training needs" (p.1).

García (1992) described the mission of the tech-prep project in Puerto Rico as one that portends to realize a philosophy and cultural change in the focus of vocational and technical education, in order to produce a worker technically well prepared to respond to the industrial needs of the present and the future. At the same time, tech-prep should strengthen the academic and technical skills of the students in the high school that want to continue their studies at the postsecondary level or that want to enter in the labor force of the country (p.10).

Robertson (1990) described some of the tech-prep programs offered in several states: "The state of Virginia saw the implementation of one of the first tech-prep
curricula ever designed: the master technician in electronics and electromechanical technology program in the Virginia peninsula, a collaborative effort of local education agencies, the state department of education, the state community college system, business, industry, and government. The articulated curriculum, combining the 2 final years of high school and 2 years of community college for an associate in applied science degree in electronics and electromechanical technology, was installed in Hampton, Virginia, in 1983" (p.10).

The participation of business and industry was remarkable in this program. According to Robertson (1990) forty supervisors from business and industry came together to define the skills that they believed entry-level workers in electronics and electromechanical technology should have. A core of common skills were identified and embedded in a single, 4-year continuum of program offerings bridging the last 2 years of high school and the first 2 years of college. Taken as a whole, the Tech-Prep curriculum comprised a program for master technicians in electronics and electromechanical technology to meet the labor force needs of a job market that included naval shipyards, research centers, and NASA.

Other tech-prep models were developed in another states like Michigan, California, New York, Ohio and North Carolina. The programs more involved in the tech-prep model
were nursing, drafting and design, automotive technology, and automated manufacturing (Robertson 1991).

Another approach model was reported for Delaware in a Tech-prep compendium of models (p.1). Figure 2 present the Delaware Tech-Prep Compendium Model.
This model was divided into four sections. Section I dealt with the components of the craft committee. The craft committee members joined in a small group representing the entire district and were identified as Partnership in
Excellence. "The craft committees advise on the specific curriculum needs of their craft while the Partners advise the district on policy and procedures related to curriculum development or revision" (p. 2). The DACUM process was conducted in the development of the curriculum. Finch and Crunkilton (1989) described the following steps in the DACUM process:

"(1) Reviewing a written description of the specific occupation (2) Identifying general areas of competence within the occupation, (3) Identifying specific skills or behaviors for each general area of competence, (4) Structuring the skills into a meaningful learning sequence, (5) Establishing levels of competence for each skill as related to realistic work situations" (p. 140).

The union was one of the elements in section I that was represented across the board on craft committees and within the partners group. The Business, Industry, and Education Alliance (BIE) facilitated a cooperative effort and encourage active participation by business. On the other hand the Chambers of Commerce participated in BIE but also had ample resources and expertise to share. As a final element in this first section there were Government Agencies that impacted on the model. These included the Department of Public Instruction, the State Board of Education, the
Department of Labor, and the Legislative and Executive Branch. In Section II, the consortium of tech-prep Program established the lines of communication between participating secondary and postsecondary institutions. The Delaware Consortium on Tech-Prep Project developed a functional operational model to solicit the involvement of Business and Industry. Section III included the steps of the articulation model. Among those steps were the Secondary and Postsecondary Institutions agree on a technical area that could be articulated and the quantity of courses to be articulated as feasible within a technology in order to strengthen the appeal of advance credit. In section IV, the student became eligible to earn advanced credit toward postsecondary work at Delaware Technical and Community College.

Bragg and Allen (1991) discussed several types of models for secondary and postsecondary articulation. There are advanced curriculum, time shortened or advanced placement and tech-prep. According to Bragg and Phelps (1991) there are differences between these various types of articulation modes:

"Time-shortened or advance placement models provide students with credit or advanced standing for postsecondary requirements completed before high school graduation. As a result of enrolling in time-shortened programs, students can complete
their associate degrees in less than the standard two-year period, typically, in one and one half years" (p. 4).

The advanced curriculum model includes 4+2, 2+2 or 2+2+2. These models tended to be highly coordinated and sophisticated in the sequencing and structuring of courses provided between the various levels of education. The 4+2 and 2+2 programs are based on a continuous six or four year curriculum covering grades nine or eleven through fourteen. The 2+2+2 model provides for a six-year articulation plan for the secondary level (grade eleven and twelve), the two-year college level (grades thirteen and fourteen) and the remaining two years at the four-year college level (grades fifteen and sixteen). Successful advanced curriculum programs typically had joint facilities, faculty, advisory committees, and coordinators. Students can exit the program with a certificate at the end of grades twelve, thirteen and fourteen. (Bragg and Phelps, 1991)

A third rigorous articulation model was tech-prep. This model combined a common core of learning and technical education based on math, science, communication, and technology in an applied setting. Beginning with the junior year in high school, students received coursework in applied science, applied math, communications, and technology. More intensive technical education specializations were developed
during the thirteenth and fourteenth years on the postsecondary level in such vocational-technical areas as agriculture, nursing, electronics, telecommunications, computers, business, marketing, entrepreneurship, and the construction trades (Bragg and Phelps, 1991).

Bragg and Phelps (1991) argued in terms of a research conducted by Mckinney et al. (1988) which "reveal that only ten percent of secondary/postsecondary programs fit the definition of tech-prep. Approximately twenty percent of the programs were identified as 2+2 and the remaining seventy percent reported articulation that were time-shortened placement. This study also revealed that as secondary and postsecondary programs worked together, particularly to offer articulated programs in the advances technologies, there was a tendency to move toward the more sophisticated and coordinated tech-prep or 2+2 models" (p. 4). Tech-Prep program articulation can be between individual secondary and postsecondary institutions, among groups of schools in a consortium, between two years and four year college, or between educational institutions and nonschool agencies that have training needs (Robertson, 1990). Tech-prep is a program with a new structure blending two traditional types of academic and vocational education. The applied academic classes are taught by applying knowledge to workplace-related tasks. Teaching applied communications skills is more relevant if focused in writing
business letter or reports related to the nature of work. Applied mathematics will be more useful when the student deals with problem solving, as an example the application of mathematics in the Ohms Law formula in the course of electronics. Similarly, applied science will be more relevant if concepts of the Fahrenheit and Centigrade formulas are used with practical applications in the Refrigeration and Air Conditioning Course.

In a research project funded by the National Center for Research in Vocational Education, Hoerner, Clowes, and Impara (1991) identified approximately 380 Tech prep programs in the nation. Eleven states identified in the research did not have any Tech prep program.

Regarding the definition of Tech - Prep, Hoerner (1991) analyzed it in terms of the Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990. He argued that "While the new act prescriptively defines Tech prep, there are many misconceptions. It is not the new name for vocational education as many seem to think. It is not a 4-year program that must lead to an associate degree as again seems to be the perception. In fact, Tech-prep does not have to involve a community college. The law says 2 years of postsecondary education- it could be apprenticeship or a university that offers a 2-year postsecondary certificate" (p.5). Tech-Prep is an articulated educational program of 2 years high school and 2 years postsecondary
preparation which includes a common core of math, science, communications and technologies designed to lead to an associate degree or certificate in a specific career field. It may include many other things. It can be a 2+2, a 4+2 or 2+2+2, etc." (p. 4).

Tech-Prep is an excellent opportunity to human resource development. Johnston and Parker (1987) argue that education and training are primary systems by which the human capital of a nation are preserved and increased.

**Tech-Prep Evaluation**

To conduct an evaluation different techniques are available. Finch and Crunkilton argued that "these techniques tend to be categorized as being either quantitative or naturalistic" (p. 274). Quantitative techniques focus on specific evaluation outcomes and objectives measures. Naturalistic techniques, on the other hand, place emphasis on process rather than on outcomes (Finch & Crunkilton, 1989). Finch and Bjorkquist (1977) sustained that evaluation is related with the initiation, structuring, and operation of vocational education curricula, programs and services. Finch and McGough (1982) presented a framework of evaluation related to these areas in which four elements of evaluation are included: context, input, process, and product. According to Finch and McGough (1982) "Context and input evaluation are most appropriate
when initiation and structuring activities are to be conducted. This might involve decisions such as whether or not to establish a curriculum or what content should be included in the program. Process and product evaluation relate most closely to operation. Process evaluation relates to decisions such as whether or not students have learned certain content. Product evaluation focuses on decisions related to effects on students, such as whether or not former students are employable" (p.279).

Finch and Crunkilton (1989) also stated that process evaluation could be used to determine "whether a certain innovative program is operating properly" (p.278). The extent to what the students are satisfied with their instruction is associated with process evaluation (Finch and Crunkilton, 1982). Two types of evaluation for vocational programs were discussed by McCaslin, (1990). These are process evaluation and outcomes evaluation. Regarding to process evaluation McCaslin (1990) stated that:

"Program sponsors/founders typically place emphasis on process information in demonstrating their accountability. Process information provides evaluators with a basis for understanding and interpreting what was occurred. If vocational education programs are to be improved as a result of an evaluation, it is essential to provide
According to Hunting, Zymelman, and Godfre (1986) process evaluation involves the ex-post analysis of the functioning of the project. Hunting, Zymelman, and Godfre stated "if the evaluation is done as part of midterm monitoring, it will focus on ways of improving the project (for example, by redesigning its mode, curricula, or management) or perhaps on decisions about its continuation, expansion, or replication" (p.3).

Helmandollar and Wayne (1990) conducted a study in Tech-Prep to evaluate the Roanoke area's 2+2 Automated Manufacturing Technology Program. This program included the Roanoke County Schools, Roanoke City Schools, Boletourt County Schools, Salem City Schools, in articulation effort with Virginia Western Community College. Three components were considered in the process phase of evaluation. These were: administration procedures, curriculum development, and, timeline integration. In this process phase Helmandollar and Wayne addressed:

"(1) the goals and objectives set for the administrative procedures for curriculum development to ascertain if they are appropriate for the program"; (2) the degree to which the needs assessment inputs developed during DACUM
(Developing A Curriculum) procedure were integrated into the curriculum; (3) and evaluate the timeline for integration to determine if it is appropriate and realistic" (p. 4).

Each one of the three components: administration procedures, curriculum development and timeline integration were found to be favorable and the success of this project must be attributed to the comprehensiveness of involvement by business and industry leaders, school administrators from all levels, teachers from secondary schools and community colleges, state and local government officials, and the project director and staff (Hunting, Zymelman and Godfre, 1986).

Dornsife (1992) identified four key phases in Tech-Prep program development. The first phase involved the participation of groups in planning process and in the design of organizational structures. The second phase included the development of specific Tech-Prep programs components, such as local policies, articulation agreements, professional development, marketing and outreach, and business and industry collaboration. In the third phase, Dornsife proposed that Tech-Prep takes action, through specific implementation strategies and the recognition and handling of possible barriers. The final stage involved evaluation of program efforts and outcomes to ensure continuous quality improvement. Rubin (1993) argued that
implementation of Tech-Prep takes more time than initially anticipated. According to Rubin (1993), a successful evaluation must be flexible to adapt to this ever-expanding timeline of Tech-Prep implementation and program development. The evaluation designs must also be flexible to adjust to changing circumstances at the local level, including modifications in program design, discipline focus, timeframe, etc. Rubin also pointed out that given the growing importance of Tech-Prep as part of the national education picture, it is important to recognize the political nature of any evaluation.

Figure 3 shows a conceptual framework of the Tech-Prep process evaluation. This framework was used as a guide for the development of the study. Information was gathered from the major institutional stakeholders (students, vocational teachers and academic teachers) in the tech-prep program. Information related to demographic variables and attitudes toward Tech-Prep program was gathered from teachers and students. Information about the conditions in which the Tech-Prep program was offered related to the processes involved in program content, counseling services, physical facilities, equipment and materials was also obtained from teachers and students. Information regarding the business and industries relations was obtained from the teachers.
Figure 3. A conceptual framework of the tech-prep process evaluation
CHAPTER III

METHODOLOGY

This chapter will present the methodology that was used to conduct the study. The methodology included: (a) research design, (b) population and subject selection, (c) instrumentation, (d) data collection procedures, and (e) data analysis.

Research Design

The type of research was descriptive-correlational. According to Fraenkel & Wallen (1990), descriptive-correlational research attempts to investigate possible relationships among variables without trying to influence those variables. Descriptive research is the type of research in which the researchers asking questions related to the issue of interest (Fraenkel and Wallen 1990). Ary, Jacobs and Razavieh (1990), argued that "descriptive surveys focus on determining the status of a defined population with respect to certain variables" (p.407). The design for this study was the one shot case study (Campbell and Stanley, 1963). According to Campbell and Stanley (1963), most studies in education use this design when a single group is
studied. Campbell and Stanley (1963) identified the sources of internal validity of this design. Testing, instrumentation, regression and interaction of selection and maturation were not a problem with this design. Testing was not a problem because no pretest was used. Instrumentation was not a threat because there were no changes in the calibration of the instruments and in the data collectors. Regression was not a threat because there were not extremes scores. There was not interaction between selection and maturation because the study was a census. There were some threats to internal validity like history (events that may occur and affect responses of the subjects), maturation (student may change due to factors associated with the passing of time and not necessarily by the tech-prep program), selection (although in our study it was not a problem because it was a census) and mortality that was considered by reporting how many subjects dropped out in the first year of the program.

In terms of external validity, there was no problem with interaction of testing and x (because no pretest), reactive arrangements, and multiple interference (because there was just one instrument), interaction of selection and x (treatment) could be a problem, but in the current study a census was utilized, thus eliminating the threat.

The study was designed to collect data from the teachers and students regarding the effectiveness of the
tech-prep program. The data was collected face to face with teachers and group of students.

**Population and Subject Selection**

The study was conducted in 13 vocational high schools of Puerto Rico where the electronics tech-prep program was offered in its first year on 1992-1993. The schools were purposely selected for this study because they were the only schools that offered Electronics Tech-Prep Project in 1992-1993. The target population was all secondary vocational and academic teachers involved in the Tech-Prep Project and all the secondary vocational students that were enrolled in the first year of the Tech-Prep Project in the school year 1992-1993. There was a total of 65 teachers in the target population of teachers and 195 students in the target population of students. Table 1 presents a distribution of the population and respondents by schools and educational regions.

A census was used for the study in both populations. Questionnaires were administered to all secondary vocational and academic teachers involved in the Electronics Tech-Prep Project in the thirteen schools (N=65). A total of 60 teachers returned their questionnaires for a response rate of 92 percent. The number of usable responses for data analysis purposes was 59 (90%). A student survey questionnaires were administered to 195 secondary vocational
students involved in the Electronics Tech-Prep Project during 1992-93. A total of 183 students returned their questionnaires for a response rate of 94 percent. The numbers of usable responses for data analysis was 181 (93%).

<table>
<thead>
<tr>
<th>Name of the School</th>
<th>Educational Regions</th>
<th>Population of Students</th>
<th>Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antonio Luchetti</td>
<td>Arecibo</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Tomas C. Ongay</td>
<td>Bayamón</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>Emilio R. Delgado</td>
<td>Bayamon</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Republica de Costa Rica</td>
<td>Caguas</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Benjamín Harrison</td>
<td>Caguas</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Ramón Avila</td>
<td>Caguas</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Veve Calzada</td>
<td>Humacao</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Pedro Perea</td>
<td>Mayagüez</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>Bernardino Cordero</td>
<td>Ponce</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Area Vocational School of Yauco</td>
<td>Ponce</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Trina Padilla</td>
<td>San Juan</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Trujillo Alto</td>
<td>San Juan</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Carlos F. Daniels</td>
<td>San Juan</td>
<td>15</td>
<td>12</td>
</tr>
</tbody>
</table>

*Figure 4* - Population of Students by Schools and Educational Regions
<table>
<thead>
<tr>
<th>Name of the School</th>
<th>Educational Regions</th>
<th>Population of Teachers</th>
<th>Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antonio Luchetti</td>
<td>Arecibo</td>
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<td>4</td>
</tr>
<tr>
<td>Tomas C. Ongay</td>
<td>Bayamón</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Emilio R. Delgado</td>
<td>Bayamón</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Republica de Costa Rica</td>
<td>Caguas</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Benjamín Harrison</td>
<td>Caguas</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Ramón Avila</td>
<td>Caguas</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Veve Calzada</td>
<td>Humacao</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Pedro Perea</td>
<td>Mayagüez</td>
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<td>5</td>
</tr>
<tr>
<td>Bernardino Cordero</td>
<td>Ponce</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Area Vocational School of Yauco</td>
<td>Ponce</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Trina Padilla</td>
<td>San Juan</td>
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<tr>
<td>Carlos F. Daniels</td>
<td>San Juan</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

**Figure 5.** Population of Teachers by Schools and Educational Regions
**Instrumentation**

The instruments used in the study were developed by the researcher from statements of vocational program evaluation gathered from a variety of sources (questionnaires). Among the sources used to develop the questionnaires there are the Practical Guide for Evaluating Vocational Training Programs (Hunting, Zymelman, and Godfre, 1986), the Student Reaction Form (Wentling, Leach, and Galloway, 1991), the Vocational Student Survey Form (Owens, 1982), the Discussion Guide for Student Satisfaction (Wentling and Roegge, 1991), and the questionnaire to determine the attitudes of Ohio Vocational Agriculture Teachers toward Summer Programs with an internal consistency reliability of .82 Cronbach's alpha (Short and Miller, 1985).

A panel of experts consisting of two university faculty, two graduate students in the Department of Agricultural Education at the Ohio State University, one vocational school director, two coordinators of the Electronics Tech-Prep Project in Puerto Rico, and two academic teachers, were used to establish the content validity of the instrument. Based on their revision several statements were modified in terms of item content, item clarity, wording, length, format, and instrument's overall appearance. The Spanish translation of the instrument (Appendix) was reviewed for validity by three members of the panel of experts who were fluent in Spanish.
A five-part instrument was constructed to collect the data from the students. A six-part instrument was constructed to collect the data from the teachers. Parts I, II and III in the students' and teachers' questionnaires were program content; counseling services; and physical facilities, equipment and materials respectively. The attitude of the students toward the Electronics Tech-Prep Project constituted Part IV and the demographic variables constituted Part V in the students' questionnaire. In the teachers' questionnaire, business and industry linkages constituted Part IV, attitude of teachers toward the Electronics Tech-Prep Project constituted Part V and the demographic characteristics were found in Part VI.

In the student questionnaire the demographic characteristics of interest were: gender, age, ethnic background, fathers' education and mothers' education. The demographic characteristics of interest in the teachers' questionnaire were: course taught, gender, years of experience, academic preparation, tenure and program.

A pilot test was conducted with a group of 26 Puerto Rico Electronics Vocational Teachers not included in the study. The coefficient of stability for each section was: Part I = .87, Part II = .84, Part III = .88, Part IV = .82, and Part V = .82. Cronbach's alpha was used to determine internal consistency. The Cronbach's alpha for each section
was: Part I = .80, Part II = .78, Part III = .90, Part IV = .81, and, Part V = .78.

A pilot test was also administered to a group of 26 Puerto Rico academic teachers not included in the study with the following coefficients of stability: Part I = .85, Part II = .87, Part III = .89, Part IV = .82, and Part V = .89. The Cronbach's alpha coefficients were: Part I = .82, Part II = .73, Part III = .92, Part IV = .82 and Part V = .78.

Finally a pilot test was conducted with a group of 30 Puerto Rico vocational students not included in the study. The computed coefficients of stability were: Part I = .84, Part II = .86, Part III = .81, and Part IV = .83. A Cronbach's alpha coefficient was also computed to determine the internal consistency of each part. These coefficients were: Part I = .87, Part II = .76, Part III = .87, and Part IV = .80.

From April 20, 1994, the researcher gave an instrument to each member of the pilot test group. A second copy of the instrument was given to each pilot group member one week after the first instrument was collected.

Data Collection Procedures

In order to conduct this study the researcher made the necessary arrangements with the tech-prep program director
in Puerto Rico. With the cooperation of the program director the researcher coordinated an appointment with the schools directors from each one of the 13 schools. The researcher informed the school directors of the purpose of the study and the arrangements to visit the school for the administration of the questionnaires was made.

If during the administration of the questionnaires the students or teachers were absent from school, the researcher left the appropriate quantity of questionnaires with the school director. Another visit was made to collect the questionnaires that were not collected at first time. The researcher also used another follow up techniques such as calling the school directors when ever it was necessary to increase the response rate.

Data Analysis

The data were analyzed by using the SPSS program. Since a census was used in this study, the type of statistics was descriptive. The different statistics were frequency distributions, means, mode, median, standard deviation and correlations ($r_{pb} =$ point biserial and $r =$ pearson product moment correlation coefficient). The data for the strongly disagree/ strongly agree was interval. The data for the variable gender and tenure status, were assumed to be nominal. On the other hand, the data
regarding the degree earned and years of experience was ordinal. Data for variable age was assumed to be interval. For interpretation purposes the scale from 1 to 4 was adjusted in the following way: strongly disagree = 1.00 to 1.49; disagree = 1.50 to 2.49; agree = 2.50 to 3.49; and strongly agree = 3.50 to 4.00. In determining the strength of relationships, descriptors as recommended by Davis (1971) will be used. They are shown in Figure 6.

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.70 or higher</td>
<td>Very Strong Association</td>
</tr>
<tr>
<td>.50 to .69</td>
<td>Substantial Association</td>
</tr>
<tr>
<td>.30 to .49</td>
<td>Moderate Association</td>
</tr>
<tr>
<td>.10 to .29</td>
<td>Low Association</td>
</tr>
<tr>
<td>.01 to .09</td>
<td>Negligible Association</td>
</tr>
</tbody>
</table>

*Figure 6. Convention Used to Describe Measures of Association*
CHAPTER IV

FINDINGS

In this Chapter the findings of this study will be reported. The sections of this chapter are arranged according to the objectives of the study and include:
1) To determine the demographic characteristics of students (gender, age, ethnic background, and level of education of the parents), 2) To determine the demographic characteristics of the teachers (course taught, gender, program, years of experience, academic preparation and tenure), 3) To ascertain the attitudes of students toward the electronic tech-prep project, 4) To ascertain the attitudes of teachers toward the Electronic Tech-Prep Project, 5a) To assess the student level of agreement with program content, 5b) To assess the student level of agreement with counseling services, 5c) To assess the student level of agreement with physical facilities, equipment and materials. 6a) To assess the teacher level of agreement with program content, 6b) To assess the teacher level of agreement with counseling services, 6c) To assess the teacher level of agreement with physical facilities,
equipment and materials, 6d) To assess the teacher level of agreement with business and industry linkages, 7) To determine the relationships between the students' demographic, attitude and selected variables of the Tech-Prep Project (program content, counseling, physical facilities, equipment and materials), 8) To determine the relationships between the teachers demographic, attitude and selected variables of the Tech-Prep Project (program content, counseling, physical facilities, equipment and materials).

Objective 1 - To determine the demographic characteristics of students (gender, age, ethnic background, and level of education of the parents)

Gender

Table 1 shows the gender of the students in the electronics Tech-Prep project. The majority of the students (86.7%) were male while 13.3% were female. The information on the enrollment of all electronics students in Puerto Rico for 1992 to 1993 was gathered from the Department of Education Planning Office (G. Ortiz, personal communication, February 9, 1995).
Table 1

Gender of Electronics Students (N = 181)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Tech-Prep Project</th>
<th>All Electronics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
</tr>
<tr>
<td>Male</td>
<td>157</td>
<td>86.7</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Age

The data presented in Table 2 shows how the students in the Electronics Tech-Prep Project were distributed in three age categories. More than three-fourths of the students (76.8%) were 16 years of age. Twenty percent of the students were 15 and three percent were 17 years of age. The average age of the students was 15.8 years of age.
Table 2

Age of Students (N = 181)

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>36</td>
<td>19.9</td>
</tr>
<tr>
<td>16</td>
<td>139</td>
<td>76.8</td>
</tr>
<tr>
<td>17</td>
<td>6</td>
<td>3.3</td>
</tr>
</tbody>
</table>

Mean = 15.8    SD = .45

Ethnic Background

The data reported in Table 3 is related to the students' ethnic background. Nearly 92% of the students were from Puerto Rico. Eight percent of the students were from other countries (Dominican Republic, Cuba, South America, and United States of America).
Table 3

**Ethnic Background**  
(N = 181)

<table>
<thead>
<tr>
<th>Country</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puerto Rico</td>
<td>166</td>
<td>91.7</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>5</td>
<td>2.8</td>
</tr>
<tr>
<td>Cuba</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>South America</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>United States of America</td>
<td>7</td>
<td>3.9</td>
</tr>
</tbody>
</table>

**Fathers' Education**

The data presented on table 4 indicates the educational level of the students father. Approximately one-half of the fathers of the students enrolled in the Electronics Tech-Prep Project have completed high school (53.8%). About fourteen percent of the fathers had 9th grade education or less. Approximately 32.0% of the parents had completed some type of a college level degree (from associate degree to doctoral degree).
### Table 4

**Father's Education Level** 
(N = 173)

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st to 6th grade</td>
<td>11</td>
<td>6.4</td>
</tr>
<tr>
<td>7th to 9th grade</td>
<td>14</td>
<td>8.1</td>
</tr>
<tr>
<td>10th to 12th grade</td>
<td>93</td>
<td>53.8</td>
</tr>
<tr>
<td>Associate Degree</td>
<td>34</td>
<td>19.7</td>
</tr>
<tr>
<td>Bachelor Degree</td>
<td>18</td>
<td>10.4</td>
</tr>
<tr>
<td>Master Degree</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>Doctor Degree</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>Other (Voc. Course)</td>
<td>1</td>
<td>.6</td>
</tr>
</tbody>
</table>

### Mother's Education

Table 9 presents information about the educational level of the students' mothers. Sixteen percent of the mothers had nine years or less of education. About one-half of the mother of the students enrolled in the Electronics Tech-Prep Project (47.5%) had completed from 10-12 grades of high school. Approximately 37.0% of the mothers had completed a college level degree (associate degree to doctoral degree).
Table 5

Mother's Education Level (N = 177)

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st to 6th grade</td>
<td>11</td>
<td>6.1</td>
</tr>
<tr>
<td>7th to 9th grade</td>
<td>18</td>
<td>9.9</td>
</tr>
<tr>
<td>10th to 12th grade</td>
<td>86</td>
<td>47.5</td>
</tr>
<tr>
<td>Associate Degree</td>
<td>33</td>
<td>18.2</td>
</tr>
<tr>
<td>Bachelor Degree</td>
<td>24</td>
<td>13.3</td>
</tr>
<tr>
<td>Master Degree</td>
<td>4</td>
<td>2.2</td>
</tr>
<tr>
<td>Doctor Degree</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>Missing</td>
<td>4</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Objective 2 - To determine the demographic characteristics of the teachers (course taught, gender, program, years of experience, academic preparation and tenure).

Courses Taught

As reported in Table 6, about 78.0% of the teachers were academic teachers in the courses of Spanish, English, mathematics and physics. Twenty-two percent of the teachers were from the electronics vocational course.
Table 6

Courses Taught by Teachers (N = 59)

<table>
<thead>
<tr>
<th>Course</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spanish</td>
<td>13</td>
<td>22.0</td>
</tr>
<tr>
<td>English</td>
<td>13</td>
<td>22.0</td>
</tr>
<tr>
<td>Mathematics</td>
<td>11</td>
<td>18.6</td>
</tr>
<tr>
<td>Physics</td>
<td>9</td>
<td>15.3</td>
</tr>
<tr>
<td>Electronics</td>
<td>13</td>
<td>22.0</td>
</tr>
</tbody>
</table>

Gender

The data presented in Table 7 shows the gender of the teachers in the Electronics Tech-Prep Project. The majority of the teachers were female (61.0%), while 39.0% were male.

Table 7

Gender of Teachers (N = 59)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Electronics</th>
<th>Academics</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>12 92</td>
<td>11 24</td>
<td>23 39</td>
</tr>
<tr>
<td>Female</td>
<td>1 8</td>
<td>35 76</td>
<td>36 61</td>
</tr>
</tbody>
</table>
Years of Experience

Table 8 shows that 61.1% of the teachers had eleven or more years of experience as teachers. Approximately 38.9% of the teachers had ten or less years of experience. The teachers averaged 3.12 years of teaching experience.

Table 8

<table>
<thead>
<tr>
<th>Years of Experience (N = 59)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>0-5</td>
</tr>
<tr>
<td>6-10</td>
</tr>
<tr>
<td>11-15</td>
</tr>
<tr>
<td>16-20</td>
</tr>
<tr>
<td>21-25</td>
</tr>
<tr>
<td>25 or more</td>
</tr>
</tbody>
</table>

Mode = 16-20 SD = 1.57

Academic Preparation

Table 9 presents a distribution of the teachers in terms of their academic preparation. The majority of the teachers had a bachelor's or a higher degree (89.8%). Ten percent of the teachers had not completed a bachelor's degree. No teacher had PhD degree.
Table 9

**Academic Preparation (N = 59)**

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate Degree</td>
<td>6</td>
<td>10.2</td>
</tr>
<tr>
<td>Bachelor Degree</td>
<td>43</td>
<td>72.9</td>
</tr>
<tr>
<td>Master Degree</td>
<td>10</td>
<td>16.9</td>
</tr>
<tr>
<td>Ph.D Degree</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Tenure Status**

The data presented in Table 10 indicates the tenure status of the teacher. Most of the teachers (91.5%) had achieved tenure status. Eight percent of the teachers did not have tenure.
Table 10

**Tenure Status**  \( (N = 59) \)

<table>
<thead>
<tr>
<th>Status</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transitory</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td>Provisional</td>
<td>3</td>
<td>5.1</td>
</tr>
<tr>
<td>Tenure</td>
<td>54</td>
<td>91.5</td>
</tr>
</tbody>
</table>

Table 11 reports the program of the teachers. Approximately three-fourths of the teachers were academic teachers (78.0%). Twenty-two percent of the teachers were vocational.

Table 11

**Program (Academic or Vocational)**  \( (N = 59) \)

<table>
<thead>
<tr>
<th>Program</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic</td>
<td>46</td>
<td>78.0</td>
</tr>
<tr>
<td>Vocational</td>
<td>13</td>
<td>22.0</td>
</tr>
</tbody>
</table>
Objective 3 - To ascertain the attitudes of students toward the electronic tech-prep project.

The data in Table 12 revealed the attitude of students toward the Electronics Tech-Prep Project. The overall mean value for attitudes of students toward the Electronics Tech-Prep Project was 3.10. The students expressed the highest level of agreement (3.40) with item 1 (I believe that I can complete the electronics program due to my mathematic abilities), and item 9 (After completing the program, I will apply for college studies).

The lowest level of agreement was for item 11 (I would like to continue studying the tech-prep program with the same conditions that I had last year) with a mean score of 2.37. This was the only item on which the students disagreed.
<table>
<thead>
<tr>
<th>Attitude Items</th>
<th>N</th>
<th>M&lt;sup&gt;a&lt;/sup&gt;</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I believe that I can complete the electronics program due to my mathematic abilities.&lt;sup&gt;b&lt;/sup&gt;</td>
<td>179</td>
<td>3.40</td>
<td>.71</td>
</tr>
<tr>
<td>2. I believe that I will complete the electronics program due to my physical sciences abilities.</td>
<td>180</td>
<td>3.16</td>
<td>.64</td>
</tr>
<tr>
<td>3. I believe that I can complete the program due to my English abilities.&lt;sup&gt;b&lt;/sup&gt;</td>
<td>178</td>
<td>3.10</td>
<td>.86</td>
</tr>
<tr>
<td>4. I believe that I will complete the electronics program due to my Spanish abilities.</td>
<td>179</td>
<td>3.27</td>
<td>.77</td>
</tr>
<tr>
<td>5. After having completing my first year of studies in the program I will continue in it.&lt;sup&gt;b&lt;/sup&gt;</td>
<td>176</td>
<td>3.27</td>
<td>.90</td>
</tr>
<tr>
<td>6. I believe that the academic courses are important to the program.&lt;sup&gt;b&lt;/sup&gt;</td>
<td>179</td>
<td>3.27</td>
<td>.89</td>
</tr>
<tr>
<td>7. I am interested in continuing the program after completing the high school.&lt;sup&gt;b&lt;/sup&gt;</td>
<td>178</td>
<td>3.14</td>
<td>.93</td>
</tr>
<tr>
<td>8. After completing the program, I will apply for a job that is related to electronics.</td>
<td>177</td>
<td>2.73</td>
<td>.99</td>
</tr>
</tbody>
</table>
Table 12 continued.

<table>
<thead>
<tr>
<th>Attitude Items</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. After completing the program, I will apply for college studies.</td>
<td>180</td>
<td>3.40</td>
<td>.75</td>
</tr>
<tr>
<td>10. I am satisfied with the integration of the academic and vocational courses in the program.</td>
<td>180</td>
<td>2.83</td>
<td>.95</td>
</tr>
<tr>
<td>11. I like to continue studying the Tech-Prep program with the same conditions that I was last year.</td>
<td>179</td>
<td>2.37</td>
<td>1.04</td>
</tr>
<tr>
<td>12. I have a greater appreciation for the importance of both academic and vocational courses.</td>
<td>179</td>
<td>2.99</td>
<td>.85</td>
</tr>
</tbody>
</table>

Mean = 3.10 SD = .47

a: 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Agree.

b: The original negative statement items was rewritten to reflect a positive statement and allow the items to be summed.

Objective 4 - To ascertain the attitudes of teachers toward the electronic tech-prep project.

Table 13 shows the level of agreement of the teachers in their attitude toward the Tech-Prep Project. In the overall mean attitude variable the vocational teachers scored higher (3.49) than the academic teachers (3.21).

The highest level of agreement for the teachers in the attitude variable was for item 5 (I am interested in the
program because it contributes to my expertise in my profession) with a score of 3.71. The lowest level of agreement for the teachers was for item 2 (The teacher should visit personnel in related business to develop good public relations) with a score of 2.68.
Table 13

Attitude of Teachers Toward Electronics Tech-Prep

<table>
<thead>
<tr>
<th>Attitude Items</th>
<th>Voc. Teacher</th>
<th>Academic Teacher</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>1. A teacher should provide individualized instruction to the students.</td>
<td>13</td>
<td>3.62</td>
<td>.51</td>
</tr>
<tr>
<td>2. The teacher should visit personnel in related business to develop good public relations.</td>
<td>13</td>
<td>2.85</td>
<td>.99</td>
</tr>
<tr>
<td>3. I am interested in the program because it contributes to my expertise in my profession.</td>
<td>13</td>
<td>3.92</td>
<td>.28</td>
</tr>
<tr>
<td>4. The vocational teacher is not too busy to coordinate student learning activities with the academic teacher.</td>
<td>13</td>
<td>3.38</td>
<td>.65</td>
</tr>
<tr>
<td>5. Beliefs concerning the integration among academic and vocational teachers support teamwork in the program.</td>
<td>13</td>
<td>3.85</td>
<td>.38</td>
</tr>
</tbody>
</table>
(Table 13 Continued)

<table>
<thead>
<tr>
<th>Attitude Items</th>
<th>Voc. Teacher</th>
<th>Academic Teacher</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N  M&lt;sup&gt;a&lt;/sup&gt; SD</td>
<td>N  M&lt;sup&gt;a&lt;/sup&gt; SD</td>
<td>N  M&lt;sup&gt;a&lt;/sup&gt; SD</td>
</tr>
<tr>
<td>6. There was opportunity for face-to-face interactions between academic and vocational teachers&lt;sup&gt;b&lt;/sup&gt;.</td>
<td>13  3.62 .65 46  3.22 .84</td>
<td>59  3.31 .81</td>
<td></td>
</tr>
<tr>
<td>7. I am satisfied with the integration of the academic and vocational courses in the program&lt;sup&gt;b&lt;/sup&gt;.</td>
<td>13  3.23 1.01 45  3.16 .93</td>
<td>58  3.17 .94</td>
<td></td>
</tr>
<tr>
<td>8. I have an appreciation for the importance of both academic and vocational courses.</td>
<td>12  3.50 .67 45  3.24 .88</td>
<td>57  3.30 .88</td>
<td></td>
</tr>
<tr>
<td>9. Every year the teachers should attend at least one seminar related with the new technology.</td>
<td>12  3.58 .67 45  3.53 .66</td>
<td>57  3.54 .66</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13  3.49 .28 42  3.21 .38</td>
<td>59  3.28 .42</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>: 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Disagree

<sup>b</sup>: The original negative statement items were rewritten to reflect a positive statement and allow the items to be summed.
**Objective 5a - To assess the student level of agreement with**

**Program Content**

Table 14 presents the student level of agreement with Program Content in the Electronics Tech-Prep Project. The overall mean value for students' level of agreement with program content was 2.93.

The highest level of agreement of the students in the Program Content variable was for item 3 (The content in the program is up to date) with a score of 3.23. This was interpreted that the students thought the program content responded to new technology. The lowest level of agreement of the students was for item 5 (There is enough time for subjects) with a score of 2.46, which means that the student disagree.
Table 14

**Student Level of Agreement with Program Content**

<table>
<thead>
<tr>
<th>Program Content Items</th>
<th>N</th>
<th>M(^a)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The order in which knowledge is taught is appropriate.</td>
<td>181</td>
<td>2.88</td>
<td>0.63</td>
</tr>
<tr>
<td>2. The content in the program has practical applications.(^b)</td>
<td>176</td>
<td>3.08</td>
<td>0.87</td>
</tr>
<tr>
<td>3. The content in the program is up to date.</td>
<td>180</td>
<td>3.23</td>
<td>0.66</td>
</tr>
<tr>
<td>4. The content in the program is not very difficult.</td>
<td>180</td>
<td>2.76</td>
<td>0.73</td>
</tr>
<tr>
<td>5. There is enough time for subjects.(^b)</td>
<td>181</td>
<td>2.46</td>
<td>0.92</td>
</tr>
<tr>
<td>6. The learning objectives are clearly described in the task sheets.</td>
<td>180</td>
<td>2.93</td>
<td>0.77</td>
</tr>
<tr>
<td>7. The academic subjects have practical applications in the electronics program.(^b)</td>
<td>181</td>
<td>2.93</td>
<td>0.88</td>
</tr>
<tr>
<td>8. The program encourages a smooth transition from high school to employment.</td>
<td>179</td>
<td>2.67</td>
<td>0.89</td>
</tr>
<tr>
<td>9. The relevant theoretical areas were taught.(^b)</td>
<td>180</td>
<td>3.19</td>
<td>0.71</td>
</tr>
<tr>
<td>10. The program addresses problem solving skills.(^b)</td>
<td>178</td>
<td>3.19</td>
<td>0.70</td>
</tr>
<tr>
<td>11. Sufficient time for practice is provided.</td>
<td>180</td>
<td>2.60</td>
<td>0.89</td>
</tr>
<tr>
<td>12. The practical skills included in the objectives were taught.(^b)</td>
<td>179</td>
<td>3.15</td>
<td>0.74</td>
</tr>
</tbody>
</table>

Mean = 2.93  SD = .40

\(^a\): 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree.

\(^b\): The original negative statement items was rewritten to reflect a positive statement and allow the items to be summed.
Objective 5b - To assess the student level of agreement with Counseling Services

The data presented on Table 15 shows the student level of agreement with Counseling Services in the Tech-Prep Project. The students were in agreement with all the counseling items. The overall mean value for the student level of agreement with counseling services was 2.78. The highest level of agreement of the students with the counseling services variable was for item 5 (The counseling services help students to know the relationship between school and work) with a score of 2.98. The lowest level of agreement of the students was for item 8 (The counseling services provide tutoring for students) with a score of 2.61.
Table 15

Student Level of Agreement with Counseling Services

<table>
<thead>
<tr>
<th>Counseling Items</th>
<th>Students</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The occupational information is up to date.(^b)</td>
<td></td>
<td>180</td>
<td>2.93</td>
<td>0.66</td>
</tr>
<tr>
<td>2. Counseling services regarding careers were effective.</td>
<td></td>
<td>180</td>
<td>2.64</td>
<td>0.81</td>
</tr>
<tr>
<td>3. There is a plan for advising potential students about courses and careers.</td>
<td></td>
<td>181</td>
<td>2.90</td>
<td>0.92</td>
</tr>
<tr>
<td>4. There are arrangements for counseling students on the progress of their training.</td>
<td></td>
<td>180</td>
<td>2.62</td>
<td>0.79</td>
</tr>
<tr>
<td>5. The counseling services help students to know the relationship between school and work.(^b)</td>
<td></td>
<td>181</td>
<td>2.98</td>
<td>0.86</td>
</tr>
<tr>
<td>6. There are counseling activities designed to help students with their academic achievement.</td>
<td></td>
<td>181</td>
<td>2.69</td>
<td>0.87</td>
</tr>
<tr>
<td>7. The counseling services promote student development.(^b)</td>
<td></td>
<td>180</td>
<td>2.89</td>
<td>0.82</td>
</tr>
<tr>
<td>8. The counseling services provide tutoring for students.</td>
<td></td>
<td>179</td>
<td>2.61</td>
<td>1.05</td>
</tr>
<tr>
<td>9. There are group orientation activities.</td>
<td></td>
<td>181</td>
<td>2.78</td>
<td>0.98</td>
</tr>
</tbody>
</table>

Mean 2.78  SD 0.58

\(^a\): 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Agree.

\(^b\): The original negative statement items was rewritten to reflect a positive statement and allow the items to be summed.
Objective 5c - To assess the student level of agreement with Physical Facilities, Equipment and Materials

The data presented on Table 16 shows the student level of agreement with Physical Facilities, Equipment and Materials in the Electronics Tech-Prep Project. The students were in agreement with all the physical facilities, equipment and materials items. The overall mean value for student level of agreement with physical facilities, equipment and materials was 2.87.

The highest level of student agreement with the physical facilities, equipment and materials was for item 9 (Lighting in the laboratory was good) with a score of 3.23. The lowest level of agreement of the students was for item 10 (Equipment was available for the student's projects) with a score of 2.59.
### Table 16

**Student Level of Agreement with Physical Facilities, Equipment and Materials**

<table>
<thead>
<tr>
<th>Physical Facilities, Equipment and Materials</th>
<th>Students</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. There were sufficient quantity of materials available for student's projects.</td>
<td>180</td>
<td>2.62</td>
<td>0.98</td>
</tr>
<tr>
<td>2. The quality of classrooms was good.</td>
<td>180</td>
<td>2.92</td>
<td>0.87</td>
</tr>
<tr>
<td>3. The quality of labs was good.</td>
<td>180</td>
<td>3.02</td>
<td>0.86</td>
</tr>
<tr>
<td>4. The quality of textbooks was good.</td>
<td>181</td>
<td>2.85</td>
<td>0.79</td>
</tr>
<tr>
<td>5. The safety features in the laboratory were in good conditions.</td>
<td>181</td>
<td>2.92</td>
<td>0.81</td>
</tr>
<tr>
<td>6. The library facilities were in good conditions.</td>
<td>179</td>
<td>2.75</td>
<td>0.95</td>
</tr>
<tr>
<td>7. The audio visual aids provided were good.</td>
<td>181</td>
<td>2.69</td>
<td>0.89</td>
</tr>
<tr>
<td>8. Lighting in the classroom was good.</td>
<td>179</td>
<td>3.16</td>
<td>0.75</td>
</tr>
<tr>
<td>9. Lighting in the laboratory was good.</td>
<td>181</td>
<td>3.23</td>
<td>0.74</td>
</tr>
<tr>
<td>10. Equipment was available for the student's projects.</td>
<td>181</td>
<td>2.59</td>
<td>0.99</td>
</tr>
<tr>
<td>11. Ventilation in the laboratory was good.</td>
<td>180</td>
<td>2.77</td>
<td>1.06</td>
</tr>
</tbody>
</table>

Mean = 2.87  
SD = .53

- **a:** 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Agree.

- **b:** The original negative statement items was rewritten to reflect a positive statement and allow the items to be summed.
Objective 6a - To assess the teacher level of agreement with Program Content

Table 17 shows the teacher level of agreement with the program content in the Electronics Tech-Prep Project. The highest level of teacher agreement with the program content was for item 2 (The content in the program has practical applications) with a score of 3.47. The lowest level of teacher agreement was for item 11 (Sufficient time for practice is provided) with a score of 2.54. For the overall mean program content variable the vocational teachers scored higher (3.24) than the academic teachers (3.07).
Table 17

Teacher Level of Agreement with the Program Content

<table>
<thead>
<tr>
<th>Program Content Items</th>
<th>Voc. Teacher</th>
<th>Academic Teacher</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N  M^a  SD</td>
<td>N  M^a  SD</td>
<td>N  M^a  SD</td>
</tr>
<tr>
<td>1. The order in which knowledge is talk is appropriate.</td>
<td>13 3.28 .87</td>
<td>44 2.95 .83</td>
<td>57 3.05 .85</td>
</tr>
<tr>
<td>2. The content in the program has practical applications.</td>
<td>13 3.69 .63</td>
<td>46 3.41 .78</td>
<td>59 3.47 .75</td>
</tr>
<tr>
<td>3. The content in the program is up-to-date.</td>
<td>13 3.69 .63</td>
<td>46 3.24 .64</td>
<td>59 3.34 .66</td>
</tr>
<tr>
<td>4. The content in the program is not very difficult.</td>
<td>12 2.92 .79</td>
<td>46 3.17 .74</td>
<td>58 3.12 .75</td>
</tr>
<tr>
<td>5. There is enough time for subjects.</td>
<td>13 2.46 .88</td>
<td>45 2.64 .93</td>
<td>58 2.60 .92</td>
</tr>
<tr>
<td>6. The learning objectives are clearly described in the task sheets.</td>
<td>12 3.33 .49</td>
<td>46 3.11 .90</td>
<td>58 3.16 .83</td>
</tr>
<tr>
<td>7. The academic subjects have practical applications in the electronics program.</td>
<td>13 3.46 .78</td>
<td>44 3.41 .84</td>
<td>57 3.42 .82</td>
</tr>
<tr>
<td>8. The program encourages a smooth transition from high school to employment.</td>
<td>13 2.69 .63</td>
<td>44 3.02 .66</td>
<td>57 2.95 .67</td>
</tr>
</tbody>
</table>
(Table 17 Continued)

<table>
<thead>
<tr>
<th>Program Content Items</th>
<th>Voc. Teacher</th>
<th>Academic Teacher</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N  M&lt;sup&gt;a&lt;/sup&gt; SD</td>
<td>N  M&lt;sup&gt;a&lt;/sup&gt; SD</td>
<td>N  M&lt;sup&gt;a&lt;/sup&gt; SD</td>
</tr>
<tr>
<td>9. The relevant theoretical areas were taught&lt;sup&gt;b&lt;/sup&gt;.</td>
<td>13  3.77 .44</td>
<td>46  3.20 .72</td>
<td>59  3.32 .71</td>
</tr>
<tr>
<td>10. The program addresses problem-solving skills&lt;sup&gt;b&lt;/sup&gt;.</td>
<td>13  3.62 .51</td>
<td>46  3.37 .74</td>
<td>59  3.42 .70</td>
</tr>
<tr>
<td>11. Sufficient time for practice is provided.</td>
<td>13  2.62 .87</td>
<td>46  2.52 .75</td>
<td>59  2.54 .77</td>
</tr>
<tr>
<td>12. The practical skills included in the objectives were taught&lt;sup&gt;b&lt;/sup&gt;.</td>
<td>13  3.62 .51</td>
<td>45  3.16 .80</td>
<td>58  3.26 .76</td>
</tr>
<tr>
<td>Total</td>
<td>11  3.24 .25</td>
<td>39  3.07 .43</td>
<td>50  3.11 .40</td>
</tr>
</tbody>
</table>

<sup>a</sup>: 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Disagree

<sup>b</sup>: The original negative statement items were rewritten to reflect a positive statement and allow the items to be summed.
Objective 6b - To assess the teacher level of agreement with Counseling Services

The data presented in Table 18 indicates the teacher level of agreement with counseling services in the Electronics Tech-Prep Project. Both vocational and academic teachers agreed with all the counseling services items. For the overall mean counseling services variable the academic teachers score higher (2.92) than the vocational teachers (2.88).

The highest level of teacher agreement (3.10) with counseling services was for item 5 (The counseling services help students to know the relationship between school and work) and item 7 (The counseling services promote student development). The lowest level of teacher agreement was for item 14 (Counseling services regarding careers were effective) with a score of 2.56.
Table 18

Teacher Level of Agreement with the Counseling Services

<table>
<thead>
<tr>
<th>Counseling Service Item</th>
<th>Voc. Teacher</th>
<th>Academic Teacher</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The occupational information is up-to-date&lt;sup&gt;b&lt;/sup&gt;.</td>
<td>13 3.08 .76</td>
<td>46 2.98 .68</td>
<td>59 3.00 .69</td>
</tr>
<tr>
<td>2. Counseling services regarding careers were effective.</td>
<td>13 2.62 .77</td>
<td>46 2.54 .69</td>
<td>59 2.56 .70</td>
</tr>
<tr>
<td>3. There is a plan for advising potential students about courses and careers&lt;sup&gt;b&lt;/sup&gt;.</td>
<td>13 3.00 1.08</td>
<td>46 3.00 .87</td>
<td>59 3.00 .91</td>
</tr>
<tr>
<td>4. There are arrangements for counseling students on the progress of their training.</td>
<td>13 3.08 .95</td>
<td>46 2.74 .83</td>
<td>59 2.81 .86</td>
</tr>
<tr>
<td>5. The counseling services help students to know the relationship between school and work&lt;sup&gt;b&lt;/sup&gt;.</td>
<td>13 2.85 .90</td>
<td>46 3.17 .71</td>
<td>59 3.10 .76</td>
</tr>
<tr>
<td>6. There are counseling activities designed to help students with their academic achievement.</td>
<td>13 2.77 .73</td>
<td>46 2.74 .71</td>
<td>59 2.75 .71</td>
</tr>
</tbody>
</table>
(Table 18 Continued)

<table>
<thead>
<tr>
<th>Counseling Service Item</th>
<th>Voc. Teacher</th>
<th></th>
<th>Academic Teacher</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M&lt;sup&gt;a&lt;/sup&gt;</td>
<td>SD</td>
<td>N</td>
<td>M&lt;sup&gt;a&lt;/sup&gt;</td>
<td>SD</td>
</tr>
<tr>
<td>7. The counseling services promote student development&lt;sup&gt;b&lt;/sup&gt;.</td>
<td>13</td>
<td>2.69</td>
<td>.63</td>
<td>46</td>
<td>3.22</td>
<td>.66</td>
</tr>
<tr>
<td>8. The counseling services provide tutoring for students.</td>
<td>13</td>
<td>3.15</td>
<td>.80</td>
<td>46</td>
<td>2.76</td>
<td>.92</td>
</tr>
<tr>
<td>9. There are group orientation activities.</td>
<td>13</td>
<td>2.69</td>
<td>1.03</td>
<td>45</td>
<td>2.98</td>
<td>.89</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>13</td>
<td>2.88</td>
<td>.60</td>
<td>45</td>
<td>2.92</td>
</tr>
</tbody>
</table>

a: 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Disagree

b: The original negative statement items were rewritten to reflect a positive statement and allow the items to be summed.
Objective 6c - To assess the teacher level of agreement with Physical Facilities, Equipment and Materials

Table 19 shows the teacher level of agreement with physical facilities, equipment and materials in the Electronics Tech-Prep Project. The vocational and academic teachers agreed with all the physical facilities, equipment and materials items. Both vocational and academic teachers answered in the same way. For the overall mean Physical Facilities, Equipment and Materials items the vocational teachers scored higher (3.10) than the academic teachers with score (2.97).

The highest level of teacher agreement with physical facilities, equipment and materials was for item 9 (Lighting in the laboratory was good) with a score of 3.41. The lowest level of teacher agreement was for item 10 (Equipment was available for the student's projects) with a score of 2.67.
<table>
<thead>
<tr>
<th>Physical Facilities and Equipment Items</th>
<th>Voc. Teacher</th>
<th>Academic Teacher</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N  M SD</td>
<td>N  M SD</td>
<td>N  M SD</td>
</tr>
<tr>
<td>1. There were sufficient quantity of materials available for student's projects.</td>
<td>13 3.15 .99 46 2.70 .99</td>
<td>59 2.80 1.00</td>
<td></td>
</tr>
<tr>
<td>2. The quality of classrooms was good.</td>
<td>13 3.00 .82 46 2.98 .91</td>
<td>59 2.98 .88</td>
<td></td>
</tr>
<tr>
<td>3. The quality of labs was good.</td>
<td>13 3.62 .65 46 3.11 .82</td>
<td>59 3.22 .81</td>
<td></td>
</tr>
<tr>
<td>4. The quality of textbooks was good.</td>
<td>13 3.08 1.04 46 2.65 .97</td>
<td>59 2.75 .99</td>
<td></td>
</tr>
<tr>
<td>5. The safety features in the laboratory were good.</td>
<td>13 3.15 .80 46 3.02 .80</td>
<td>59 3.05 .80</td>
<td></td>
</tr>
<tr>
<td>6. The library facilities were in good condition.</td>
<td>13 2.85 .90 45 2.91 .87</td>
<td>58 2.90 .87</td>
<td></td>
</tr>
<tr>
<td>7. The audio visual aids provided were good.</td>
<td>13 2.92 .64 45 3.02 .89</td>
<td>58 3.00 .84</td>
<td></td>
</tr>
<tr>
<td>8. Lighting in the classroom was good.</td>
<td>13 3.23 .93 45 3.24 .65</td>
<td>58 3.24 .71</td>
<td></td>
</tr>
<tr>
<td>Physical Facilities and Equipment Items</td>
<td>Voc. Teacher</td>
<td>Academic Teacher</td>
<td>Total</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------</td>
<td>------------------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>M&lt;sup&gt;a&lt;/sup&gt;</td>
<td>SD</td>
</tr>
<tr>
<td>9. Lighting in the laboratory was good&lt;sup&gt;b&lt;/sup&gt;.</td>
<td>13</td>
<td>3.38</td>
<td>.77</td>
</tr>
<tr>
<td>10. Equipment was available for the student's projects.</td>
<td>13</td>
<td>2.77</td>
<td>1.09</td>
</tr>
<tr>
<td>11. Ventilation in the laboratory was good&lt;sup&gt;b&lt;/sup&gt;.</td>
<td>13</td>
<td>2.92</td>
<td>.86</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13</td>
<td>3.10</td>
<td>.49</td>
</tr>
</tbody>
</table>

a: 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Disagree

b: The original negative statement items were rewritten to reflect a positive statement and allow the items to be summed.
Objective 6d - To assess the teacher level of agreement with Business and Industry Linkages

Table 20 shows the teacher level of agreement with business and industry linkages in the Electronics Tech-Prep Project. For the overall mean Business and Industry variable the academic teachers score higher (2.89) than the vocational teachers (2.86). The highest level of teacher agreement with business and industry linkages was for item 4 (The program reflects emerging trends in the electronics field) with a score of 3.29. The lowest level of agreement of the teachers was for item 3 (Effective collaboration exists between the program and the industry) with a score of 2.45. This established the need for an active Advisory Committee and the need of more involvement of the industrial sector.
<table>
<thead>
<tr>
<th>Business and Industry Linkages</th>
<th>Voc. Teacher</th>
<th>Academic Teacher</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>1. The Advisory Committee contributes to the program b.</td>
<td>12</td>
<td>2.67</td>
<td>.98</td>
</tr>
<tr>
<td>2. The program meets present local labor market needs b.</td>
<td>13</td>
<td>3.54</td>
<td>.52</td>
</tr>
<tr>
<td>3. Effective collaboration exists between the program and industry.</td>
<td>13</td>
<td>2.46</td>
<td>.97</td>
</tr>
<tr>
<td>4. The program reflects emerging trends in the electronic field b.</td>
<td>13</td>
<td>3.46</td>
<td>.66</td>
</tr>
<tr>
<td>5. The electronics tech-prep program makes community attractive for economic development.</td>
<td>13</td>
<td>3.00</td>
<td>.82</td>
</tr>
<tr>
<td>6. The program has an advisory committee that includes experts from the electronics b.</td>
<td>13</td>
<td>2.92</td>
<td>.86</td>
</tr>
<tr>
<td>7. The advisory committee meets at regular intervals throughout the school year.</td>
<td>13</td>
<td>2.62</td>
<td>.65</td>
</tr>
</tbody>
</table>
(Table 20 Continued)

<table>
<thead>
<tr>
<th>Business and Industry Linkages</th>
<th>Voc. Teacher</th>
<th>Academic Teacher</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M^a</td>
<td>SD</td>
</tr>
<tr>
<td>8. The advisory committee members are provided with a description of the program's objectives.</td>
<td>13</td>
<td>2.54</td>
<td>.52</td>
</tr>
<tr>
<td>9. The advisory committee members have a role in recommending improvement in program's operations^b^</td>
<td>13</td>
<td>2.69</td>
<td>.75</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>2.86</td>
<td>.38</td>
</tr>
</tbody>
</table>

a: 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Disagree

b: The original negative statement items were rewritten to reflect a positive statement and allow the items to be summed.
Objective 7 - To determine the relationships between the students' demographic, attitude and selected variables of the tech-prep program (Program Content, Counseling, Physical Facilities, Equipment and Materials).

Table 21 presents the correlations between the student demographic and selected variables of the tech-prep program.

Point biserial correlations were calculated to describe the relationship between attitude and selected demographic variables. A negligible negative relation \( r_{pb} = - .08 \) was found between gender and attitude of the students. A negative low relation was found between ethnic background and attitude of the students \( r_{pb} = -.12 \).

Point biserial correlations were calculated to describe the relationship between Program Content and selected demographic variables of the students. A low negative relation \( r_{pb} = - .10 \) was found between gender and program content. A negligible positive relation \( r_{pb} = .09 \) was found between ethnic background and program content.

Point biserial correlations were calculated to describe the relationship between Counseling and selected demographic variables of the students. A negative negligible relation \( r_{pb} = - .07 \) was found between gender and the level of agreement of the students with the counseling services. A negligible positive relation \( r_{pb} = .04 \) was found between ethnic background and the level of agreement of the students with the counseling services.
Pearson product moment correlation was calculated to describe the relationship between program content and attitude. A positive substantial relation \((r = .58)\) was found between the attitude of the students and their level of agreement with the program content in the Tech-Prep Project.

Pearson product moment correlations were calculated to describe the relationship between program content and selected variables in the Electronics Tech-Prep Project. A substantial positive relation \((r = .54)\) was found between counseling and program content. A substantial positive relation \((r = .62)\) was found between the Counseling Services and the Physical Facilities, Equipment and Materials in the Electronic Tech-Prep Project. There was substantial relation \((r = .65)\) between program content and physical facilities, equipment and materials. A substantial relation \((r = .53)\) was also found between attitude and physical facilities, equipment and materials. A moderate positive relation \((r = .41)\) was found between the student level of agreement with counseling services and the attitude of the students.
Table 21

Intercorrelations Between the Students Demographic, Attitude and Selected Variables of the Electronics Tech-Prep Project

<table>
<thead>
<tr>
<th>Variable</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>X5</th>
<th>X6</th>
<th>X7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td>-0.09</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnic Group</td>
<td></td>
<td></td>
<td>-0.01</td>
<td>0.04</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Content</td>
<td></td>
<td></td>
<td>-0.10</td>
<td>0.03</td>
<td>0.09</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Counseling</td>
<td></td>
<td></td>
<td>-0.07</td>
<td>-0.05</td>
<td>0.04</td>
<td></td>
<td>0.54</td>
</tr>
<tr>
<td>Physical Facility</td>
<td></td>
<td></td>
<td></td>
<td>-0.03</td>
<td>0.07</td>
<td>0.65</td>
<td>0.62</td>
</tr>
<tr>
<td>Attitude</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.08</td>
<td>0.14</td>
<td>-0.12</td>
</tr>
</tbody>
</table>
Objective 8 - To determine the relationships between the teachers' demographic, attitude and selected variables of the tech-prep program (Program Content, Counseling, Physical Facilities, Equipment and Materials).

Point biserial correlation was calculated to describe the relationship between attitude of teachers and gender. A positive low association ($r_{pb} = .28$) was found between gender and attitude of the teachers. A negligible relation ($r_{pb} = .03$) was found between years of experience and attitude of the teachers. (See Table 22).

Point biserial correlation was calculated to describe the relationship between the level of agreement of teachers in program content and gender. A low relation ($r_{pb} = .20$) was found between gender and the level of agreement of teachers in program content. A negligible relation ($r_{pb} = .08$) was found between academic preparation and the level of agreement of teachers in program content. The relationships between the level of agreement of teachers with counseling services and selected demographic variables. A low relation ($r_{pb} = .14$) was found between academic preparation and the level of agreement of teachers with the counseling services. A negligible relation ($r_{pb} = .02$) was found between tenure status and the level of agreement of teachers with counseling services.

Point Biserial were calculated to describe the relationships between the level of agreement of teachers in
terms of physical facilities, equipment and materials and selected demographic variables. A low relation \( r_{pb} = .16 \) was found between academic preparation and the level of agreement of teachers in terms of physical facilities, equipment and materials. A low relation \( r_{pb} = -.27 \) was found between tenure status and the level of agreement of teachers in terms of physical facilities, equipment and materials.

Pearson correlation was calculated to describe the relationship between program content and attitude of the teachers. A moderate relation \( r = .49 \) was found between the attitude of the students and their level of agreement with the program content in the Tech-Prep Project.

Pearson correlation was calculated to describe the relationship between the level of agreement of the teachers in program content and selected variables of the Tech-Prep Project. A substantial positive relation \( r = .61 \) was found between the level of agreement of the teachers in program content and the physical facilities, equipment and materials. There were substantial positive relations between the level of agreement of the teachers in program content and counseling services \( r = .54 \), and between the level of agreement of the teachers in program content and the business and industry linkages \( r = .61 \). A substantial positive relation \( r = .54 \) also was found between program content and counseling services. There was a positive
substantial relation ($r = .58$) between attitude and business and industry linkages. A positive moderate relation ($r = .42$) was found between counseling services and physical facilities, and between business and industry linkages and physical facilities, equipment and materials ($r = .36$). A positive moderate relation ($r = .34$) also were found between business and industry linkages and counseling services, and between attitude and physical facilities, equipment and materials ($r = .42$).
### Table 22

**Intercorrelations Between the Teachers Demographic, Attitude and Selected Variables of the Electronics Tech-Prep Project**

<table>
<thead>
<tr>
<th>Variable</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>X5</th>
<th>X6</th>
<th>X7</th>
<th>X8</th>
<th>X9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>X1</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of Exp.</td>
<td>X2</td>
<td>-.15</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Prep.</td>
<td>X3</td>
<td>-.17</td>
<td>-.01</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tenure</td>
<td>X4</td>
<td>.04</td>
<td>-.30</td>
<td>.30</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Content</td>
<td>X5</td>
<td>.20</td>
<td>.15</td>
<td>.08</td>
<td>-.23</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counseling</td>
<td>X6</td>
<td>.03</td>
<td>.09</td>
<td>.14</td>
<td>.02</td>
<td>.54</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Facility</td>
<td>X7</td>
<td>.05</td>
<td>.09</td>
<td>.16</td>
<td>-.27</td>
<td>.61</td>
<td>.42</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Business Industry</td>
<td>X8</td>
<td>.11</td>
<td>.16</td>
<td>.01</td>
<td>-.10</td>
<td>.61</td>
<td>.34</td>
<td>.36</td>
<td>1.00</td>
</tr>
<tr>
<td>Attitude</td>
<td>X9</td>
<td>.28</td>
<td>.03</td>
<td>.03</td>
<td>-.28</td>
<td>.49</td>
<td>.17</td>
<td>.42</td>
<td>.58</td>
</tr>
</tbody>
</table>
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Background

In Puerto Rico, Tech-Prep was started during the school year 1992-93, with 13 electronic technology programs at the secondary level. These programs were to be coordinated with programs at the four campuses of the Technological Institute of Puerto Rico. The Department of Education of Puerto Rico portends that basic skills will be strengthened at the high school level by focusing on mathematics, science, and communication. Emphasis was to be placed on the principles of electronic technology at the secondary level. At the postsecondary level the student was to take advanced technology related to the field of electronics.

The Tech-Prep Project in Puerto Rico was a new alternative for students that wanted to continue studies at higher levels or enter into the world of work with more technical and academic skills. The Tech-Prep project included a sequential program of studies starting in the 10th grade and finishing with two years of postsecondary education. The Tech-Prep curriculum was responsive to the
demands of the new technology (Puerto Rico Department of Education, 1992). This current study was designed to aid programs administrators in assessing the processes involved in the development of the Tech-Prep Project in the area of electronics during the first year of implementation in thirteen vocational schools in Puerto Rico. The study focused on the following aspects: a) program content, b) counseling services, c) physical facilities, equipment and materials, d) business and industries linkages, e) attitudes of teachers and students toward the program and, f) demographic characteristics. The study also ascertained how the students and teachers perceived the program in terms of their attitudes that they have toward the project.

This process evaluation of the Tech-Prep Project was conducted after its first year of operation in 13 vocational high schools in Puerto Rico. It was designed to help ensure that the project was of a high quality and that deficiencies were identified before they caused major problems.

Statement of the Problem

Several studies have been conducted regarding the evaluation of the tech-prep programs in the United States of America. The Carl D. Perkins Vocational and Applied Technology Act Amendments of 1990, Title III, Part E, sec.346, stated that "After grant recipients who receive
grants in the first year in which grants are made under this part complete the eligibility under the program, the Secretary shall submit to the Congress a report evaluating the program under this part" (p.790).

In Puerto Rico the Tech-Prep Project began in 1992-93 school year. Therefore, information was needed regarding the conditions under which the program was offered. This study obtained this information by collecting data regarding the perceptions of teachers and students. Furthermore, the study examined the possible relationships between vocational and academic teachers in terms of teamwork, an essential element for the success of the program.

**Purpose of the Study**

The purpose of the study was to determine the processes under which the Tech-Prep Project was offered to the students that completed the first year of the program in 13 vocational high schools in Puerto Rico. The specific objectives of the study were:

1. To determine the demographic characteristics of the students (gender, age, ethnic background, and level of education of the parents)
2. To determine the demographic characteristics of the teachers (course taught, gender academic preparation, program, gender, years of experience, academic preparation and tenure).
3. To ascertain the attitudes of students toward the Electronic Tech-Prep Project.
4. To ascertain the attitudes of teachers toward the Electronic Tech-Prep Project.
5. To assess the student level of agreement with:
   a. Program Content
   b. Counseling Services
   c. Physical Facilities, Equipment and Materials
6. To assess the teacher level of agreement with:
   a. Program Content
   b. Counseling Services
   c. Physical Facilities, Equipment and materials
   d. Business and industry linkages
7. To determine the relationships between the students' demographic, attitude and selected variables of the Tech-Prep Project (Program Content, Counseling, Physical Facilities, Equipment and Materials).
8. To determine the relationships between the teachers demographic, attitude and selected variables of the Tech-Prep Project (Program Content, Counseling, Physical Facilities, Equipment and Materials).
Methodology

The descriptive - correlational study was conducted in the spring of 1994. The study was designed to collect data from the students and from the teachers in the Electronics Tech-Pep Project in Puerto Rico. Descriptive and demographic data were collected from the students and teachers and relationships between variables were studied.

A panel of experts consisting of two university faculty, two graduate students in the Department of Agricultural Education at the Ohio State University, one vocational school director, two coordinators of the Electronics Tech-Prep Project in Puerto Rico, and two academic teachers, were used to established the content validity of the instrument. Based on their revision several statements were modified in terms of item content, item clarity, wording, length, format, and instrument's overall appearance. The spanish translation of the instrument (Appendix ) was reviewed for validity by three members of the panel of experts who were fluent in Spanish.

A five-part instrument was constructed to collect the data from the students. A six-part instrument was constructed to collect the data from the teachers. Parts I, II and III in the students' and teachers' questionnaires were program content; counseling services; and physical facilities, equipment and materials respectively. The attitude of the students toward the Electronics Tech-Prep
Project constituted Part IV and the demographic variables constituted Part V in the students' questionnaire. In the teachers' questionnaire, business and industry linkages constituted Part IV, attitude of teachers toward the Electronics Tech-Prep Project constituted Part V and the demographic characteristics were found in Part VI.

In the student questionnaire the demographic characteristics of interest were: gender, age, ethnic background, fathers' education and mothers' education. The demographic characteristics of interest in the teachers' questionnaire were: course taught, gender, years of experience, academic preparation, tenure and program.

A pilot test was conducted with a group of 26 Puerto Rico Electronics Vocational Teachers not included in the study. Cronbach's alpha was used to determine internal consistency. The Cronbach's alpha for each section was: Part I = .80, Part II = .78, Part III = .90, Part IV = .81, and, Part V = .78.

A pilot test was also administered to a group of 26 Puerto Rico academic teachers not included in the study with the following Cronbach's alpha coefficients: Part I = .82, Part II = .73, Part III = .92, Part IV = .82 and Part V = .78.

Finally a pilot test was conducted with a group of 30 Puerto Rico vocational students not included in the study. A Cronbach's alpha coefficient was also computed to determine
the internal consistency of each part. These coefficients were: Part I = .87, Part II = .76, Part III = .87, and Part IV = .80.

A census was used for the study. Questionnaires were administered to all students that completed the first year of study in the Electronics Tech-Prep Project (N=195). A total of 183 students returned their questionnaires for a response rate of 93.8%. The number of usable responses for data analysis purposes was 181 (92.8%). Questionnaires were administered to all academic and vocational teachers involved in the Electronics Tech-Prep Project in the thirteen schools (N=65). A total of 60 teachers returned their questionnaires for a response rate of 92.3%. The number of usable responses for data analysis purposes was 59 (90.7%). For interpretation purposes the scale from 1 to 4 was adjusted in the following way: strongly disagree = 1:00 to 1:49; disagree = 1:50 to 2:49; agree = 2:50 to 3:49; and strongly agree = 3:50 to 4:00.

The data were coded and descriptive statistics were computed using the Statistical Package for the Social Sciences (SPSS).
Summary of the Study

The summary is organized according to the objectives of the study. The specific data and information follow the statement of the objectives.

Objective 1: To determine the demographic characteristics of students (gender, age, ethnic background, and level of education of the parents)

The majority of the students (86.7%) were male while 13 percent were female. Approximately three-fourths of the students (76.8%) were 16 years of age. About 91.7% of the students were from Puerto Rico. One-half of the fathers of the students who enrolled in the Electronic Tech-Prep Project had completed high school (53.8%). Nearly one-half of the mothers of the students enrolled in the Electronics Tech-Prep Project (47.5%) had completed from 10-12 grades of school.

Objective 2: To determine the demographic characteristics of the teachers (course taught, gender, years of experience, academic preparation, tenure, and program)

About 78.0% of the teachers taught academic subjects while the remaining 22.0% taught electronics. The majority of the teachers were female (61.0%), while 39.0% were male. About sixty percent of the teachers had eleven or more years of teaching experience. The teachers averaged 3.12 years of teaching experience. The majority of the teachers had a
bachelor's or higher degree (89.8%). More than 90.0% of the teachers had achieved tenure status.

Objective 3: To ascertain the attitudes of students toward the Electronic Tech-Prep Project

The students expressed the highest level of agreement (3.40 in the scale from 1.00 to 4.00) with item 1 (I believe that I will complete the electronics program due to my mathematic abilities). The overall mean attitudes of students toward the Electronics Tech-Prep Project was 3.10.

Objective 4: To ascertain the attitudes of teachers toward the Electronic Tech-Prep Project

The highest level of agreement of the teachers in the attitude variable was for item 5 (I am interested in the program because it contributes to my expertise in my profession) with a score of 3.71. The overall mean attitude variable for vocational teachers was 3.49, while for academic teachers it was 3.21.

Objective 5a: To assess the student level of agreement with Program Content in the Tech-Prep Project

The highest level of student agreement was with item 3 in Program Content (The content in the program is up-to-date) with a score of 3.23. The overall mean value for program content variable was 2.93.
Objective 5b: To assess the student level of agreement with counseling services

The highest level of student agreement for the counseling service variable was for item 5 (The counseling services help students to know relationship between school and work) with a score of 2.98. The overall mean value for the counseling service was 2.78.

Objective 5c: To assess the student level of agreement with Physical Facilities, Equipment, and Materials

The highest level of student agreement with the physical facilities, equipment, and materials was for item 9 (lighting in the laboratory was good) with a score of 3.23. The overall mean value for physical facilities, equipment, and materials was 2.87.

Objective 6a: To assess the teacher level of agreement with Program Content in the Electronics Tech-Prep Project

In program content the highest level of teacher agreement was for item 2 (The content in the program has practical applications) with a score of 3.47. The overall mean value for program content of the vocational teachers was higher (3.24) than that for the academic teachers (3.07).

Objective 6b: To assess the teacher level of agreement with Counseling Services in the Tech-Prep Project

For the counseling service the highest level of teacher agreement (3.10) was for item 5 (The counseling
services help students to know the relationship between school and work) and item 7 (The counseling services promote student development). For the overall mean value of counseling service, the vocational and academic teachers scored 2.88 and 2.92, respectively.

Objective 6c: To assess the teacher level of agreement with Physical Facilities, Equipment, and Materials

The highest level of teacher agreement with physical facilities, equipment, and materials was for item 9 (Lighting in the laboratory was good) with a score of 3.41. For the overall mean value of Physical Facilities, Equipment, and Materials, the vocational teachers scored higher (3.10) than the academic teachers with score (2.97).

Objective 6d: To assess the teacher level of agreement with business and industry linkages

The highest level of teacher agreement with business and industry linkages was for item 4 (The program reflects emerging trends in the electronics field) with a score of 3.29. For the overall mean value of business and industry, the academic teachers scored higher (2.89) than the vocational teachers (2.86).
Objective 7: To determine the relationships between the students' demographic, attitude and selected variables of the tech-prep program (Program Content, Counseling, Physical Facilities, Equipment and Materials)

A negligible negative relation was found between attitude and gender \( (r_{pb} = -0.09) \). The relationship between program content and gender of the student also had a low negative relation \( (r_{pb} = -0.11) \). A positive substantial relation \( (r = 0.54) \) was found between the attitude of the students and their level of agreement with the program content. A substantial positive relation \( (r = 0.66) \) was also found between the program content and Physical Facilities, Equipment and Materials.

Objective 8: To determine the relationship between the teachers' demographic, attitude and selected variables of the Tech-Prep Project (Program Content, Counseling, Physical Facilities, Equipment and Materials)

A positive low relation \( (r_{pb} = 0.28) \) was found between gender and attitude of teachers. The relationship between the level of agreement of teachers in program content and gender was also low \( (r_{pb} = 0.21) \).

A substantial positive relation \( (r = 0.63) \) was found between the level of agreement of the teachers in program content and physical facilities, equipment and materials. There were substantial positive relationships between the level of agreement of the teachers with program content and
the counseling services \((r = .51)\), and with program content and business and industry linkages \((r = .64)\).

Conclusions

The following conclusions are based upon the specific findings of the study and apply to the particular population studied:

1. The attitudes of students and teachers toward the Tech-Prep Project were similar. The vocational teacher, academic teacher and the student in this study agreed with the integration of applied academics.

2. The students' gender, age, ethnic background, and level of education of the parents were independent of the level of agreement of the student with the program content. Prior to this study, no study had been conducted to investigate the possible relationships between the student level of agreement with program content and selected demographic variables such as gender, age, ethnic background, and level of education of the parents. The students' demographic variables investigated in the study had a weak relationship with level of agreement of the student with program content.
3. The attitude of the students toward the Electronics Tech-Prep Project and the student level of agreement with program content showed a positive substantial relationship.

4. The attitude of the teacher toward the Electronics Tech-Prep Project and the teacher level of agreement with program content showed a positive moderate relationship.

5. The teachers and the students have a similar level of agreement in the program content variable.

6. The teachers and the students have a similar level of agreement on the physical facilities, equipment and materials variable.

7. The teacher level of agreement with program content and the teacher level of agreement with physical facilities, equipment and materials variables were positive substantial related.

8. The student level of agreement with counseling services and the attitude of the students toward the Electronics Tech-Prep Project were positive substantial related.

9. The student level of agreement with program content and the student level of agreement with physical facilities, equipment and materials were positive substantial related.
10. The teacher level of agreement with program content and the teacher level of agreement with business and industry linkages were positive substantial related.

Recommendations

Research theory

The selected variables of the processes involved in the Electronics Tech-Prep Project were related. Each one of the selected variables for the students and teachers were related with the attitude of both. Figure 6 shows a conceptual framework of the variables that were related in the study. Since the teachers and the students demographic variables were not related to the processes involved in the Electronics Tech-Prep Project all of them were excluded from the framework.

Based on this study, the students and teachers agreed that academic and vocational courses should be integrated. Therefore, team building activities between academics and vocational teachers that enhance professional growth and collaboration should be promoted.

Newsom and Sutphin (1994), also argued that achievement would be accomplished through teamwork and interaction.
Figure 6. A conceptual framework of the variables related in the tech-prep process
The study also found that involving people from the industrial sector in the Local Advisory Committee for the Electronics Tech-Prep Project was important. The need for effective collaboration between the program and the industry was also established. Based on the study it is recommended that the Local Advisory Committee, in which people from the business and industrial sector can contribute in the program content with their ideas according to the new technological change, participate in the project. Research conducted by Roegge and Brown (1992), also indicated the importance of Business and Industry involvement in developing the Tech-Prep curriculum. Newsom and Sutphin (1994), conducted a study also found teachers indicated that community, including business, should be involved in the Tech-Prep Project.

The school administrators should see that the counseling services and the information available to students is up to date. Regarding counseling services, Roegge and Brown (1992), also found that counselors, teachers and administrators collaborate in the implementation of Tech-Prep.

The study also found agreement regarding the physical facilities, equipment and materials used by the tech-prep project. Both students and teachers agreed. Therefore, it is important to maintain the physical facilities and equipment. Roegge and Brown (1992), also reported that
facilities and equipment were important in the implementation of Tech-Prep. Wentling (1990), suggested that it was necessary to provide technical assistance to school personnel in selecting equipment and set-up of equipment and labs. Wentling also argued that it is necessary to establish a list of essential resources and equipment needed for the implementation of Tech-Prep.

**Practice**

1. The coordination between vocational teachers and academic teachers should be maintained and improved by using team building activities and seminars that promote professional growth and collaboration.

2. School administrators and staff members of the Puerto Rico Department of Education should consider the teachers perception of program content as an important factor influencing attitude toward Tech-Prep.

3. Curriculum developers should consider physical facilities, equipment and materials in maintaining and improving the quality of program content in the Electronics Tech-Prep Project.

4. The teachers and the school administrators should involve people from the industrial sector in the
Local Advisory Committee for the Electronics Tech-Prep Project.

Need for Further Study

Similar studies should be conducted to determine the conditions in which the processes involved in the Tech-Prep program are appropriate for the students that complete the second year in the Electronics Tech-Prep Project in Puerto Rico. As mentioned before this study was only conducted after the first year of operation of the Electronics Tech-Prep Project in Puerto Rico. Therefore, the conditions in which the processes involved in the Electronics Tech-Prep Project are not known for the second year. Business and industry participation in a similar study should be consider. Is recommendable to expand the study to get the perception of the counselors. A similar study in other state can help to see is there is consistency with the results.
TECH-PREP SURVEY
STUDENT FORM

PART I: PROGRAM CONTENT

Directions: Program content is one of the most important aspects of any educational program. Please circle the response following each statement that best describes your level of agreement with the program content in the electronics tech-prep program.

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

Example

The content in the program includes the basic skills of the electronic tech-prep course.  

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD</th>
<th>D</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The order in which knowledge is talk is appropriate.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2. The content in the program has not practical applications.</td>
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<tr>
<td>3. The content in the program is up to date.</td>
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<tr>
<td>4. The content in the program is very difficult.</td>
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<tr>
<td>5. There is not enough time for subjects.</td>
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<tr>
<td>6. The learning objectives are clearly described in the task sheets.</td>
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</tr>
<tr>
<td>7. The academic subjects have not practical applications in the electronics program.</td>
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<tr>
<td>8. The program encourages a smooth transition from high school to employment.</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Key

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

9. The relevant theoretical areas were not taught. SD D A SA

10. The program does not address problem solving skills. SD D A SA

11. Sufficient time for practice is provided. SD D A SA

12. The practical skills included in the objectives were not taught. SD D A SA

PART II: COUNSELING SERVICES

Directions: Please circle the response following each statement that best describes your level of agreement about the counseling services in your electronics tech-prep program.

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

Example

Counseling services were available for all the students in the electronics tech-prep program. SD D A SA

1. The occupational information is not up to date. SD D A SA

2. Counseling services regarding careers were effective. SD D A SA

3. There is not a plan for advising potential students about courses and careers. SD D A SA
Key

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

4. There are arrangements for counseling students on the progress of their training. SD D A SA

5. The counseling services do not help students to know the relationship between school and work. SD D A SA

6. There are counseling activities designed to help students with their academic achievement. SD D A SA

7. The counseling services do not promote student development. SD D A SA

8. The counseling services provide tutoring for students. SD D A SA

9. There are group orientation activities. SD D A SA
PART III: PHYSICAL FACILITIES, EQUIPMENT, AND MATERIALS

Directions: Please circle the response following each statement that best describes your level of agreement with the program equipment, facilities and materials in the electronics tech-prep program.

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

Example
The quantity of material was appropriate. SD D A SA

1. There were sufficient quantity of materials available for student's projects. SD D A SA
2. The quality of classrooms was not good. SD D A SA
3. The quality of labs was good. SD D A SA
4. The quality of textbooks was not good. SD D A SA
5. The safety features in the laboratory were in good. SD D A SA
6. The library facilities were not in good conditions. SD D A SA
7. The audio visual aids provided were good. SD D A SA
8. Lighting in the classroom was not good. SD D A SA
9. Lighting in the laboratory was not good. SD D A SA
10. Equipment was available for the student's projects. SD D A SA
11. Ventilation in the laboratory was not good. SD D A SA
### IV. ATTITUDE OF VOCATIONAL STUDENTS TOWARD TECH-PREP

**Directions:** Please circle the response following each statement that best describe your level of agreement with the different aspects of the electronics tech-prep program.

- **SD** = Strongly Disagree
- **D** = Disagree
- **A** = Agree
- **SA** = Strongly Agree

**Example**

Tech-prep provide a excellent opportunity to increase the cooperation between the academic and vocational teacher resulting in a benefit for the student.

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD</th>
<th>D</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I believe that I <strong>can not</strong> complete the electronics program due to my mathematic abilities.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>2. I believe that I will complete the electronics program due to my physical sciences abilities.</td>
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<td></td>
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</tr>
<tr>
<td>3. I believe that I <strong>can not</strong> complete the program due to my English abilities.</td>
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<td></td>
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<tr>
<td>4. I believe that I will complete the electronics program due to my Spanish abilities.</td>
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<tr>
<td>5. After having completing my first year of studies in the program I <strong>am not</strong> interested to continue in it.</td>
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<tr>
<td>6. I believe that the academic courses <strong>are not</strong> important to the program.</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Key
SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

7. I am not interested in continuing the program after completing the high school. SD D A SA

8. After completing the program, I will apply for a job that is related to electronics. SD D A SA

9. After completing the program, I will apply for college studies. SD D A SA

10. I am not satisfied with the integration of the academic and vocational courses in the program. SD D A SA

11. I like to continue studying the tech-prep program with the same conditions that I was last year. SD D A SA

12. I have a greater appreciation for the importance of both academic and vocational courses. SD D A SA
PART IV: BACKGROUND INFORMATION

We would like to know some information about you. This information will allow us to analyze the data in different ways. Please circle the appropriate response.

1. Sex
   a. Male
   b. Female

2. How old are you?
   ____ years

3. Ethnic Background
   a. Puerto Rico
   b. Dominican Republic
   c. Cuba
   d. South America
   e. United States of America
   f. Other______________

4. What was the highest level of education your father (or male or guardian) completed?
   a. Elementary School (1 - 6 grades)
   b. Middle School (7 - 9 grades)
   c. High School (10 - 12)
   d. Some College
   e. Finish College

5. What was the highest level of education your mother (or female or guardian) completed?
   a. Elementary School (1 - 6 grades)
   b. Middle School (7 - 9 grades)
   c. High School (10 - 12)
   d. Some College
   e. Finish College
TECH - PREP SURVEY
ACADEMIC TEACHER FORM

PART I: PROGRAM CONTENT

Directions: Program content is one of the most important aspects of any educational program. Please circle the response following each statement that best describes your level of agreement with the program content in the electronics tech-prep program.

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

Example
The content in the program includes the basic skills of the electronic tech-prep course. SD D A SA

1. The order in which knowledge is talk is appropriate. SD D A SA

2. The content in the program has not practical applications. SD D A SA

3. The content in the program is up to date. SD D A SA

4. The content in the program is very difficult. SD D A SA

5. There is not enough time for subjects. SD D A SA

6. The learning objectives are clearly described in the task sheets. SD D A SA

7. The academic subjects have not practical applications in the electronics program. SD D A SA

8. The program encourages a smooth transition from high school to employment. SD D A SA
Key

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

9. The relevant theoretical areas were not taught. SD D A SA

10. The program does not address problem solving skills. SD D A SA

11. Sufficient time for practice is provided. SD D A SA

12. The practical skills included in the objectives were not taught. SD D A SA

PART II: COUNSELING SERVICES

Directions: Please circle the response following each statement that best describes your level of agreement about the counseling services in your electronics tech-prep program.

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

Example

Counseling services were available for all the students in the electronics tech-prep program. SD D A SA

1. The occupational information is not up to date. SD D A SA

2. Counseling services regarding careers were effective. SD D A SA
Key

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

3. There is not a plan for advising potential students about courses and careers. SD D A SA

4. There are arrangements for counseling students on the progress of their training. SD D A SA

5. The counseling services do not help students to know the relationship between school and work. SD D A SA

6. There are counseling activities designed to help students with their academic achievement. SD D A SA

7. The counseling services do not promote student development. SD D A SA

8. The counseling services provide tutoring for students. SD D A SA

9. There are group orientation activities. SD D A SA
PART III: PHYSICAL FACILITIES, EQUIPMENT, AND MATERIALS

Directions: Please circle the response following each statement that best describes your level of agreement with the program equipment, facilities and materials in the electronics tech-prep program.

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

Example

The quantity of material was appropriate. SD D A SA

1. There were sufficient quantity of materials available for student's projects.
   SD D A SA

2. The quality of classrooms was not good.
   SD D A SA

3. The quality of labs was good.
   SD D A SA

4. The quality of textbooks was not good.
   SD D A SA

5. The safety features in the laboratory were in good.
   SD D A SA

6. The library facilities were not in good conditions.
   SD D A SA

7. The audio visual aids provided were good.
   SD D A SA

8. Lighting in the classroom was not good.
   SD D A SA

9. Lighting in the laboratory was not good.
   SD D A SA

10. Equipment was available for the student's projects.
    SD D A SA

11. Ventilation in the laboratory was not good.
    SD D A SA
PART IV: BUSINESS AND INDUSTRY

Directions: Please circle the response following each statement that best describes your level of agreement with the business and industry involvement in the electronics program.

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

Example

There is an effective collaboration between tech-prep program and the industry.

1. The Advisory Committee did not contribute to the program.  SD  D  A  SA
2. The program does not meet present local labor market needs.  SD  D  A  SA
3. Effective collaboration exists between the program and industry.  SD  D  A  SA
4. The program does not reflect emerging trends in the electronic field.  SD  D  A  SA
5. The electronics tech-prep program makes community attractive for economic development.  SD  D  A  SA
6. The program has not an advisory committee that includes experts from the electronics.  SD  D  A  SA
7. The advisory committee meets at regular intervals throughout the school year.  SD  D  A  SA
8. The advisory committee members are provide with a description of the program's objectives.  SD  D  A  SA
9. The advisory committee members do not have role in recommending improvement in program's operations.  SD  D  A  SA
V. ATTITUDE OF ACADEMIC TEACHERS TOWARD TECH-PREP

Directions: Please circle the response following each statement that best describes your level of agreement with the different aspects of the electronics tech-prep program.

SD = Strongly Disagree
D = Disagree
A = Agree
SA = Strongly Agree

Example

Joint action among academic and vocational teachers became one of the more important aspects of the tech-prep program. SD D A SA

1. A teacher should provide individualized instruction to the students. SD D A SA

2. The teacher should not visit personnel in related business to develop good public relations. SD D A SA

3. I am not interested in the program because it doesn't contribute to my expertise in my profession. SD D A SA

4. The vocational teacher is too busy to coordinate student learning activities with the academic teacher. SD D A SA

5. Beliefs concerning the integration among academic and vocational teachers support teamwork in the program. SD D A SA

6. There was no opportunity for face to face interactions between academic and vocational teachers. SD D A SA

7. I am not satisfied with the integration of the academic and vocational courses in the program. SD D A SA
### Key

- **SD** = Strongly Disagree
- **D** = Disagree
- **A** = Agree
- **SA** = Strongly Agree

8. I have an appreciation for the importance of both academic and vocational courses.  
   
9. Every year the teachers should attend at least one seminar related with the new technology.
PART VI: BACKGROUND INFORMATION

For statistical purposes it is helpful to know the characteristics of those we have surveyed. We would appreciate your giving us the following information, however if there are any items you wish to omit, feel free to do so. Please circle the appropriate response.

1. School______________________________________________________________

2. What course do you teach? ____________________________

3. Sex
   a. Male
   b. Female

4. Number of years you have been an academic teacher:
   a. 0 - 5
   b. 6 - 10
   c. 11 - 15
   d. 16 - 20
   e. 21 - 25
   f. 26 - more than 30

5. Highest Earned Degree:
   a. Less than Bachelor's _____
   b. Bachelor's _____
   c. Master's _____
   d. Doctorate _____

6. TENURE STATUS
   a. Regular
   b. Substitute
   c. Provisional
   d. Temporary

7. Program
   a. Vocational
   b. Academic
TECH - PREP SURVEY
VOCATIONAL TEACHER FORM

PART I: PROGRAM CONTENT

Directions: Program content is one of the most important aspects of any educational program. Please circle the response following each statement that best describes your level of agreement with the program content in the electronics tech-prep program.

SD = Strongly Disagree
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Example

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1. The order in which knowledge is talk is appropriate.  
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3. The content in the program is up to date.  
4. The content in the program is very difficult.  
5. There is not enough time for subjects.  
6. The learning objectives are clearly described in the task sheets.  
7. The academic subjects have not practical applications in the electronics program.  
8. The program encourages a smooth transition from high school to employment.
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SD = Strongly Disagree
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Directions: Please circle the response following each statement that best describes your level of agreement about the counseling services in your electronics tech-prep program.

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PART III : PHYSICAL FACILITIES, EQUIPMENT, AND MATERIALS

Directions: Please circle the response following each statement that best describes the level of agreement with the program equipment, facilities and materials in the electronics tech-prep program.

SD = Strongly Disagree
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1. There were sufficient quantity of materials available for student's projects. SD D A SA
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9. The advisory committee members do not have role in recommending improvement in program's operations. SD D A SA
V. ATTITUDE OF VOCATIONAL TEACHERS TOWARD TECH-PREP

Directions: Please circle the response following each statement that best describes your level of agreement with the different aspects of the electronics tech-prep program.

<table>
<thead>
<tr>
<th>SD</th>
<th>D</th>
<th>A</th>
<th>SA</th>
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</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

Example

Joint action among academic and vocational teachers became one of the more important aspects of the tech-prep program.

<table>
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1. A teacher should provide individualized instruction to the students. SD D A SA

2. The teacher **should not** visit personnel in related business to develop good public relations. SD D A SA

3. I **am not** interested in the program because it doesn't contribute to my expertise in my profession. SD D A SA

4. The vocational teacher is too busy to coordinate student learning activities with the academic teacher. SD D A SA

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6. There **was no** opportunity for face to face interactions between academic and vocational teachers. SD D A SA

7. I **am not** satisfied with the integration of the academic and vocational courses in the program. SD D A SA
8. I have an appreciation for the importance of both academic and vocational courses.

9. Every year the teachers should attend at least one seminar related with the new technology.
PART VI: BACKGROUND INFORMATION

For statistical purposes it is helpful to know the characteristics of those we have surveyed. We would appreciate your giving us the following information, however if there are any items you wish to omit, feel free to do so. Please circle the appropriate response.

1. School ______________________________________________

2. What course do you teach? ____________________________

3. Sex
   a. Male
   b. Female

4. Number of years you have been an academic teacher:
   a. 0 -5
   b. 6 - 10
   c. 11 - 15
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   e. 21 - 25
   f. 26 - more than 30

5. Highest Earned Degree:
   a. Less than Bachelor's _____
   b. Bachelor's _____
   c. Master's _____
   d. Doctorate _____

6. TENURE STATUS
   a. Regular
   b. Substitute
   c. Provisional
   d. Temporary

7. Program
   a. Vocational
   b. Academic
APPENDIX B
SPANISH VERSION OF THE STUDY INSTRUMENT
ENCUESTA TECH-PREP
FORMA DEL ESTUDIANTE

PARTE I: CONTENIDO DEL PROGRAMA

Instrucciones: El contenido del programa es uno de los aspectos más importantes en cualquier programa educativo. Para cada una de las oraciones favor de marcar un círculo al lado de la respuesta que mejor describa cuán de acuerdo está usted con relación al contenido del programa de electrónica.

CD = Completamente en desacuerdo
D = En desacuerdo
A = De acuerdo
CA = Completamente de acuerdo

Ejemplo:

La secuencia en el contenido del programa es apropiada.

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
</table>

1. La secuencia en que el contenido del programa es enseñado es apropiada.

2. El contenido del programa **no** tiene aplicación práctica.

3. El contenido en este programa está actualizado.

4. El contenido del programa es muy difícil.

5. El tiempo designado para los temas **no** es suficiente.

6. Los objetivos de aprendizaje están claramente descritos en las hojas de tarea.

7. Las asignaturas académicas **no** tienen aplicación real en el programa de electrónica.
Clave
CD = Completamente en desacuerdo
D = En desacuerdo
A = De acuerdo
CA = Completamente de acuerdo

8. El programa promueve una fácil transición de escuela superior al trabajo. CD D A CA

9. Las áreas teóricas importantes no fueron enseñadas. CD D A CA

10. El programa no enfatiza destrezas para la solución de problemas. CD D A CA

11. El tiempo de práctica fue suficiente. CD D A CA

12. Las destrezas prácticas incluidas en los objetivos no fueron enseñadas. CD D A CA

PARTE II: SERVICIOS DE CONSEJERÍA

Instrucciones: Para cada una de las oraciones favor de hacer un círculo al lado de la respuesta que mejor describa cuan de acuerdo usted está con relación a los servicios de consejería para el programa.

CD = Completamente en desacuerdo
D = En desacuerdo
A = De acuerdo
CA = Completamente de acuerdo

Ejemplo:
Los servicios de consejería fueron efectivos. CD D A CA

1. La información ocupacional no está actualizada. CD D A CA

2. Los servicios de consejería son efectivos. CD D A CA
Clave
CD = Completamente en desacuerdo
D = En desacuerdo
A = De acuerdo
CA = Completamente de acuerdo

3. **No** existe un plan para orientar estudiantes potenciales acerca de los cursos y ocupaciones.  
   CD D A CA

4. Hay arreglos para la consejería de estudiantes en el proceso de su entrenamiento.  
   CD D A CA

5. Los servicios de consejería **no** ayudan a los estudiantes a entender la relación entre la escuela y el mundo del trabajo.  
   CD D A CA

6. Hay actividades de consejería diseñadas para ayudar a los estudiantes en su aprovechamiento académico.  
   CD D A CA

7. Los servicios de consejería **no** promueven el desarrollo del estudiante.  
   CD D A CA

8. Hay servicios de tutoría.  
   CD D A CA

9. Hay actividades de orientación de grupo.  
   CD D A CA
PARTE III: EQUIPO, FACILIDADES, Y MATERIALES

Instrucciones: Para cada una de las oraciones favor de hacer un círculo al lado de la respuesta que mejor describe cuan de acuerdo usted está con relación al equipo, facilidades, y materiales en el programa de electrónica.

CD = Completamente en desacuerdo
D = En desacuerdo
A = De acuerdo
CA = Completamente de acuerdo

Ejemplo:
La cantidad de material fue apropiada. CD D A CA

1. Hubo suficientes materiales disponibles para los proyectos de los estudiantes. CD D A CA
2. La calidad de los salones no es buena. CD D A CA
3. La calidad de los laboratorios es buena. CD D A CA
4. La calidad de los libros de texto no es buena. CD D A CA
5. Las condiciones de seguridad en el laboratorio son buenas. CD D A CA
6. Las facilidades de la biblioteca no estaban en buenas condiciones. CD D A CA
7. La ayuda audio visual provista fue adecuada. CD D A CA
8. La iluminación en el salón de clase no fue adecuada. CD D A CA
9. La iluminación en el laboratorio de clase no fue adecuada. CD D A CA
10. Hay suficiente equipo disponible para que los estudiantes realicen su labor. CD D A CA
11. La ventilación en el laboratorio no era buena. CD D A CA
### PARTE IV: ACTITUDES DE LOS ESTUDIANTES HACIA EL PROGRAMA

Instrucciones: Para cada una de las oraciones favor de hacer un círculo a la respuesta que mejor describe cuán de acuerdo usted está con relación a los diferentes aspectos del programa de electrónica que se presentan a continuación.

<table>
<thead>
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<th>CD</th>
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<th>CA</th>
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<tbody>
<tr>
<td>CD = Completamente Desacuerdo</td>
<td>D = Desacuerdo</td>
<td>A = Acuerdo</td>
<td>CA = Completamente Acuerdo</td>
</tr>
</tbody>
</table>

Ejemplo:
El programa provee una excelente oportunidad de aumentar la cooperación entre el maestro académico y vocacional, resultando en beneficio para los estudiantes.  

<table>
<thead>
<tr>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
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</thead>
</table>

1. En mi opinión, **no** puedo completar el programa debido a mis deficiencias en destrezas de matemática.  

| CD | D | A | CA |

2. En mi opinión, puedo completar el programa ya que domino las destrezas de ciencia física.  

| CD | D | A | CA |

3. En mi opinión, **no** puedo completar el programa debido a mis deficiencias en destrezas de comunicación en inglés.  

| CD | D | A | CA |

4. En mi opinión, puedo completar el programa ya que domino destrezas de comunicación en español.  

| CD | D | A | CA |

5. Después de completar mi primer año en el programa **no** tengo interés de continuar en él.  

| CD | D | A | CA |

6. En mi opinión, los cursos académicos **no** son importantes para el programa.  

| CD | D | A | CA |

7. El contenido académico aplicado debería ser enseñado por un maestro vocacional.  

| CD | D | A | CA |

8. **No** estoy interesado en continuar en el programa después de completar la escuela superior.  

| CD | D | A | CA |
Clave
CD = Completamente en desacuerdo
D = En desacuerdo
A = De acuerdo
CA = Completamente de acuerdo

9. Después de completar el programa voy a solicitar un trabajo relacionado con la electrónica. CD D A CA

10. Después de terminado el programa voy a solicitar estudios universitarios. CD D A CA

11. No estoy muy satisfecho con la integración de los maestros académicos y vocacionales en el programa. CD D A CA

12. Me gustaría continuar estudiando en el programa con las mismas condiciones que estuve estudiando el año pasado. CD D A CA

13. Siento una mayor apreciación por la importancia de ambos cursos (académicos y vocacionales). CD D A CA
PARTE V: INFORMACION PERSONAL

Nos gustaría conocer alguna información relacionada a usted. Esta información nos permitirá agrupar la data en diferentes maneras para análisis.

1. Sexo:
   a. Masculino
   b. Femenino

2. ¿Cuántos años tienes?
   ______

3. Lugar de Origen:
   a. Puerto Rico
   b. República Dominicana
   c. Cuba
   d. América del Sur
   e. Estados Unidos de América
   f. Otro (Favor de especificar) ______________________

4. El nivel de educación más alto completado por su padre (o encargado masculino) es:
   a. Diploma de escuela elemental (Grados 1-6)
   b. Diploma de escuela intermedia (Grados 7-9)
   c. Diploma de escuela superior (Grados 10-12)
   d. Grado Asociado (Diploma de dos años de universidad)
   e. Bachillerato (Diploma de cuatro años de universidad)
   f. Maestría (Diploma de seis años de universidad)
   g. Doctorado (Diploma de ocho años o más de universidad)
   h. Otro (Favor de especificar)

5. El nivel de educación más alto completado por su madre (o encargado femenino) es:
   a. Diploma de escuela elemental (Grados 1-6)
   b. Diploma de escuela intermedia (Grados 7-9)
   c. Diploma de escuela superior (Grados 10-12)
   d. Grado Asociado (Diploma de dos años de universidad)
   e. Bachillerato (Diploma de cuatro años de universidad)
   f. Maestría (Diploma de seis años de universidad)
   g. Doctorado (Diploma de ocho años o más de universidad)
   h. Otro (Favor de especificar)
ENCUESTA TECH-PREP
FORMA DEL MAESTRO ACADEMICO

PARTE I: CONTENIDO DEL PROGRAMA

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Ejemplo:

La secuencia en el contenido del programa es apropiada. __________ CD D A CA

1. La secuencia en que el contenido del programa es enseñado es apropiada. CD D A CA
2. El contenido del programa no tiene aplicación práctica. CD D A CA
3. El contenido en este programa está actualizado. CD D A CA
4. El contenido del programa es muy difícil. CD D A CA
5. El tiempo designado para los temas no es suficiente. CD D A CA
6. Los objetivos de aprendizaje están claramente descritos en las hojas de tarea. CD D A CA
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PARTE II: SERVICIOS DE CONSEJERÍA

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3. **No** existe un plan para orientar estudiantes potenciales acerca de los cursos y ocupaciones.
   CD D A CA

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1. Hubo suficientes materiales disponibles para los proyectos de los estudiantes.  

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2. La calidad de los salones no es buena.  

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
</table>

3. La calidad de los laboratorios es buena.  

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
</table>

4. La calidad de los libros de texto no es buena.  

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>D</th>
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<th>CA</th>
</tr>
</thead>
</table>

5. Las condiciones de seguridad en el laboratorio son buenas.  

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
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<th>A</th>
<th>CA</th>
</tr>
</thead>
</table>

6. Las facilidades de la biblioteca no estaban en buenas condiciones.  

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
</table>

7. La ayuda audio visual provista fue adecuada.  

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
</table>

8. La iluminación en el salón de clase no fue adecuada.  

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
</table>

9. La iluminación en el laboratorio de clase no fue adecuada.  

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
</table>

10. Hay suficiente equipo disponible para que los estudiantes realicen su labor.  

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
</table>

11. La ventilación en el laboratorio no era buena.  

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
</table>
### PARTE IV: NEGOCIOS E INDUSTRIAS

Instrucciones: Para cada una de las oraciones favor de hacer un círculo al lado de la respuesta que mejor describe cuán de acuerdo usted está con relación a la participación de los negocios e industrias en el programa de electrónica.

- **CD** = Completamente en desacuerdo
- **D** = En desacuerdo
- **A** = De acuerdo
- **CA** = Completamente de acuerdo

**Ejemplo:**
*Hay una colaboración efectiva entre el programa y la industria.*

<table>
<thead>
<tr>
<th>1. El Comité Técnico Asesor no contribuyó al programa.</th>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. El programa no reúne las necesidades del mercado laboral local.</td>
<td>CD</td>
<td>D</td>
<td>A</td>
<td>CA</td>
</tr>
<tr>
<td>3. El programa reúne las necesidades del mercado laboral local de los próximos cinco años.</td>
<td>CD</td>
<td>D</td>
<td>A</td>
<td>CA</td>
</tr>
<tr>
<td>4. Existe colaboración efectiva entre el programa y la industria local.</td>
<td>CD</td>
<td>D</td>
<td>A</td>
<td>CA</td>
</tr>
<tr>
<td>5. El programa no refleja las últimas tendencias en el campo de la electrónica.</td>
<td>CD</td>
<td>D</td>
<td>A</td>
<td>CA</td>
</tr>
<tr>
<td>6. El programa aumenta el atractivo de la comunidad para el desarrollo económico.</td>
<td>CD</td>
<td>D</td>
<td>A</td>
<td>CA</td>
</tr>
<tr>
<td>7. El programa no tiene un Comité Técnico Asesor que incluye expertos de la industria de la electrónica.</td>
<td>CD</td>
<td>D</td>
<td>A</td>
<td>CA</td>
</tr>
<tr>
<td>8. El Comité Técnico Asesor se reúne a intervalos regulares a través del año escolar.</td>
<td>CD</td>
<td>D</td>
<td>A</td>
<td>CA</td>
</tr>
<tr>
<td>9. A los miembros del Comité Técnico Asesor se les provee de una descripción de los objetivos del programa.</td>
<td>CD</td>
<td>D</td>
<td>A</td>
<td>CA</td>
</tr>
</tbody>
</table>
10. Los miembros del Comité Técnico Asesor no tienen un rol activo en la recomendación del mejoramiento del programa. CD D A CA

PARTE V: ACTITUD DEL MAESTRO ACADEMICO HACIA EL PROGRAMA DE ELECTRONICA

Instrucciones: Para cada una de las oraciones favor de hacer un círculo al lado de la respuesta que mejor describe cuán de acuerdo usted está con relación a los diferentes aspectos del programa de electrónica.

CD = Completamente en Desacuerdo
D = En Desacuerdo
A = De Acuerdo
CA = Completamente de Acuerdo

Ejemplo:
La acción unida entre maestros académicos y vocacionales es uno de los aspectos más importantes del programa. CD D A C

1. El maestro debe proveer instrucción individual al estudiante del programa. CD D A CA

2. El maestro no tiene que visitar gerentes y patronos relacionados con los negocios, para desarrollar buenas relaciones públicas. CD D A CA

3. No estoy interesado en el programa porque no contribuye a mi especialidad profesional. CD D A CA

4. El maestro vocacional está muy ocupado para coordinar actividades educativas con el maestro académico. CD D A CA
5. Entiendo que la integración entre maestros académicos y vocacionales puede apoyar el trabajo en equipo en el programa. CD D A CA

6. El programa no provee oportunidad para una interacción entre maestros académicos y vocacionales. CD D A CA

7. No estoy muy satisfecho con la integración de los componentes académico y vocacional en el programa. CD D A CA

8. Ahora siento una apreciación mayor sobre la importancia de ambos componentes (académico y vocacional). CD D A CA

9. Los maestros deberían atender por lo menos a un seminario relacionado con la nueva tecnología una vez al año. CD D A CA
PARTE VI: INFORMACION PERSONAL

Para propósitos estadísticos nos gustaría conocer la información que se pide a continuación. Si interesa omitir alguna información sientase libre de hacerlo.

1. Escuela

2. Curso que enseña

3. Sexo: (Favor de hacer un círculo al lado de la respuesta)
   a. Masculino
   b. Femenino

4. El número de años que usted ha sido un maestro vocacional es ____.

5. Grado más alto que has alcanzado: (Favor de hacer un círculo al lado de la respuesta)
   a. Menos de Bachillerato
   b. Bachillerato
   c. Maestría
   d. Doctorado

6. Status que posee: (Favor de hacer un círculo al lado de la respuesta)
   a. Permanente
   b. Sustituto
   c. Provisional
   d. Temporero

7. El programa al cual pertenece: (Favor de hacer un círculo al lado de la respuesta)
   a. Vocacional
   b. Académico
ENCUESTA TECH-PREP
FORMA DEL MAESTRO VOCACIONAL

PARTE I: CONTENIDO DEL PROGRAMA

Instrucciones: El contenido del programa es uno de los aspectos más importantes en cualquier programa educativo. Para cada una de las oraciones favor de marcar un círculo al lado de la respuesta que mejor describa cuán de acuerdo está usted con relación al contenido del programa de electrónica.

<table>
<thead>
<tr>
<th>CD</th>
<th>D</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completamente en desacuerdo</td>
<td>En desacuerdo</td>
<td>De acuerdo</td>
<td>Completamente de acuerdo</td>
</tr>
</tbody>
</table>

Ejemplo:
La secuencia en el contenido del programa es apropiada. CD D A CA

1. La secuencia en que el contenido del programa es enseñado es apropiada. CD D A CA
2. El contenido del programa no tiene aplicación práctica. CD D A CA
3. El contenido en este programa está actualizado. CD D A CA
4. El contenido del programa es muy difícil. CD D A CA
5. El tiempo designado para los temas no es suficiente. CD D A CA
6. Los objetivos de aprendizaje están claramente descritos en las hojas de tarea. CD D A CA
7. Las asignaturas académicas no tienen aplicación real en el programa de electrónica. CD D A CA
Clave
CD = Completamente en desacuerdo
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8. El programa promueve una fácil transición de escuela superior al trabajo. CD D A CA

9. Las áreas teóricas importantes no fueron enseñadas. CD D A CA

10. El programa no enfatiza destrezas para la solución de problemas. CD D A CA

11. El tiempo de práctica fue suficiente. CD D A CA

12. Las destrezas prácticas incluidas en los objetivos no fueron enseñadas. CD D A CA

PARTE II: SERVICIOS DE CONSEJERÍA

Instrucciones: Para cada una de las oraciones favor de hacer un círculo al lado de la respuesta que mejor describa cuán de acuerdo usted está con relación a los servicios de consejería para el programa.

CD = Completamente en desacuerdo
D = En desacuerdo
A = De acuerdo
CA = Completamente de acuerdo

Ejemplo:
Los servicios de consejería fueron efectivos. CD D A CA

1. La información ocupacional no está actualizada. CD D A CA

2. Los servicios de consejería son efectivos. CD D A CA
Clave
CD = Completamente en desacuerdo
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3. **No** existe un plan para orientar estudiantes potenciales acerca de los cursos y ocupaciones. **CD D A CA**

4. Hay arreglos para la consejería de estudiantes en el proceso de su entrenamiento. **CD D A CA**

5. Los servicios de consejería **no** ayudan a los estudiantes a entender la relación entre la escuela y el mundo del trabajo. **CD D A CA**

6. Hay actividades de consejería diseñadas para ayudar a los estudiantes en su aprovechamiento académico. **CD D A CA**

7. Los servicios de consejería **no** promueven el desarrollo del estudiante. **CD D A CA**

8. Hay servicios de tutoría. **CD D A CA**

9. Hay actividades de orientación de grupo. **CD D A CA**
PARTE III: EQUIPO, FACILIDADES, Y MATERIALES

Instrucciones: Para cada una de las oraciones favor de hacer un círculo al lado de la respuesta que mejor describe cuán de acuerdo usted está con relación al equipo, facilidades, y materiales en el programa de electrónica.

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Ejemplo:
La cantidad de material fue apropiada. CD D A CA

1. Hubo suficientes materiales disponibles para los proyectos de los estudiantes. CD D A CA

2. La calidad de los salones no es buena. CD D A CA

3. La calidad de los laboratorios es buena. CD D A CA

4. La calidad de los libros de texto no es buena. CD D A CA

5. Las condiciones de seguridad en el laboratorio son buenas. CD D A CA

6. Las facilidades de la biblioteca no estaban en buenas condiciones. CD D A CA

7. La ayuda audio visual provista fue adecuada. CD D A CA

8. La iluminación en el salón de clase no fue adecuada. CD D A CA

9. La iluminación en el laboratorio de clase no fue adecuada. CD D A CA

10. Hay suficiente equipo disponible para que los estudiantes realicen su labor. CD D A CA

11. La ventilación en el laboratorio no era buena. CD D A CA
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2. El maestro no tiene que visitar gerentes y patronos relacionados con los negocios, para desarrollar buenas relaciones públicas.  

3. No estoy interesado en el programa porque no contribuye a mi especialidad profesional.  

4. El maestro vocacional está muy ocupado para coordinar actividades educativas con el maestro académico.
Clave
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5. Entiendo que la integración entre maestros académicos y vocacionales puede apoyar el trabajo en equipo en el programa. CD D A CA

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APPENDIX C
PANEL OF EXPERTS
PANEL OF EXPERTS

The following people from the Department of Education in Puerto Rico, The Ohio State University, The Metropolitan University of Puerto Rico, The University of Puerto Rico in Mayagüez Campus, served on the panel of experts:

Aida Hernández Colón, Graduate Student in Educational Administration in the Metropolitan University of Puerto Rico

Dra. Luz M. Estrada, Former Superintendent of Schools in Rio Piedras, Puerto Rico

María Martin, Graduate Student at The Ohio State University and Director of the Civil Rights Unit in the Auxiliary Secretary of Vocational Education in Puerto Rico

Felipe Rosas, School Director in the Carlos F. Daniels Vocational School of Carolina Puerto Rico

José Santana, Director of Tech - Prep Project in Puerto Rico

José Galarza, Tech - Prep Project Coordinator

Julia Pérez Poll, Spanish teacher at the Miguel Such Vocational School

María Hernández Noa, English teacher at the Miguel Such Vocational School

Dr. David Padilla, Professor in the University of Puerto Rico - Mayagüez Campus
APPENDIX D
STUDY AUTHORIZATION LETTER
20 de abril de 1994

Directores de las
Regiones Educativas,
Superintendentes y
Directores de Escuela

Aída I. Rodríguez Roig, D.Ed.
Secretaria Auxiliar

AUTORIZACIÓN PARA LLEVAR A CABO ESTUDIO EN EL SISTEMA EDUCATIVO


Autorizo al señor Virella Torres a visitar estas escuelas con el propósito de administrar los cuestionarios del estudio a una muestra de maestros académicos y vocacionales y a estudiantes. La colaboración del personal escolar es de importancia para que la administración de los cuestionarios sea adecuada.

El Departamento de Educación no se solidariza necesariamente con las opiniones o preferencias que pudieran surgir por razón de este estudio.

Esta autorización tiene vigencia hasta junio de 1994.
REFERENCES


