DOCUMENT RESUME

ED 383 916 CE 069 317

AUTHOR Raber, Suzanne M.; Merchlinsky, Suzanne R.
TITLE An Evaluation of the Southern Maryland Educational Consortium's Tech Prep Program: Final Report.
INSTITUTION COSMOS Corp., Bethesda, MD.; Southern Maryland Educational Consortium, La Plata.
SPONS AGENCY Office of Vocational and Adult Education (ED), Washington, DC.
PUB DATE Mar 95
CONTRACT V248A20033-92A
NOTE 285p.; For a related final report, see CE 069 316.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC12 Plus Postage.
DESCRIPTORS Academic Education; *Articulation (Education); Case Studies; College School Cooperation; Community Colleges; *Consortia; Demonstration Programs; High Schools; Occupational Clusters; Outcomes of Education; *Program Effectiveness; *Regional Planning; Technical Education; *Tech Prep; Two Year Colleges
IDENTIFIERS *Maryland (South)

ABSTRACT

In the Southern Maryland Educational Consortium's 4 + 2 tech prep program, ninth-grade students develop career plans and follow career pathways in one of three technologies--health and human services, electronics and engineering, or business. The program was evaluated by an independent social science research firm to identify the different strategies being used by the consortium partners and the institutional and student outcomes resulting from implementation. The evaluation entailed case studies of each of the three participating school districts (Calvert, Charles, and St. Mary's counties) and Charles County Community College. The following data collection methods were used: in-depth interviews of selected staff, administrators, and counselors from the community college, high schools, career and technology centers, and feeder middle schools; surveys of all teachers and counselors in the sample secondary schools; observations of selected tech prep classes; reviews of key school system and community college documents; and analysis of all available student outcome data. The following implementation strategies were evaluated: counseling and advisement; pathways and career clusters; integration of technical and academic content into an applied curriculum; curriculum articulation; and facilitators, barriers, support, and other programs. Institutional outcomes assessed included the following: staff development, curriculum, counseling/advisement, teaching strategies and methods, collaborative instructional activities, and staff attitudes. Student outcomes were reported in terms of secondary and community college student data trends. The following recommendations for future data collection were made: continue to focus on systemic trends, target tech prep students, track tech prep students, and track longer-term outcomes. (Twenty-one numbered exhibits and numerous unnumbered tables are included. Appended are the following: interview protocols, teacher and counselor surveys, response rates, observation form, and 19 survey data tables.) (MN)

ED 383 916

An Evaluation of the Southern Maryland Educational Consortium's Tech Prep Program: Final Report

Suzanne M. Raber
Suzanne R. Merchlinsky

March 1995

Prepared for Charles County Community College
La Plata, Maryland
Award #V248A20033-92A

BEST COPY AVAILABLE

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it
☐ Minor changes have been made to improve reproduction quality
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

COSMOS CORPORATION

An Evaluation of the Southern Maryland Educational Consortium's Tech Prep Program: Final Report

Suzanne M. Raber
Suzanne R. Merchlinsky

March 1995

Prepared for Charles County Community College
La Plata, Maryland
Award #V248A20033-92A

Executive Summary

A. Background

The Southern Maryland Educational Consortium (SMEC) was formed in 1989, in response to requests from local area businesses for a more highly-skilled, technologically proficient high school and community college graduate. SMEC developed and implemented a Tech Prep program in three local school districts (Calvert, Charles, and St. Mary's Counties), and at the Charles County Community College. This Tech Prep program seeks to transform the high school experience for students in the middle majority by creating a clear pathway from school to work and/or higher education. Tech Prep has been implemented through a collaboration among the school systems, the community college, and the business communities in these three counties. The project has been supported with federal, state, and local funds, including a model demonstration grant from the U.S. Department of Education which required that an evaluation be conducted.

The Tech Prep model developed by SMEC is a 4 + 2 model. Ninth grade students develop career plans, and then follow career pathways in one of three technologies: health and human services, electronics and engineering, or business. Each pathway provides courses throughout high school and links with articulated programs at the community college. This is a more extensive model than the 2 + 2 model generally referenced as Tech Prep. This model program was first implemented in Calvert and St. Mary's Counties in 1991-92, and during the following school year in Charles County.

B. Study Objectives

SMEC contracted with COSMOS Corporation, a social science research firm located in Bethesda, Maryland, to conduct a preliminary evaluation of their program efforts through the 1993-94 school year. The objectives of the evaluation were to address three study questions:

- What different strategies are being used by the three school districts and the community college to implement Tech Prep;

- What institutional outcomes have resulted from the implementation of Tech Prep in these school districts and the community college; and

- What student outcomes have been achieved by Tech Prep?

C. Methods and Data Sources

The evaluation design involved case studies of each of the three participating school districts and the community college. Within each school district, data were collected from the career and technology center, two high schools, and middle school counselors in the respective feeder schools. The case studies included a variety of data collection methods in each district, and the community college:

- In-depth interviews with secondary staff, including central office administrators in each district; principals, selected teachers, and counselors in the sample high schools and career and technology centers; and middle school counselors from the feeder schools;

- In-depth interviews with selected administrators, faculty, and advisors at the community college;

- Surveys of all teachers and counselors in the sample secondary schools;

- Observations of selected Tech Prep classes;

- Reviews of key school system and community college documents (e.g., programs of study, articulation agreements); and

- Analysis of extant student outcome data from school system, community college, and state reports, records, and databases.

D. Implementation Strategies

In order to understand the different strategies used by the three school districts and the community college in implementing Tech Prep, the evaluation relied primarily on three sources of information: in-depth staff interviews, review of key school system and community college documents, and staff surveys. The interviews also provided staff perceptions regarding factors that had facilitated or hindered the implementation of Tech Prep, and other programs which may have affected Tech Prep outcomes. The surveys included items regarding the support they had received to implement Tech Prep.

Across the three school districts and the community college, Tech Prep has been implemented around essentially the same four components:

- **Counseling and advisement** in the secondary schools and the community college;
- **Pathways and career clusters** within the high school curriculum;
- **Integration of technical and academic content** into an **applied curriculum**; and
- **Curriculum articulation** between the high schools and the community college.

Counseling and Advisement

At the secondary level, counseling was the first component of Tech Prep to be implemented in all three school districts. Counselors were involved in the initial planning phase and in promoting Tech Prep to teachers, students, parents, and the local business community. All students participate in the same counseling activities to prepare them to choose a Tech Prep pathway or cluster and develop a four-year educational plan. Counselors visit the feeder schools to speak with eighth graders about Tech Prep's purpose, options, and articulation. In addition, counselors give presentations at parents' nights, PTA meetings, and in social studies classes, and coordinate visits for students to the career and technical centers.

Community college administrators have anticipated the need to develop new advisement strategies to me the needs of entering Tech Prep students. Although the community college is still awaiting the first four-year

completers of secondary Tech Prep programs, the advisement staff have begun to prepare for these students, through staff development activities and joint activities with secondary counseling staff, particularly around the articulation process. Starting in 1994-95, the community college has brought in a Tech Prep specialist to serve as an academic advisor to facilitate the implementation of Tech Prep advisement at the community college level.

Pathways and Career Clusters

Across the three school districts, curricula have been reorganized or restructured around different career pathways or clusters. Each pathway/cluster offers a coordinated sequence of academic and technology courses to enable students to acquire technically oriented knowledge and skills. Each pathway/career cluster is designed to prepare students for lifelong learning, including advanced study at community colleges, technical institutions, and four-year colleges and universities. and/or direct entry into the world of work.

Through these pathways and clusters, each school district offers students the opportunity to prepare for advanced study at the community college in business, engineering, or health and human services technologies (Tech Prep), direct job entry (Occupational Prep), or further education at a four-year institution of higher education (College Prep). In implementing Tech Prep, however, each of the three school systems has developed a slightly different approach to organizing their pathways or clusters:

St. Mary's County. Beginning in 1991-92, all ninth-grade students participate in the Tech Prep program, and elect a four-year sequence in one of three applied technology clusters (Business/Management, Engineering/ Mechanical, or Health/Human Service), or a Four-Year College/University cluster.

Calvert County. Starting in 1991-92, students select one of three career pathways: Advanced Tech Prep (for students planning to continue their education at the community college in one of three career clusters: business technology, engineering technology or health and human services); Occupational Prep; and College Prep.

Charles County. Starting one year later in 1992-93, students select from career pathways similar to those in Calvert County: Tech Prep, Occupational Prep, and College Prep.

Integration of Technical and Academic Content

A primary characteristic of Tech Prep is the integration of technical and academic content into an applied curriculum. Interview respondents in all three counties provided several specific examples of integrated academic and technical content and use of applied curricula. In addition, they cited more comprehensive changes in the curriculum which reflect this integration. In St. Mary's County, schools have continued the use of applied curricula adopted when they served as an SREB pilot site (e.g., Applied Mathematics, Principles of Technology, Chemistry in the Community). All three counties have developed additional applied courses; St. Mary's and Calvert Counties offer several (e.g., Applied Communications, Applied Algebra, Applied Geometry, Applied Physics, Applied Economics, and Principles of Technology), while Charles County has developed an Applied Mathematics course for students at their Career and Technology Center. In addition, staff in all three counties mentioned the increased use of computers and other technology in all courses.

At the same time, many staff commented that academic teachers still need to be more applied in their instruction. And survey data indicate that the integration of academic and technical content may not yet be evident in all curricular areas. Almost all counselors (91 percent) and teachers (88 percent) responding to the survey agree that integrating academic and vocational content is crucial to Tech Prep success. However, actual implementation of academic and technical integration was less prevalent:

- Thirty-six (36) percent of responding teachers reported integrating academic and vocational/technical course content;
- Twenty-three (23) percent of teachers said they used applied academic curricula; and
- Eighteen (18) percent of teachers reported providing instruction in advanced technical skills.

Where integration of academic and technical content has not occurred, the explanation may in part be due to lack of staff development on the topic and time for joint instructional activities among academic and technical teachers. For example, the survey data revealed that 32 percent of responding teachers had participated in staff development activities on integrating vocational and academic content, 16 percent had participated in collaboration

among academic or vocational teachers to develop course content; and 7 percent had participated in team teaching or joint planning time between academic and vocational teachers.

Curriculum Articulation

Community college articulated career programs are certificate and degree programs sequenced with 11th and 12th grade secondary courses. Students from public high schools in the tri-county area may receive college credit for courses they have taken under articulation agreements between the college and these school systems. Each school district has negotiated articulation agreements with the community college for specific courses in their high schools. These courses are listed in each school district's case study (see Chapters 2 - 4).

Articulation agreements between the community college and the surrounding school districts were first developed in 1985, pre-dating Tech Prep. In anticipation of the implementation of Tech Prep at the secondary level, divisional faculty meetings were held in 1991 and 1992 to expand articulation agreements and propose course sequences to guide the secondary systems as they revised their programs of study. In 1993 an articulation form was developed specifically for the transfer of credit by Tech Prep students. Although some articulation agreements were in place before Tech Prep, now more programs are being articulated. Currently, articulation only applies to career programs, but the community college is considering expanding its application to transfer programs. The state of Maryland is presently discussing whether four-year institutions of higher education (IHEs) should accept credits from community colleges that were earned in high schools through articulation agreements.

The articulation process is the major component of Tech Prep at the community college because it is the mechanism that ties the secondary and community college curricula together. However, thus far only a small number of students have taken advantage of articulation to receive community college credit for courses taken in high school. The community college suspects that students may not fully understand the articulation process, or may plan to transfer to four-year IHEs and be concerned about losing articulated credit.

Facilitators, Barriers, Support, and Other Programs

In addition to examining the strategies used to implement each of the Tech Prep components, the evaluation also collected staff perceptions of

factors that had facilitated or hindered the implementation of Tech Prep, the adequacy of the support staff had received, and other programs which may have affected Tech Prep outcomes.

Facilitators. Respondents in the three school districts and the community college consistently mentioned the leadership and support from administrators as key to the successful implementation of Tech Prep. They also mentioned the importance of viewing Tech Prep as curriculum reform, and a way to restructure high schools, rather than one of many individual programs; the involvement of local government and business community; and professional development opportunities for teachers and counselors to visit other Tech Prep programs and attend conferences.

Barriers. In general, interview respondents felt that the major barriers to implementation stemmed from resistance to change among staff and the community; concerns that Tech Prep was not meeting the needs of all students (particularly low-achieving students and students with disabilities); and the lack of resources for adequate staffing, materials, training, and planning time to support the program.

Adequacy of Support. The majority of teachers reported sufficient support in all areas except planning time. Higher percentages of Calvert and St. Mary's County teachers reported sufficient support than did teachers from Charles County in all but one area. Technical teachers and counselors appeared to be more satisfied with the support they had received to implement Tech Prep than were academic teachers and teachers in general.

Other Programs. Secondary interview respondents mentioned several programs or initiatives, most of which are being implemented by the school districts at the same time as Tech Prep, that compliment Tech Prep with similar goals and objectives. These programs have helped to make Tech Prep more of a systemic reform, but at the same time, make it more difficult to attribute any institutional or student outcomes specifically to Tech Prep. Predominant among the programs and initiatives mentioned were the following:

- St. Mary's prior involvement in the Southern Regional Education Board, which focused on raising expectations and academics for vocational students;
- Maryland's Student Performance Program (MSPP) which holds schools accountable for

some of same objectives and encourages similar instructional techniques;

- New state graduation requirements which include algebra and geometry for all students, a technology education course, and two years of advanced technology or foreign language;

- The concurrent push for increased use of computers and technology in instruction; and

- The Southern Maryland Early Intervention Program (SMEIP), a collaborative effort among the three counties and three IHEs, which assists disadvantaged students in planning a course of study early in their high school program, and then offers a variety of support services.

E. Institutional Outcomes

In order to determine what institutional outcomes have resulted from the implementation of Tech Prep in these school districts and the community college, the evaluation relied heavily on the in-depth interviews with staff involved in Tech Prep, and surveys of all secondary teachers and counselors. The interviews and surveys focused primarily on institutional outcomes in six areas:

- Staff development;

- Curriculum;

- Counseling/advisement;

- Teaching strategies and methods;

- Collaborative instructional activities; and

- Staff attitudes toward Tech Prep.

The interviews and surveys complemented each other. In addition to providing information about institutional outcomes from informed staff, the interviews suggested the more specific issues and different activities on which to survey teaching and counseling staff. The surveys provided information on the extent to which activities had occurred in each of these areas for all staff, and form the basis for the summaries below.

The interview and survey data suggest that the implementation of Tech Prep has resulted in secondary institutional outcomes in all of these areas. In general, the data suggest higher levels of implementation and institutional change in Calvert and St. Mary's Counties where the program has been implemented since 1991-92, than in Charles County which started a year later. The data also consistently indicate that technical/vocational teachers are more aware of Tech Prep and its institutional effects than are academic teachers. Finally, counselors, probably because of their significant role in planning and promoting Tech Prep, also were more likely to have seen institutional changes as a result of Tech Prep. The community college is still preparing for the arrival of four-year Tech Prep completers, and consequently, it is somewhat premature to expect significant institutional change there. The findings, primarily from the secondary schools, are summarized below for institutional outcomes in six areas.

Staff Development

Staff Development Activities. In all three school districts, the majority of teachers responding to the survey had participated in some staff development activities on Tech Prep-related topics. However, the most common topic of such staff development was general information about Tech Prep, rather than specific training on strategies or methods critical to program implementation. And teachers from Calvert and St. Mary's Counties, technical teachers, and counselors were more likely to have received in-service training on Tech Prep-related topics than were teachers in general.

Changes in Staff Development. Teachers and counselors were asked if they had seen any changes in staff development activities in the last three years. Across all three school districts, 42 percent of the teachers responding to the survey indicated that they had seen some increases in staff development activities, either in frequency, relevance, or opportunities to attend conferences. Higher percentages of Calvert County teachers, technical teachers, and counselors reported some change in their staff development activities than did teachers in general.

Curriculum

Teachers were asked whether they had seen any changes in the curriculum in their subject area. Across the three districts, 70 percent of the teachers responding to the survey reported some change in the curriculum, most frequently citing the curriculum restructuring around career pathways or clusters. Charles County teachers reported seeing the integration of academic content across disciplines more frequently than did teachers from the other districts. Teachers from Calvert and St. Mary's Counties indicated curriculum restructuring more frequently than did Charles County teachers. Technical teachers and counselors more frequently reported curriculum change than did academic teachers and teachers in general. However, teacher responses were restricted to curriculum changes in their own subject area.

Counseling/Advisement

Data from both the interviews and surveys suggest that Tech Prep has had a significant impact on counseling activities at the secondary level. First, the implementation of Tech Prep includes career education for eighth grade students and the development of a individualized four-year plans with each ninth grade student. In addition, a majority of counselors in each district have provided students with vocational counseling and evaluation; worked with teachers to integrate career development activities into instruction; conducted informational sessions for parents and students about Tech Prep; and promoted awareness of various Tech Prep components, such as the career and technology centers and programs available at the community college. Advisement methods at the community college are just beginning to change in anticipation of four-year Tech Prep completers enrolling in Fall 1995.

Teaching Strategies and Methods

With the implementation of Tech Prep, program planners had expected to see utilization of various instructional methods advocated by Tech Prep. The survey asked teachers which of several different teaching strategies they had used during the past year. Across the three school districts, responding teachers most frequently indicated use of several strategies which have been advocated by Tech Prep, as well as other educational reform movements: hands-on learning opportunities (70 percent), cooperative learning techniques (70 percent), and variation in teaching to meet diverse learning styles (70 percent). Use of strategies specific to Tech Prep was also common but less frequently reported—for example:

- Fifty-eight (58) percent of teachers said they had used instruction relevant to the world of work;

- Thirty-nine (39) percent reported integration of career development activities into instruction;

- Thirty-six (36) percent reported integration of academic and vocational/technical course content; and

- Twenty-three (23) percent said they had used applied academic curricula.

There were few significant differences among the school districts. However, technical teachers were consistently and significantly more likely to report usage of the instructional strategies listed on the survey than were academic teachers.

Collaborative Instructional Activities

In order to effectively implement Tech Prep, teachers need to work with other professionals--their secondary colleagues as well as community college faculty and the business community. Teachers were asked which of several collaborative instructional activities they had personally participated in during the year. Roughly half of the teachers responding to the survey had participated in at least one of the collaborative instructional activities listed, most frequently contact with a business or industry representative (30 percent). There were few differences among the counties, with Charles County teachers most likely to have participated in at least one collaborative instructional activity, and more frequently having contact with the community college, than teachers from Calvert and St. Mary's Counties. However, technical teachers (82 percent) were significantly more likely to report participation in collaborative instructional activities than were their academic counterparts (39 percent). Especially relevant to Tech Prep are results for collaborative activities involving technical and academic teachers, where a much higher percentage of technical teachers are participating than are academic teachers.

Staff Attitudes

The survey also included several items designed to tap staff attitudes toward Tech Prep. Among teachers, attitudes toward Tech Prep were generally very positive. From a list of 12 items, a majority of teachers across the three school districts expressed positive attitudes on all but two items (see Exhibits E-17 through E-19 in Appendix E). In summary, 77 percent of the responding teachers support continuation of the Tech Prep program. These positive attitudes were generally consistent across all three districts. But technical teachers and counselors were more likely to indicate positive responses to attitudinal items than were academic teachers and teachers in general.

F. Student Data Outcomes

In order to determine what student outcomes have been achieved by Tech Prep thus far, the evaluation relied most heavily on extant data available from the secondary schools and the community college. The timing of this evaluation did not permit a full evaluation of student outcomes for the 4 + 2 model. The first class to complete a full four years of Tech Prep in high school will not graduate until June 1995. Therefore, this preliminary examination of student outcomes focused on the more common 2 + 2 Tech Prep model.

Secondary Student Data Trends

To begin studying the high school effects of Tech Prep, student data trends from before the implementation of Tech Prep through the 1993-94 and 1994-95 school years were examined. Secondary student indicators of program implementation and impact included:

- Tech Prep pathway and course enrollment;
- Enrollment in advanced level courses;
- Attendance and dropout rates;
- Program completion rates;

- Performance on the Maryland Functional and the Scholastic Aptitude Tests: and

- Documented post-secondary decisions.

In addition, staff were asked about their perceptions of changes in student attitudes as a result of Tech Prep.

Tech Prep Pathway and Course Enrollment. With the advent of Tech Prep, the consortium anticipated that program and course enrollment patterns would change, especially in programs and courses related to Tech Prep. First, they expected to find enrollment increases in programs that had previously existed but that should receive renewed interest from students as a result of Tech Prep:

- Career programs articulated with the community college;

- Career and technology programs not articulated with the community college; and

- Enrollment in the career and technology centers.

Trends in the above-listed areas of program enrollment were examined from before the implementation of Tech Prep (1989-90 school year) through the 1994-95 school year (where available). The data indicate that student outcomes are generally moving in the expected directions, especially in Calvert and St. Mary's Counties.

Another obvious area for change is student enrollment in those areas where new courses or programs have been created, at least in part as a result of Tech Prep implementation:

- Tech Prep clusters or pathways;

- Technology education courses;

- Technology exploration courses; and

- Applied courses.

Unfortunately, the enrollment data provided in these areas was somewhat incomplete. However, most of the available data do suggest that student course enrollments are moving in the expected directions.

Enrollment in Advanced-level Courses. The consortium school districts had also hoped that Tech Prep would increase enrollments in **advanced level academic courses**, especially in science and mathematics. The percentage of students enrolled in college prep (CP) or advanced placement (AP) courses for English, Social Studies, Mathematics, Science and Foreign Languages were examined in each district. For the two counties with data available for this indicator (Calvert and St. Mary's), there have been increases in the percentage of students enrolled in advanced academic level courses since 1989-90 and 1990-91, with the greatest improvement in mathematics.

Attendance and Dropout Rates. Another consortium goal in its implementation of Tech Prep was to increase student participation in school, as indicated by daily student attendance rates and dropout rates. It was hoped that by making the school experience more meaningful for all students, students would attend school more regularly and not drop out. However, school attendance among secondary students is obviously subject to the influence of many factors and also one focus of the ongoing Maryland School Performance Program (MSPP). Of the three counties, only St. Mary's data indicate changes in the desired directions: modest increases in daily attendance rates and a decrease in the dropout rate since 1989-90.

Program Completion Rates. With the implementation of Tech Prep, the school districts expected that restructuring the curriculum around career clusters would increase the high school program completion rates, particularly for students meeting the occupational program requirements. Second and less directly, they thought that improving the academic rigor of courses for all students would increase the number of students meeting university entrance requirements.

Trends in high school program completion rates have been inconsistent and difficult to interpret in all three school districts. Calvert and St. Mary' County data indicate increases in the percentage of students meeting occupational program requirements, but recent decreases for students meeting university entrance requirements. The Charles County data were difficult to interpret because of dramatic fluctuations in the percentage of students meeting occupational program requirements since 1990-91.

Maryland Functional and Scholastic Aptitude Test Performance. Program developers also hoped that by improving the academic rigor of courses for all students with Tech Prep implementation, they might see

increases in student pass rates on the Maryland Functional Tests, and possibly student scores on the Scholastic Aptitude Tests (SAT).

The percentage of students passing the MFTs in grades 9 and 11 has steadily increased from 1989-90 to 1993-94 in all areas, especially in mathematics, writing, and citizenship. The largest increases have occurred among first time test-takers in grade 9 when the impact of Tech Prep on academic performance should be negligible, other than any "trickle down" effect in making the middle school curriculum more rigorous. By grade 11, virtually all students have already attained these basic competencies so increases since 1990-91 have been small, as all three districts approach 100 percent passing rates in all areas.

It is difficult to judge the impact that Tech Prep should have on student performance on the SATs since the pool of students taking the tests from year to year is a strong factor in county-wide performance. Of the two counties able to provide data in this area, only St. Mary's SAT scores have shown any increases since 1990-91 (roughly 20 points in mathematics).

Post-Secondary Decisions. Ultimately, the goal of Tech Prep is to better prepare students for post-secondary education or the world of work after they finish high school. It is not possible to fully examine student outcomes in this area until students who have completed the full four-year Tech Prep sequence have entered post-secondary education or the labor force. Trends in documented post-secondary decisions among high school graduates from the MSPP data were examined for 1992 through 1994 graduates. These data are based on annual exit surveys of all graduating seniors.

For those post-secondary decisions most likely to be affected by Tech Prep, the trends were slight and inconsistent in all three counties, with relatively low percentages of vocational respondents pursuing the following post-secondary options:

- Attend two-year colleges after high school (13 to 23 percent);
- Enter employment related to their high school programs (4 to 11 percent); and
- Pursue specialized training after high school (3 to 5 percent).

Student Attitude Change. The developers of Tech Prep also expect changes in student attitudes towards their schooling. Staff commented that it

was probably too early to assess student attitude change and impossible to attribute any changes specifically to Tech Prep. However, several staff mentioned some changes in student attitudes and behavior, primarily that students appear more goal-oriented, more focused on their courses, and more aware of post-secondary education and career options. Survey responses also suggest that there has been some change in student attitudes thus far, with a higher percentage of counselors than teachers perceiving change. Specifically, the data show that:

- Seventy-six (76) percent of responding counselors and 46 percent of responding teachers agreed that students are more focused on career goals; and

- Forty-eight (48) percent of counselors and 14 percent of teachers felt that students exhibit a more business-like, purposeful attitude.

Community College Student Data Trends

To begin examining trends in community college student outcomes, student data trends from 1992 through 1994 were examined. Community college indicators of program implementation and impact were examined in the areas of enrollment and retention, program and degree focus, and academic performance. These indicators were taken from the Maryland State High School Graduate System and Student Outcomes and Achievement Reports (SOAR), which are produced annually by the state. For this evaluation, trends were examined for all graduates from the tri-county area and for graduates of St. Mary's Public Schools, one of the districts which introduced Tech Prep in 1991-92 and consequently, has two-year Tech Prep completers who enrolled in the community college during the 1993-94 school year.

Enrollment and Retention. With the implementation of Tech Prep in the tri-county area, it is expected that the number of high school graduates enrolling at the community college will increase. Furthermore, with the focus of Tech Prep on students completing a two-year community college program, it is expected that a higher percentage of these recent high school graduates will enroll as full-time rather than part-time students and will attend continuously for the full two years. The data indicate that while the number of recent tri-county graduates enrolling in community college has decreased slightly, the percentage of students enrolling full-time and continuing into the spring

semester has increased from 1992 to 1994, particularly among St. Mary's County graduates where Tech Prep was first introduced in 1991-92.

Degree Sought and Program Focus. Students completing the 4 + 2 Tech Prep sequence should enter community college with the intention of completing a certificate program or an associate degree in a specific field. Consequently, with the implementation of Tech Prep, the composition of the community college student population should change somewhat, with the percentage of students seeking an associate degree or certificate increasing, and the percentage of students not seeking a degree or planning to transfer to a four-year IHE decreasing. The data provided on the type of degree sought do not indicate consistent trends over the last three years in the expected directions. However, based on student curriculum codes, it appears that the percentage of students seeking an associate degree has increased, and the percentage of students planning to transfer to four-year IHEs and those not seeking a degree has decreased. These three-year trends are more persuasive for recent graduates of St. Mary's County Public Schools than for students from all of the tri-county school districts.

Academic Performance. Students participating in Tech Prep are expected to be better prepared academically for community college work because of the emphasis on more academic rigor in their secondary courses. This should result in fewer community college students requiring remedial course work and possibly higher grades and a larger number of credit hours completed during the first year. Data on the percentage of students requiring remediation in math indicate that St. Mary's County 1994 graduates were better prepared in mathematics than their 1992 counterparts. This trend is encouraging since the most dramatic changes in St. Mary's secondary curriculum have occurred in mathematics. However, data for graduates from all tri-county schools and in English and reading do not suggest trends in the desired directions. St. Mary's County graduates also show increases in the mean number of credit hours earned and in their cumulative GPA during their first year of community college, while these trends are not evident in the tri-county data.

Recommendations for Future Data Collection

Continue Systemic Trends. This evaluation focused on systemic trends in student outcomes, by looking at the impact of Tech Prep on the outcomes of all students, and not just those students most directly affected by Tech Prep. For the most part, these aggregate data are readily available at both the secondary and community college levels, because of MSPP and the Maryland Higher Education Commission's reporting requirements (e.g. SOAR).

Consequently, it is recommended that the school districts and the community college continue to monitor the data trends examined in this report. Data systems staff in each county should be able to tabulate the basic enrollment data discussed above and the other indicators are available from MSPP and SOAR. In continuing to monitor these student trends, school districts should:

- Calculate trends as a percentage of enrollment, so that any changes will reflect new enrollment patterns rather than fluctuations in the total number of students;
- Examine trends by grade level where appropriate (e.g., enrollments for courses only offered in specific grades); and
- Focus on indicators of academic performance which are closest to Tech Prep program goals (e.g., enrollment in higher-level courses, and academic preparation for community college).

Target Tech Prep Students. Ideally, the data elements discussed in this report should be examined for those students most directly affected by Tech Prep, that is, students enrolled in the Tech Prep pathways and clusters. This would require that the cluster or pathway chosen by each student be included in the district's student database. This would permit the examination of student outcomes for different subgroups of students, and possibly the historical comparison of student outcomes for current Tech Prep students and former "general track" students. These efforts could be facilitated by the use computerized student databases that administrators and counselors can readily access, like the system currently being piloted in Calvert County.

Track Tech Prep Students. Once individual students can be flagged according to their Tech Prep experience, school districts should track the progress of these students through high school and after graduation. Student tracking could be facilitated by the use of unique identifying numbers for high school students that could be carried with them into post-secondary education, such as social security numbers. This individual student tracking could provide the community college with much needed information about the number of students they can expect to enroll who have taken articulated programs in high school or followed a particular Tech Prep cluster or pathway.

As these Tech Prep students enroll in community college, they should continue to be tracked on the indicators discussed in this report—enrollment

and retention; program and degree focus; and academic performance. Finally, the data elements provided to the Maryland Higher Education Commission include the additional indicators which would be useful in assessing student's academic preparation for community college work (i.e., developmental course placement, level of first mathematics and English courses taken and grade).

Track Longer-term Outcomes. Ultimately, Tech Prep hopes to achieve better employment outcomes for students, by preparing them well for the higher-tech jobs of the present and the future. Consequently, Tech Prep graduates should be tracked after high school, into college and into employment. Longer-term outcomes include continuing higher education, obtaining employment, completing a higher education program, retaining employment in a high-skilled job, employer satisfaction, and improved work performance of graduates. However, once students leave school, it becomes much more difficult to track their outcomes without their cooperation. One possibility is to work through local businesses and industry to retrospectively examine the outcomes of students who were Tech Prep completers. Another option is to conduct a more intensive follow-up of a sample of Tech Prep completers and then maintain contact with these students for a period of five to ten years after graduation.

Preface

The Southern Maryland Educational Consortium (SMEC), comprised of three local school districts (Calvert, Charles, and St. Mary's Counties) and the Charles County Community College, was established in 1989 in response to requests from local area businesses for a more highly-skilled, technological proficient high school and community college graduate. Through the implementation of Tech Prep, SMEC sought to eliminate the "general track" from the high school curriculum, and create district pathways for all students from high school to work and/or higher education.

SMEC contracted with COSMOS Corporation to conduct an evaluation of their Tech Prep program through the 1993-94 school year. The evaluation objectives were to answer the following study questions: 1) What different strategies are being used by the three school districts and the community college to implement Tech Prep; 2) What institutional outcomes have resulted from the implementation of Tech Prep; and 3) What student outcomes have been achieved by Tech Prep? An additional evaluation goals was to develop a plan for data collection and analysis to be used by SMEC upon the full implementation of Tech Prep. This final report presents the evaluation findings and recommendations for SMEC's Tech Prep program through the 1993-94 school year.

The COSMOS study team recognizes that the evaluation would not have been possible without the cooperation and support of numerous individuals in the Calvert, Charles, and St. Mary's County school districts, and the Charles County Community College. We are grateful for the assistance provided by Andrea Smith, Dean of Career and Technical Education, Charles County Community College, and Mary Byrski, Tech Prep Project Director. Special thanks also are given to the administrators, principals, teachers, and counselors in the target schools who agreed to be interviewed and completed surveys.

The members of the COSMOS team who conducted this study are: Judith A. Alamprese, Senior Project Director; Suzanne M. Raber, Project Director; and Suzanne R. Merchlinsky, Research Associate. Finally, while we are thankful for the assistance provided by others, the authors alone are responsible for the contents of this report.

Contents

	Page
Executive Summary	ii
A. Background	ii
B. Study Objectives	ii
C. Methods and Data Sources	iii
D. Implementation Strategies	iv
Counseling and Advisement	iv
Pathways and Career Clusters	v
Integration of Technical and Academic Content	vi
Curriculum Articulation	vii
Facilitators, Barriers, Support, and Other Programs	vii
E. Institutional Outcomes	ix
Staff Development	x
Curriculum	xi
Counseling/Advisement	xi
Teaching Strategies and Methods	xi
Collaborative Instructional Activities	xii
Staff Attitudes	xii
F. Student Data Outcomes	xiii
Secondary Student Data Trends	xiii
Community College Student Data Trends	xvii
Recommendations for Future Data Collection	xviii
Preface	xxi
Section	
I. Study Overview	1
A. Background	1
B. Study Objectives	1
C. Methods and Data Sources	2
Staff Interviews	5
Staff Surveys	5
Classroom Observations	6
Student Outcome Data	6
D. Report Layout	7
II. Case Study #1: Calvert County Public Schools	8
A. Overview of Tech Prep Components	8
College Prep	8
Advanced Tech Prep	8
Occupational Tech Prep	9

Articulated Courses with Community College 10
Middle School Activities 10
Role of the Career Center 11
B. Implementation Strategies 12
Counseling 12
Pathways and Career Clusters 14
Integration of Technical and Academic Content into an Applied Curriculum 15
Articulated Programs 16
Facilitation of and Barriers to Implementation 17
C. Institutional Outcomes 19
Curriculum 19
Staff Development 20
Counseling Strategies and Methods 23
Instructional Strategies and Methods 24
Relationship with the Community College 26
Relationship with the Local Business Community 26
Staff Attitudes 27
Logistical Impacts 28
Other Programs Affecting Tech Prep Outcomes 29
D. Student Outcomes 30
Student Attitudes 30
Course Enrollment 31
Student Performance 37
Student Attendance 41
Post-Secondary Decisions 41

III. Case Study #2: Charles County Public Schools 44
A. Overview of Tech Prep Components 44
College Prep 44
Tech Prep 44
Occupational Prep 45
Articulated Courses with the Community College 45
Role of the Career and Technology Center (CTC) 45
B. Implementation Strategies 46
Counseling 46
Pathways and Career Clusters 48
Integration of Technical and Academic Content into an Applied Curriculum 48
Articulated Programs 50
Facilitation of and Barriers to Implementation 50
C. Institutional Outcomes 52
Curriculum 53
Staff Development 54

Counseling Strategies and Methods 56
Instructional Strategies and Methods 57
Relationship with the Community College 59
Relationship with the Local Business Community 60
Staff Attitudes 61
Logistical Impacts 63
Other Programs Affecting Tech Prep Outcomes 63
D. Student Outcomes 63
Student Attitudes 64
Program and Course Enrollment 65
Student Performance 69
Student Attendance 73
Post-Secondary Decisions 73

IV. Case Study #3: St. Mary's County Public Schools 76
A. Overview of Tech Prep and Its Components 76
Applied Business/Management Technologies 77
Applied Engineering/Mechanical Technologies 77
Applied Health/Human Service Technologies 78
Four-Year College/University 78
Articulated Courses with Community College 79
Role of St. Mary's County Technical Center 79
B. Implementation Strategies 80
Counseling 81
Career Clusters 83
Integration of Technical and Academic Content into an Applied Curriculum 84
Articulated Programs 86
Facilitation of and Barriers to Implementation 87
C. Institutional Outcomes 90
Curriculum 91
Staff Development 93
Counseling Strategies and Methods 95
Instructional Strategies and Methods 98
Relationship with the Community College 100
Relationship with the Local Business Community 101
Staff Attitudes 102
Logistical Impacts 104
Other Programs Affecting Tech Prep Outcomes 104
D. Student Outcomes 106
Student Attitudes 106
Program and Course Enrollment 107
Student Performance 113

Student Attendance 117
Post-Secondary Decisions 117

V. Charles County Community College 120
A. Overview of Tech Prep at the Community College 120
B. Implementation Process and Status 121
Articulated Programs/Courses 122
Advisement 123
Curriculum and Instructional Methods 123
Work-Based Learning Opportunities 124
Facilitation of and Barriers to Implementation 124
Major Challenges and Suggestions 126
C. Institutional Outcomes 127
Curriculum 127
Staff Development 129
Advisement Strategies and Methods 131
Instructional Strategies and Methods 132
Relationship with the Local Public School Systems 133
Staff Attitudes 134
Other Programs Affecting Tech Prep Outcomes 134
D. Student Outcomes 135
Student Attitudes 136
Student Data Trends 137

VI. Overview of Secondary Survey Results 142
A. Purpose, Topics, and Reporting 142
B. Sample and Distribution 143
C. Analysis of Results by Subgroups 143
School Districts 143
Teacher Types 143
Staff Roles 144
D. Summary of Results 144
Involvement in Implementation 145
Institutional Outcomes and Implementation Status 145
Staff Attitudes 148

VII. Overview of Student Outcomes and Future Data Collection 149
A. Background 149
B. Summary of Secondary Student Data Trends 150
Program and Course Enrollment 150
Student Performance 152
Student Attendance 153
Post-Secondary Decisions 153

C. Summary of Community College Student Data Trends 154
Enrollment and Retention 155
Degree and Program Focus 155
Academic Performance 155
D. Future Data Collection 156
Continue Systemic Trends 156
Target Tech Prep Students 157
Track Tech Prep Students 157
Track Longer-Term Outcomes 158

Exhibits

I-1 Southern Maryland Educational Consortium Evaluation Plan for Tech Prep 3
I-2 Sampling for Secondary Schools Staff Interviews and Surveys 4
II-1 Calvert County Public Schools Course and Program Enrollments 1990-91 through 1994-95 33
II-2 Calvert High School Course and Program Enrollments 1990-91 through 1994-95 34
II-3 Northern High School Course and Program Enrollments 1990-91 through 1994-95 35
II-4 Calvert County Public Schools Student Performance and Participation Data 1990-91 through 1993-94 38
II-5 Calvert County Public Schools Maryland Functional Test and SAT Performance 1990-91 through 1993-94 39
II-6 Calvert County Public Schools Post-Secondary Documented Decisions Classes of 1992 through 1994 42
III-1 Charles County Public Schools Career and Technology Program and Center Enrollment 1989-90 through 1993-94 66
III-2 Charles County Public Schools Tech Prep Course and Pathway Enrollments 1992-93 through 1994-95 68
III-3 Charles County Public Schools Student Performance and Participation Data 1989 through 1993-94 71
III-4 Charles County Public Schools Maryland Functional Test Performance 1989-90 through 1993-94 72
III-5 Charles County Public Schools Post-Secondary Documented Decisions Class of 1992 through 1994 74
IV-1 St. Mary's County Public Schools Career and Technology Program, Course, and Center Enrollments 1989-90 through 1994-95 109
IV-2 St. Mary's County Public Schools Tech Prep Cluster and Course Enrollments 1993-94 through 1994-95 111

IV-3 St. Mary's County Public Schools Course Enrollments 1989-90 through 1994-95 112
IV-4 St. Mary's County Public Schools Student Performance and Participation Data 1989-90 through 1993-94 114
IV-5 St. Mary's County Public Schools Maryland Functional Test MFT and SAT Performance 1989-90 through 1993-94 115
IV-6 St. Mary's County Public Schools Post-Secondary Documented Decisions Classes of 1992 through 1994 118
V-1 Charles County Community College Data on Potential Tech Prep Student Outcome Indicators for Tri-County High School Graduates, 1992-1994 138
V-2 Charles County Community College Data on Potential Tech Prep Student Outcome Indicators for St. Mary's County High School Graduates, 1992-1994 139

Appendices

A. Interview Protocols A-1
B. Teacher and Counselor Surveys B-1
C. Response Rates C-1
D. Observation Form D-1
E. Survey Data Tables E-1

I. STUDY OVERVIEW

A. Background

The Southern Maryland Educational Consortium (SMEC) was formed in 1989, in response to requests from local area businesses for a more highly-skilled, technologically proficient high school and community college graduate. SMEC developed and implemented a Tech Prep program in three local school districts (Calvert, Charles, and St. Mary's Counties), and at the Charles County Community College. This Tech Prep program seeks to transform the high school experience for students in the middle majority by creating a clear pathway from school to work and/or higher education. Tech Prep has been implemented through a collaboration among the school systems, the community college, and the business communities in these three counties. The project has been supported with federal, state, and local funds, including a model demonstration grant from the U.S. Department of Education which required that an evaluation be conducted.

The Tech Prep model developed by SMEC is a 4 + 2 model. Ninth grade students develop career plans, and then follow career pathways in one of three technologies: health and human services, electronics and engineering, or business. Each pathway provides courses throughout high school and links with articulated programs at the community college. This is a more extensive model than the 2 + 2 model generally referenced as Tech Prep. This model program was first implemented in Calvert and St. Mary's Counties in 1991-92, and during the following school year in Charles County.

B. Study Objectives

SMEC contracted with COSMOS Corporation, a social science research firm located in Bethesda, Maryland, to conduct a preliminary evaluation of their program efforts through the 1993-94 school year. The objectives of the evaluation were to address three study questions:

- What different strategies are being used by the three school districts and the community college to implement Tech Prep;

- What institutional outcomes have resulted from the implementation of Tech Prep in these school districts and the community college; and

- What student outcomes have been achieved by Tech Prep?

C. Methods and Data Sources

The evaluation design involved case studies of each of the three participating school districts and the community college. The case studies included a variety of data collection methods in each district and the community college:

- Interviews with a sample of high school and community college staff;

- Surveys of all teachers and counselors in the sample secondary schools;

- Observations of selected Tech Prep classes;

- Reviews of key school system and community college documents (e.g., programs of study, articulation agreements); and

- Analysis of extant student outcome data from school system, community college, and state reports, records and databases.

The study questions and their corresponding data sources are illustrated in Exhibit I-1. Exhibit I-2 presents the secondary interview and survey samples. More specific information regarding the questions asked and the sample is provided below.

Exhibit I-1

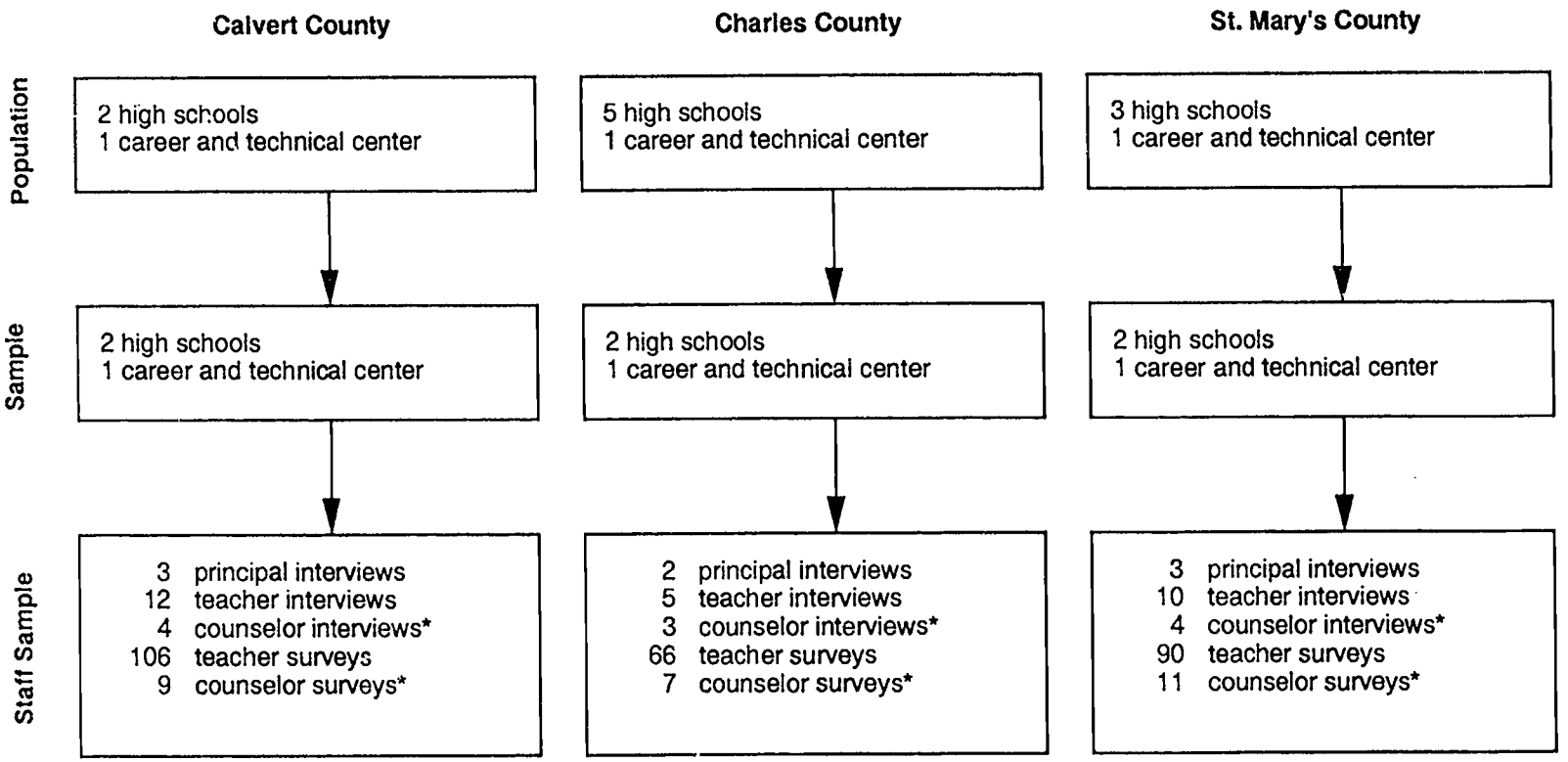
SOUTHERN MARYLAND EDUCATIONAL CONSORTIUM
EVALUATION PLAN FOR TECH PREP

Study Questions and Data Sources

STUDY QUESTIONS	DATA SOURCES
(1) What different strategies are being used by the 3 school systems and the community college to implement Tech Prep?	Document review Staff interviews Teacher and counselor surveys Classroom observations
(2) What institutional outcomes have been achieved by Tech Prep in the 3 school systems and the community college?	Document review Staff interviews Teacher and counselor surveys
(3) What student outcomes have been achieved by Tech Prep?	High school student outcome data Community college student outcome data Staff interviews Teacher and counselor surveys

Exhibit I-2

SAMPLING FOR SECONDARY SCHOOLS STAFF INTERVIEWS AND SURVEYS



* Includes middle school counselors

Staff Interviews

In-depth interviews were conducted with selected staff, most of whom had been involved in the planning and implementation of Tech Prep:

- Central office administrators in each district;
- Principals, and selected teachers and counselors from the three (3) career and technical centers and five (5) of the high schools[1];
- Middle school counselors from the feeder schools; and
- Administrators, faculty, and advisors at the community college.

These interviews covered a wide range of implementation, institutional impact, and student outcome issues. The interview protocols appear in Appendix A.

Staff Surveys

To get a broader-based picture of program implementation and institutional outcomes, secondary school staff were also asked to complete a survey in June 1994. Specifically, surveys were administered to all teachers and counselors in the sample schools: the three (3) career and technical centers and the six (6) high schools. In addition, middle school counselors in the feeder schools were surveyed. Survey topics included:

- Staff involvement in the planning and implementation of Tech Prep:
- Staff development activities;
- Changes in curriculum;
- Teaching strategies and methods;

[1]The interview sample originally included six (6) high schools (2 from each county), but one high school in Charles County did not participate.

- Career development activities;
- Tech Prep promotion activities;
- Collaborative instructional activities;
- Support to implement Tech Prep; and
- Staff attitudes toward Tech Prep.

Copies of the teacher and counselor surveys can be found in Appendix B. Surveys were returned by 262 teachers and 27 counselors, representing 55 percent of the surveys distributed. Response rates for teachers and counselors are presented for each school district in Appendix C.

Classroom Observations

To get a richer understanding of what the Tech Prep experience is for students, Tech Prep classes were observed, that is courses that had been developed either nationally or locally as part of Tech Prep. Specifically, any Tech Prep instructional strategies observed in these classes were noted. The observation form appears in Appendix D.

Student Outcome Data

The timing of this evaluation did not permit a full evaluation of student outcomes for the 4 + 2 model. The first class to complete a full four years of Tech Prep in high school will not graduate until June 1995. Therefore, this preliminary examination of student outcomes focused on the more common 2 + 2 Tech Prep model. To begin studying the high school effects of Tech Prep, student data trends from before the implementation of Tech Prep through the 1993-94 and 1994-95 school years were examined. Secondary student indicators of program implementation and impact included:

- Tech Prep pathway, cluster, and course enrollments;
- Advanced placement and college prep course enrollment;
- Attendance and dropout rates;

- Program completion rates;
- Performance on the Maryland Functional and the Scholastic Aptitude Tests: and
- Documented post-secondary decisions.

Many of these secondary student indicators are reported annually as part of the Maryland School Performance Report.

To begin examining trends in community college student outcomes, student data trends from 1992 through 1994 were examined. Community college indicators of program implementation and impact were examined in the areas of enrollment and retention, program and degree focus, and academic performance. These indicators were taken from the Maryland State High School Graduate System and Student Outcomes and Achievement Reports, which are produced annually by the Maryland Higher Education Commission.

D. Report Layout

The Executive Summary presents a brief overview of the study design, case study findings, staff survey results, student data trends, and recommendations for future data collection. Chapters 2 through 4 present detailed case study reports for each of the three school districts (Calvert, Charles, and St. Mary's). Chapter 5 reports the findings of the community college case study. Each case study presents data which address the three study questions regarding implementation strategies, institutional outcomes, and student outcomes. Chapter 6 summarizes the staff survey results across the three counties, while the detailed results are presented in Appendix E. Student data trends and recommendations for future data collection are presented in Chapter 7. The report appendices include copies of the data collection instruments and survey tables.

II. CASE STUDY #1: CALVERT COUNTY PUBLIC SCHOOLS

A. Overview of Tech Prep Components

The Calvert County Tech Prep model includes three career pathways: College Prep, Advanced Tech Prep, and Occupational Tech Prep. Articulation agreements with Charles County Community College allow all students to earn college credits for classes successfully completed in high school. In addition, the middle school component prepares students for Tech Prep before they come to high school. Each component is discussed briefly below.

College Prep

The College Prep pathway employs a four-plus-four program to prepare students for entry into a 4-year college or university, resulting in a bachelor's degree. The program is designed to meet Maryland's state graduation requirements, and the entrance requirements for the University of Maryland System. Additionally, secondary counselors and teachers are able to advise students who may choose a 4-year institution outside of the University of Maryland System.

College Prep students are encouraged to enroll in honors and advanced placement (AP) level courses whenever possible. The course of study includes classes required for admission to Maryland state colleges and universities, such as: biology and at least two additional lab sciences; Algebra I and II, and Geometry; Civics, U.S. History, and World History; and two years of the same foreign language. In addition, College Prep students are encouraged to take electives in computer science or computer literacy.

Advanced Tech Prep

The Advanced Tech Prep pathway prepares students to continue their education at the Charles County Community College. The four-plus-two curriculum (four years of high school and two years of community college or technical school) provides students with a highly structured program of studies over a six-year period. Advanced Tech Prep students may choose a program of study from three career clusters: business technology, engineering technology, or health and human services. Each cluster contains multiple specializations, including:

Business Technology:
- Accounting;
- Graphic Arts;
- Paralegal Studies; and
- Secretarial.

Engineering Technology:
- Computer Assisted Drafting;
- Computer Programming;
- Electronics; and
- Principles of Technology.

Health and Human Services:
- Child Care;
- Food Production and Management;
- Medical Assisting; and
- Pre-Nursing.

Advanced Tech Prep programs of study are characterized by the integration of academic and technical content, and practical work place applications.

Some Advanced Tech Prep students may choose to enter a four-year college or university, either after completing a community college program or immediately upon high school graduation. Therefore, students are encouraged to include rigorous academic courses in their program of study.

Occupational Tech Prep

Occupational Tech Prep students are prepared to enter the work force as an entry-level technician in their specialty area, or to continue their education in a training school or apprenticeship program. Many Occupational Tech Prep students choose to enroll in a two or four-year institution. Therefore, all students are encouraged to develop strong academic skills and knowledge in their high school classes, especially in mathematics, science and English. Occupational Tech Prep classes are characterized by the integration of academic and technical content, problem solving, hands-on activities, and practical applications of course content.

Occupational Tech Prep students may choose from approximately 17 careers, including: air conditioning, plumbing, and heating; automotive mechanics; graphics; medical assisting; business education; fashion merchandising; and child care. Although the courses requiring specialized

equipment are offered only at the Career Center, most course work is offered at the students' home school.

Articulated Courses with Community College

The Calvert County public school system has negotiated articulation agreements with the Charles County Community College, to allow students to receive college credit for courses completed in high school. College credits are granted only for those courses accepted by the college program in which the student enrolls, and students must receive a grade of "B" or better for the high school credits to articulate.

Middle School Activities

Calvert County students begin planning for Tech Prep before they actually come to high school and choose a career pathway. In the eighth grade, social studies classes include a career education unit, which helps students to:

- Investigate their career interests and aptitudes;
- Identify their strengths and needs;
- Explore career opportunities;
- Practice job seeking and keeping skills; and
- Develop a 4-year high school plan of studies.

Specific activities in the career education unit include: taking the Differential Aptitude Test (DAT); visiting the Career Center; attending a career fair of local businesses; and hearing guest speakers from a variety of occupations.

In addition to activities in the career education unit, middle school counselors conduct various ongoing exercises to inform students and parents about Tech Prep's purpose, options, and procedures. Specific activities include:

- Informally talking to students about Tech Prep;

- Familiarizing students with the high school catalog and Tech Prep pathways guide;
- Assisting students in developing a 4-year plan and registering for high school classes;
- Allowing students to serve as aides in school positions, to introduce them to various occupations;
- Developing and disseminating posters and literature about Tech Prep to students, parents, and other community members; and
- Holding a parents' night with the Career Center counselors and teachers.

In addition to the counselor's role in informing students about Tech Prep, middle school teachers have been able to answer students' questions during regular classes as they become increasingly familiar with Tech Prep.

Role of the Career Center

Declining enrollment at the Career Center was one factor behind Calvert County's decision to implement Tech Prep. The Career Center houses the majority of the more traditional technical programs, such as carpentry, cosmetology, child care, electronics, and computer-assisted drafting. Although students may attend the Career Center for a portion of their day, they return to their "home school" for their academic classes.

Collaboration between the Career Center and home school staff is intended to:

- Facilitate the integration of technical and academic content in all classes;
- Familiarize teachers, students, and parents with the opportunities available at the Career Center; and
- Provide opportunities for teachers to coordinate lesson plans and teaching strategies.

The Career Center is located on the same campus as Calvert High school, and the two share a principal. Consequently, coordination with the Career Center has been easie to achieve for Calvert High School than Northern High School.

B. Implementation Strategies

In this section, the strategies used by Calvert County to implement Tech Prep are described for each of the program's major components:

- Counseling;
- Pathways and career clusters;
- Integration of technical and academic content into an applied curriculum; and
- Articulated programs.

In addition, factors which have facilitated the implementation of Tech Prep and barriers to its implementation are discussed.

Counseling

Secondary counselors have been included in the development and implementation of Tech Prep from its initial stages. For example, several counselors attended the initial presentation by a North Carolina school district on Tech Prep's goals, processes, and implementation issues. Counselors also have been primarily responsible for introducing Tech Prep to teachers, parents, students, and the local business community. Additionally, counselors have sought guidance from teachers, administrators, the district's curriculum council, and local business representatives to develop career pathways and clusters which meet the educational and employment needs of Calvert County students and employers. Because of counselors' early and comprehensive involvement in planning for Tech Prep, counseling appears to be one of the more fully implemented components of Tech Prep.

Activities. Although Tech Prep was originally designed to target students previously enrolled in the "general track", all students participate in the same counseling activities, including choosing a career pathway, and

developing a 4-year plan. During formal counseling sessions and registration, counselors encourage students to choose their classes based on long-term plans, rather than thinking in terms of individual classes. Counselors periodically make informational presentations to parents, and encourage them to participate in their children's education and career decisions. All counselors responding to the survey indicated they have conducted small group meetings for parents and students to develop 4-year plans. Counselors also are active in developing and disseminating informational brochures, videos, and posters, to familiarize students and teachers with Tech Prep terminology and options. Sixty-seven percent of counselors responding to the survey indicated developing bulletin boards or posters in school, and 33 percent have developed brochures or other literature for students and parents. Informally, counselors discuss Tech Prep pathways and options with students whenever possible. Finally, all counselors responding to the survey indicated having facilitated student visits to the Career Center.

Career Center. Counselors at the Career Center serve several special functions. The student counselor recruits 8th and 9th graders, hosts visits, and makes presentations to parents and students about the unique features of attending classes at the Career Center. Additionally, he works with home school teachers and counselors to familiarize them with the courses offered at the Career Center, to make them better able to advise students on appropriate pathway, cluster, and class selections.

The Career Center's Job Placement Coordinator (JPC) works with juniors and seniors to prepare them for job placement after graduation. Activities with seniors include:

- Writing their resume using the computer;
- Completing job applications;
- Developing interview skills; and
- Participating in interviews with potential employers.

The JPC recruits representatives from local businesses to talk to students about work ethics and job skills. and to conduct and critique interviews. Potential employers interview approximately 40 seniors per year for full-time jobs upon graduation, and several juniors for summer jobs and co-op opportunities. Every senior will have had approximately 1-3 interviews prior to graduation. The interviewer critiques each student interviewed, and the critique is shared with the student. Additionally, the JPC follows-up with

students after their interviews to assure that they respond appropriately to the potential employer (e.g., calling to accept or decline a job offer).

Advisor/Advisee Program. The Advisor/Advisee program is a recently implemented counseling component, designed to enable teachers to provide students with additional career and academic guidance. In this program, counselors train teachers in the Tech Prep model, including: graduation requirements, career pathways, completer requirements, articulated courses, and 4-year plans. Teachers then are able to advise students, taking on a role that historically has belonged to counselors. Approximately 70 percent of teachers responding to the survey stated that they had advised students on Tech Prep requirements and options.

Pathways and Career Clusters

The pathways and career clusters described in the Overview were developed with input from teachers, counselors, administrators, and local business representatives. The pathways and clusters were designed to fulfill requirements for current employment opportunities, prepare students for further education, and infuse rigorous academic content into traditionally technical courses. In general, staff recognize that the curriculum has been restructured around these pathways and clusters—all of the counselors responding to the survey reported this perception. However, this restructuring is not evident in all areas of the curriculum—only 43 percent of responding teachers reported restructuring around pathways and clusters in their subject area.

Although each student selects a particular pathway (i.e., College Prep, Advanced Tech Prep, or Occupational Prep), course choices and other services are the same for all students. Most classes have a mixture of students from all pathways. For example, Advanced Tech Prep students are encouraged to take classes preparing them for college admission. The Advanced Tech Prep pathway is designed to prepare students for further education and managerial positions, while Occupational Prep prepares students to be assistants in their chosen specialty area. For example, and Advanced Tech Prep student may become a child care center manager, while an Occupational Prep student may become a child care aide. Regardless of pathway or cluster, all students are encouraged to enroll in rigorous academic courses which will allow them the option to continue their education beyond high school.

Integration of Technical and Academic Content into an Applied Curriculum

A primary characteristic of Calvert County's Tech Prep program is the integration of technical and academic content. Interview respondents provided several examples of integrated technical and academic content, such as:

- English classes include assignments in technical writing;
- Cosmetology classes have increased mathematics and chemistry content;
- Mathematics textbooks are divided into career fields that show students how mathematics is used in the various fields; and
- Electronics classes include projects integrating mathematics, history, English, and electronics.

Additionally, curricula are being modified to accommodate the use of computers and other technology in all classes.

However, the survey data again indicate that the integration of academic and technical content may not be evident in all curricular areas. A higher percentage of counselors, reflecting on the entire curriculum, reported integration than teachers, who only reported in their subject area:

- Sixteen (16) percent of teachers reported using applied academic curricula;
- Fourteen (14) percent of teachers reported providing instruction in advanced technical skills;
- Only 5 percent of responding teachers reported team teaching with academic and vocational teachers; and

Calvert County also has added courses to the curriculum which infuse practical applications into traditionally academic classes. New classes include:

Applied Algebra, Applied Geometry, Chemistry in the Community, Applied Physics, Applied Economics, Applied Communication, and Principles of Technology. These courses are designed to include and empower students in academic areas where previously they were unsuccessful. The applied classes include more hands-on activities, and less theory than traditional classes in these disciplines. For example, students observed in an Applied Geometry class used calculators to apply trigonometry ratios to triangles. Students in an Applied Algebra class used scaled drawings to learn how algebra is used in making maps, and viewed a video showing how computers are used to draw maps from photographs. Applied classes in mathematics and science also use more laboratory experiences, problem solving, and hands-on activities.

Curricula for the new applied courses have been developed primarily from commercial packages (i.e. CORD mathematics, and Chemistry in the Community). Over the summer, lead teachers were sent to training workshops to learn how to implement the curricula and worked with their counterparts at the county's other high school to develop a curriculum appropriate to their needs.

Articulated Programs

With the implementation of Tech Prep, Calvert County has increased the number of classes articulated with Charles County Community College. Calvert County also has a tentative commitment for articulation with Ann Arundel Community College and Montgomery College, and is working with the University of Maryland. Currently, students may receive college credit for the following high school courses:

- Electronics I, II, and III;
- Keyboarding/Formatting;
- Office Technology and Communication;
- Personal Keyboarding and Computer Skills;
- Speedwriting;
- Computer Technology I and II;
- Accounting II/Computerized Accounting;

- Computer Programming and Operations I and II;
- Pre-Nursing II or Geriatric Aide II;
- Child Care I and II; and
- Drafting I.

This articulation process is widely recognized by the counseling staff as a change in the curriculum, but only evident to teachers in the articulated fields:

- Nearly all counselors responding to the survey (89 percent) reported the articulation of the secondary curriculum with the community college curriculum as a curriculum change; but
- Only 18 percent of responding teachers reported articulated classes in their subject area.

Facilitation of and Barriers to Implementation

Interview respondents were asked to describe facilitators and barriers to the implementation of Tech Prep. Many of the factors mentioned (both facilitators and barriers) were attitudinal in nature, such as: willingness or resistance to change. Each set of factors is described below.

Facilitators. Respondents felt generally that careful planning and county-wide cooperation were essential to the successful implementation of Tech Prep. Specifically, they cited the following factors as facilitators to implementation:

- Cooperation and commitment of superintendent, teachers, counselors, principals, and community members;
- Needs assessment and analysis of Tech Prep's merits prior to implementation; and
- Willingness of Curriculum Council to undertake changes.

Other factors cited specific Tech Prep program components as facilitators to implementation:

- Articulation with the community college;
- Advisor/Advisee program;
- Strong link with the Career Center; and
- Availability of summer courses for teachers.

Finally, some respondents mentioned circumstantial factors such as national trends, funding, and the county's size as facilitators:

- National emphasis on school-to-work transition;
- Grant money that allowed Calvert County to look at other Tech Prep models; and
- County's small size that makes it possible to implement major programs in a short period of time.

Barriers. In general, interview respondents felt that the major barriers to implementation resulted from lack of knowledge about Tech Prep, philosophical concerns, negative perceptions, use of resources, and logistical issues. Respondents indicated the following specific barriers:

- Students initial uncertainty of Tech Prep's goals, processes, and options;
- Parents' concern over children making career choices in 8th grade;
- Difficulty in changing community's negative attitude toward vocational education;
- Teachers' resistance to change;
- Lack of funds for staff development, materials, high tech equipment;

- Time spent on hosting visitors and dissemination that should be spent on program implementation; and
- Inconvenience for students traveling to the Career Center.

C. Institutional Outcomes

This section addresses the institutional outcomes that have resulted from the implementation of Tech Prep in the following areas:

- Curriculum;
- Staff development;
- Counseling strategies and methods;
- Instructional strategies and methods;
- Relationship with the community college;
- Relationship with the local business community;
- Staff attitudes;
- Logistical impacts; and
- Other programs affecting Tech Prep outcomes.

Curriculum

Changes to the curriculum resulting from the implementation of Tech Prep include:

- Addition of applied academic classes, such as Applied Algebra, Applied Geometry, and Chemistry in the Community;

- Integration of technical and academic content; and

- Modification of course content to meet the requirements for articulation with the community college.

Again, a higher percentage of counselors, commenting on the entire curriculum, reported changes to the curriculum than teachers reflecting only on their subject area. For example:

- All counselors, but only 43 percent of responding teachers, reported that the curriculum had been restructured around career pathways and clusters;

- Eighty-nine (89) percent of responding counselors and 26 percent of responding teachers reported seeing integration of technical and academic content;

- Eight-nine (89) percent of responding counselors, but 18 percent of responding teachers reported articulation of the high school curriculum with the community college curriculum; and

- No counselors, but 38 percent of responding teachers reported having seen no changes to the curriculum in their subject area.

Interview respondents also mentioned examples of the integration of course content across disciplines. However, many qualified their remarks by saying that those outcomes were not necessarily attributable to the implementation of Tech Prep. Many felt that those changes came about from changes in general educational philosophy.

Staff Development

Staff development for teachers, counselors, and administrators is crucial to the successful implementation of Tech Prep. Some interview respondents stated that current staff development activities are more student-focused, and

place a greater emphasis on teaching and learning strategies than those held prior to Tech Prep. Again, the survey data indicated that any changes in staff development are more apparent to counseling staff than to teachers:

Changes in Staff Development	% of Respondents	
	Counselors (N=9)	Teachers (N=106)
Staff development topics are more relevant to instruction.	56	21
Staff development activities have been held more frequently in the last 3 years.	44	26
There have been more opportunities to attend conferences and training institutes.	44	25
There have been no changes in staff development activities in the last 3 years.	22	40

Interview respondents named several staff development activities which have come about with the implementation of Tech Prep:

- Advisor/Advisee program;
- In-services given by counselors and administrators on Tech Prep completer requirements, goals, and implementation issues;
- Teacher workshops on integration of academic and technical content;
- Summer institutes for teachers to learn how to teach applied classes (e.g., Chemistry in the Community, Applied Algebra and Geometry);
- Teacher participation in curriculum development;

- Local businesses send employees to work with teachers on appropriate curriculum content for the work place; and

- Combined in-services with Career Center and high school teachers to increase communication and collaboration.

On the other hand, the survey data indicate that most staff have participated in staff development on general information about Tech Prep. Fewer have received in-service training on specific strategies for implementing Tech Prep in the classroom:

Staff Development Topics	% of Respondents	
	Counselors (N=9)	Teachers (N=106)
General information about Tech Prep	78	84
Integrating academic and vocational content	56	43
How mathematics, science, and/or communications competencies are applied in the work setting	22	20
Developing curricula and instruction to promote hands-on learning	N/A	18

Additionally, survey data indicated that some staff also have received in-service training in areas which are integral to Tech Prep, but not specific components of Tech Prep, such as:

Survey Item	% of Respondents	
	Counselors	Teachers
Recognizing and accommodating different learning styles	30	44
Using multiple teaching strategies	N/A	25
Methods for teaching diverse populations	N/A	17

Finally, only nine (9) percent of responding teachers, and no responding counselors, reported that they had not participated in any staff development activities on Tech Prep-related topics.

Counseling Strategies and Methods

The implementation of Tech Prep has had the greatest impact on Calvert County's counseling strategies and methods. The counseling staff have been heavily involved in planning, start-up, and implementation activities. For example:

Planning and Implementation Activities	% of Responding Counselors (N=9)
Helped to develop 4-year individual student plans	100
Worked with teachers to integrate career development activities into instruction	89
Attended local, state, or regional in-service workshops or training on Tech Prep	89
Served on a Tech Prep planning or steering committee	56
Helped develop Tech Prep curriculum pathways and clusters	67
Trained teachers to advise students on Tech Prep requirements and options	67

New counseling strategies and methods have been designed specifically to prepare students, teachers, and parents for the implementation of Tech Prep. Examples discussed in the interviews include:

- Development of a 4-year plan for each high school student;
- Implementation of a career education unit for 8th grade students;
- Conduct of informational sessions for students and parents regarding Tech Prep requirements and options;
- Development of promotional items, such as brochures, bulletin boards, and posters;
- Increased emphasis and promotion of courses available at the Career Center; and
- Introduction of a Job Placement Coordinator at the Career Center.

Instructional Strategies and Methods

In the interviews, teachers discussed changes in their instructional strategies and methods with the implementation of Tech Prep. The comments indicating the greatest changes came from teachers currently teaching applied academic courses, and those teaching the more traditional technical classes (e.g., electronics, cosmetology). Generally, both set of teachers described:

- Integration of technical and academic content in their classes;
- Collaboration with traditionally academic or traditionally technical teachers; and
- Use of examples and class assignments which involved work place applications of course content.

Teachers of technical classes stated that they had traditionally used work place applications as part of their classroom experience, but since the implementation of Tech Prep have collaborated with academic teachers to plan lessons and develop teaching strategies. Teachers of applied classes who were traditionally academic teachers, indicated that they currently use more hands-on activities, less theory-based learning, and application of course

content to work place examples. They also discussed increased collaboration with technical teachers.

The survey data suggest that not all of the instructional strategies emphasized by Tech Prep have been implemented by all teachers. Among teachers responding to the survey, the use of strategies advocated by a number of educational reform movements were most common. For example:

- Seventy (70) percent reported using cooperative learning techniques;
- Sixty-nine (69) percent reported using hands-on learning opportunities; and
- Sixty-seven (67) percent reported varying their teaching to meet diverse learning styles.

On the other hand, use of those strategies most closely associated with Tech Prep was less prevalent among responding teachers:

- Fifty-four (54) percent indicated using instruction relevant to the world of work;
- Thirty-five (35) percent integrated career development activities into instruction;
- Twenty-nine (29) percent of responding teachers indicated integrating academic and vocational course content; and
- Sixteen (16) percent used applied academic curricula.

Another desired result of Tech Prep is closer communication and cooperation among academic and vocational teachers. However, survey data indicate that this collaboration is not yet occurring on a regular basis among responding teachers:

- Twenty (20) percent reported participating in interdisciplinary planning and teaching;

- Nineteen (19) percent reported collaborating with academic and vocational teachers to develop course content;

- Seven (7) percent reported participating in joint planning time with academic and vocational teachers; and

- Fifty-four (54) percent reported that they had not participated in any of the listed collaborative instructional activities this year.

Relationship with the Community College

The greatest change brought about in the relationship between the district and Charles County Community College is the increased number of articulated courses. In order to develop these additional articulation agreements, school district and community college staff have increased collaboration and communication regarding high school and college course requirements and expectations. Additionally, some community college staff work with school district staff to develop high school curricula which will adequately prepare students for community college courses.

Relationship with the Local Business Community

The implementation of Tech Prep has resulted in increased availability of and enrollment in co-op placements for students with local businesses. Representatives from local businesses also have increased their involvement with the school district by:

- Reviewing curricula and providing guidance in developing appropriate career clusters;

- Conducting staff development for teachers;

- Interviewing and critiquing students to prepare them for seeking employment after high school.

Staff Attitudes

In the interviews, many staff indicated that their first impression of Tech Prep was less positive than their current impression. For example, some respondents initially felt that Tech Prep was another temporary educational "fad." However, once they were informed of Tech Prep's purposes and options and witnessed the strengths of the program, most staff felt that Tech Prep is beneficial to students. Representative of staff opinions about Tech Prep were that it:

- Meets the needs of all students;
- Provides alternatives and skills to students who do not go to college;
- Through applied classes, enables students to succeed in subject areas in which they felt they were incapable; and
- Forces students to plan for their future and focus their educational goals.

Although interviewees' attitudinal responses to Tech Prep were overwhelmingly positive, several indicated that they would reserve final judgement until the program is fully implemented and long-term student outcomes are documented.

The survey data also indicate that staff have positive attitudes toward Tech Prep, although there continue to be some differences in perceptions between counselors and teachers. The majority of staff felt that Tech Prep is beneficial for all students, but this attitude was more widely held among counselors than teachers. Specifically:

Attitude Item	% of Respondents	
	Counselors (N=9)	Teachers (N=106)
Tech Prep is beneficial for all students	78	64
Tech Prep is appropriate for college-bound students	89	52
Tech Prep is beneficial to the former general "track" students	89	84

Most responding counselors (78 percent) and teachers (83 percent) agreed that Tech Prep helps to orient students to current work place requirements. However, they differed in their perceptions of Tech Prep's additional benefits to students. Specifically:

- Eight-nine (89) percent of counselors and 53 percent of teachers agreed that Tech Prep has increased the academic rigor of courses for the former general "track" students; and

- Seventy-eight (78) percent of counselors and 62 percent of teachers felt that Tech Prep will effectively prepare students for post-secondary education and/or future employment.

Finally, a few of the staff responding to the surveys expressed negative attitudes toward Tech Prep:

- Eleven (11) percent of counselors and seven percent of teachers felt that Tech Prep is just another short-lived educational fad; and

- No counselors and five percent of teachers felt that Tech Prep has not changed vocational education.

Despite these few negative sentiments, most staff (78 percent of counselors and 75 percent of teachers) support the continuation of the Tech Prep program.

Logistical Impacts

During the interviews, high school and Career Center principals commented on a few logistical impacts of Tech Prep, particularly the school's master schedule and bus schedule. While not major obstacles to the implementation of Tech Prep, these logistical concerns must be considered as the program continues. Specific comments included:

- Increased enrollment at the Career Center has resulted in more students being bussed from one high school to the Career Center. Prior to Tech Prep, 4 buses travelled daily

between the Career Center and Northern High School. Now there are 11 buses daily;

- The number of classes taught at the Career Center has increased. Teachers therefore currently teach 3 2-period classes. Prior to Tech Prep, Career Center teachers taught 1 3-period class and 1 2-period class;

- The school schedule must be adjusted to meet work place start times for students in co-op placements; and

- The computer lab's schedule has been rearranged to accommodate maximum student use.

Other Programs Affecting Tech Prep Outcomes

Interview respondents were asked about additional programs which may affect Tech Prep's outcomes. Several respondents indicated that many of the Tech Prep students also are involved in the Vocational and Industrial Clubs of America (VICA). VICA holds competitions in which student teams design and implement projects across vocational content areas. Respondents stated that some VICA goals are similar to Tech Prep goals, including:

- Integrating academic and vocational content;

- Developing leadership and teamwork skills; and

- Increasing students' self-confidence.

Consequently, it would be impossible to attribute any outcomes among these students specifically to Tech Prep or VICA.

Additionally, some respondents indicated that state and county initiatives designed to improve student outcomes such as GPA and attendance may be responsible for any early indicators of Tech Prep's success. Specifically, respondents cited:

- Maryland School Performance Program (MSPP); and
- The county's attendance policy.

D. Student Outcomes

Tech Prep was introduced with several student outcome goals, in the areas of attitudes, course enrollment, academic performance, attendance, and post-secondary decisions. However, it is somewhat premature to ask what secondary student outcomes have been achieved with the implementation of Tech Prep. First, the program has not been fully implemented. It was first introduced in the 1991-92 school year, and consequently, the first students to complete the full four-year program will not graduate from high school until Spring 1995. Second, it is impossible to attribute any student outcomes specifically to the Tech Prep program for two reasons:

- The absence of any comparison group of similar students who have not had the Tech Prep experience; and
- The simultaneous existence of other national, state, county, or school-level programs attempting to achieve similar outcomes.

However, it is appropriate to begin examining staff perceptions of student attitude change, and trends over time which can indicate whether course enrollment, student performance, attendance, and post-secondary intentions are at least moving in the expected directions. If indicators of these outcomes suggest movement in the desired direction, administrators can be more comfortable that Tech Prep is working. On the other hand, if there is no indication of change, or change in undesired directions, now is the time to review and revise program efforts.

Student Attitudes

Staff perceptions of student attitudes were assessed in interviews with teachers, counselors, and administrators and in surveys of teachers and counselors. Overall, staff perceptions were that there has been a change in

student attitudes with the implementation of Tech Prep. Specific findings are discussed below.

Staff Interviews. Teachers, counselors, and administrators discussed their perceptions of student attitudinal changes which may be attributable to Tech Prep. Generally, respondents indicated that student attitudes, motivation, and focus had improved with the implementation of Tech Prep. For example, interviewees felt that students have shown:

- Increased efforts when working in groups or on lab activities;
- More evidence of relating academic content to activities and concepts in other classes;
- Increased self-confidence; and
- More active involvement in developing their career goals.

Staff Surveys. Surveys of teachers and counselors included two items about students attitude change since the implementation of Tech Prep. Survey responses indicated some positive changes in student attitudes, but this perception was again more widespread among counselors than teachers. Specifically, the data show that:

- Eighty-nine (89) percent of counselors and 46 percent of teachers agreed that students are more focused on career goals; and
- Forty-four (44) percent of counselors and 18 percent of teachers felt that students exhibit a more business-like, purposeful attitude.

Course Enrollment

With the advent of Tech Prep, the school system anticipated that course enrollment patterns would change. The most obvious places to look for change were in those areas where new courses or programs had been created as a result of Tech Prep implementation:

- Applied courses;

- Technology education and exploration courses; and

- Career and technology programs.

In addition, the school system had hoped that Tech Prep also would increase enrollments in advanced level academic courses, especially science and mathematics, and increase student enrollment at the previously under-utilized Career Center.

Exhibits II-1 through II-3 present the student data available which permit the examination of trends in course enrollment. Specifically, they present data from the year before the implementation of Tech Prep (1990-91 school year) through the 1994-95 school year in each high school and county-wide. The data presented and discussed below indicate that student outcomes are moving in the expected directions in all five course enrollment areas.

Applied Courses. With the introduction of several applied courses in the 1991-92, 1992-93, and 1993-94 school years, there has been a steady increase in the percentage of Calvert County students who enroll in these courses. Enrollment in applied courses increased from only 0.2 percent of all students (6 students) in 1990-91 to 9.8 percent (306 students) in 1993-94, and then decreased to 7.3 percent in 1994-95. This trend was evident at both high schools during this period of time, but more consistent at Calvert High School.

Technology Education and Exploration Courses. Calvert County introduced Fundamentals of Technology in 1990-91, Exploring Technology I in 1991-92, and Exploring Technology II in 1994-95. Enrollment trends in these first two courses indicate an increase since their introduction in the numbers of students participating in both high schools.

- Enrollments in Fundamentals of Technology have increased from 5.5 percent of all students (158 students) in 1991-92 when it was first offered at both high schools, to 9.2 percent (311 students) in 1994-95; and

- The percentage of students enrolled in Exploring Technology I has increased from 0.6 percent of all students (9 students) in 1991-92 to 7.5 percent (256 students) in 1994-95.

Exhibit II-1

CALVERT COUNTY PUBLIC SCHOOLS
COURSE AND PROGRAM ENROLLMENTS
1990-91 THROUGH 1994-95
Percent of Students Enrolled

AREA OF ENROLLMENT	YEAR OF ENROLLMENT				
	90-91	91-92	92-93	93-94	94-95
All Applied Courses	0.2	3.6	5.6	9.8	7.3
Technology Education & Exploration Courses					
Fundamentals of Technology	7.0*	5.5	6.3*	5.5	9.2
Exploring Technology I	--	0.6**	0.8**	1.4	7.5
Exploring Technology II	--	--	--	--	0.6
Career and Technology Programs					
Advanced Tech Prep	6.6	7.6	8.6	10.0	NA
Occupational Tech Prep	8.7	8.4	7.1	7.5	NA
Advanced Level Academic Courses					
Mathematics	61.1	69.3	56.4	77.0	71.3
Science	54.2	51.7	49.5	48.9	53.8
English	43.3	46.5	39.7	52.4	44.0
Social Studies	59.4	66.3	44.7	64.6	63.4
TOTAL DISTRICT ENROLLMENT (All students Grades 9-12)	2681	2859	2994	3136	3397

* Only offered at Calvert High School; percentage based on school's enrollment.
**Only offered at Northern High School; percentage based on school's enrollment.
NA - Not available

Exhibit II-2

CALVERT HIGH SCHOOL
COURSE AND PROGRAM ENROLLMENTS
1990-91 THROUGH 1994-95
Percent of Students Enrolled

AREA OF ENROLLMENT	YEAR OF ENROLLMENT				
	90-91	91-92	92-93	93-94	94-95
All Applied Courses	0.5	4.7	11.6	14.2	9.0
Technology Education & Exploration Courses					
Fundamentals of Technology	7.0	6.1	6.3	5.8	10.7
Exploring Technology I	--	--	--	1.7	7.2
Exploring Technology II	--	--	--	--	0.5
Career and Technology Programs					
Advanced Tech Prep	NA	NA	NA	NA	NA
Occupational Tech Prep	NA	NA	NA	NA	NA
Advanced Level Academic Courses					
Mathematics	52.5	60.9	59.7	72.0	68.7
Science	45.8	49.3	55.9	55.9	53.4
English	34.2	37.3	43.3	46.4	37.2
Social Studies	45.4	58.5	39.9	59.4	60.2
TOTAL SCHOOL ENROLLMENT (All students Grades 9-12)	1263	1380	1448	1576	1765

NA - Not available by school

Exhibit II-3

NORTHERN HIGH SCHOOL
COURSE AND PROGRAM ENROLLMENTS
1990-91 THROUGH 1994-95
Percent of Students Enrolled

AREA OF ENROLLMENT	YEAR OF ENROLLMENT				
	90-91	91-92	92-93	93-94	94-95
All Applied Courses	0	2.6	0	5.3	5.5
Technology Education & Exploration Courses					
Fundamentals of Technology	--	5.0	--	5.1	7.5
Exploring Technology I	--	0.6	0.8	1.0	7.9
Exploring Technology II	--	--	--	--	0.6
Career and Technology Programs					
Advanced Tech Prep	NA	NA	NA	NA	NA
Occupational Tech Prep	NA	NA	NA	NA	NA
Advanced Level Academic Courses					
Mathematics	68.7	77.1	53.4	82.1	74.1
Science	58.3	54.0	43.4	41.9	54.2
English	51.3	55.0	36.4	58.3	51.3
Social Studies	71.9	73.6	49.1	69.9	66.7
TOTAL SCHOOL ENROLLMENT (All students Grades 9-12)	1418	1479	1546	1560	1632

NA - Not available by school

Career and Technology Programs. As Tech Prep was implemented, school district officials anticipated that more students would complete career and technology programs which articulated with programs at the community college, known as Advanced Tech Prep (ATP). They were uncertain, however, about the effects of Tech Prep on enrollment in career and technology programs that did not articulate with the community college, referred to as Occupational Tech Prep (OTP). In fact, there has been a modest but steady increase in the percentage of Calvert County students enrolled in ATP programs, from 6.6 percent of all students (176 students) in 1990-91 to 10 percent (314 students) in 1993-94. At the same time, the percentage of students enrolled in OTP programs has decreased slightly. These county-wide data are presented in Exhibit I-1.

Advanced Level Academic Courses. The school district also anticipated that students would take higher level academic courses with the implementation of Tech Prep, particularly in mathematics where the basic courses were eliminated from the curriculum. They also expected changes in science, English, and social studies as students realized the more rigorous academic requirements for careers in technical fields. Generally, the enrollment data reflect these expected changes through 1993-94 in mathematics and English county-wide and in all four subject areas at Calvert High School, but show decreases in some subjects in 1994-95. Specific trends, which are presented in Exhibits II-1 through II-3, include:

- Enrollment in advanced level mathematics courses increased from 61 percent of all students in 1990-91 to 77 percent in 1993-94 and then decreased to 71 percent in 1994-95;

- Enrollment in advanced level English courses increased from 43 percent of all students in 1990-91 to 52 percent in 1993-94 and then decreased to 44 percent in 1994-95; and

- The percentage of Calvert High School students enrolled in advanced level science courses increased from 46 percent in 1990-91 to 53 percent in 1994-95; similar increases were observed in social studies (45 to 60 percent).

Courses at the Career Center. The school district expected that Tech Prep would increase the utilization of the Career Center by making more students aware of the opportunities to pursue technical programs, with courses offered both at their home school and at the Career Center. As anticipated, student enrollment in courses offered at the Career Center has increased since Tech Prep was implemented. The total number of students enrolled in courses at the Career Center has increased from 359 students in 1989-90 to 802 students in 1993-94. These numbers include duplicate counts of students taking more than one course at the Career Center in the same year, but nonetheless, reflect an increase in course-taking behavior at the Career Center. These increases appear to reflect both the introduction of new course offerings at the Career Center (including cosmetology in 1990-91, Fundamentals of Technology in 1990-91, and Principles of Technology and pre-nursing in 1992-93), and increased enrollments in existing courses (e.g., CAD, Computer Programming, Graphics Arts, and Masonry).

Student Performance

With the implementation of Tech Prep, the school district had hoped to improve student performance in several areas. First and most obviously, they expected that restructuring the curriculum around career pathways and clusters would increase the high school program completion rates, particularly for students meeting the occupational program requirements. Second and less directly, they thought that improving the academic rigor of courses for all students would increase student pass rates on the Maryland Functional Tests, the number of students meeting university entrance requirements, and possibly student scores on the Scholastic Achievement Tests (SAT). However, it should be noted that student performance in these same areas has been the focus of the Maryland School Performance Program (MSPP). Consequently, it is impossible to attribute any changes in student academic performance specifically to Tech Prep.

Student data trends from 1990-91 through 1993-94 in each of these areas are presented in Exhibits II-4 and II-5 and discussed below.

Program Completion Rates. Trends in high school program completion rates, presented in Exhibit II-4, indicate a general increase in the percentage of students county-wide who have met occupational program requirements since Tech Prep's implementation. In addition, there has been a steady increase in the number of students meeting university entrance requirements since 1990-91 at Northern High School. Finally, although the numbers are small, there also has been an increase in the numbers of students meeting both program completion requirements. Specifically:

Exhibit II-4

CALVERT COUNTY PUBLIC SCHOOLS
STUDENT PERFORMANCE AND PARTICIPATION DATA
1990-91 THROUGH 1993-94
Percent of Students Enrolled

PERFORMANCE AND PARTICIPATION	CALVERT HIGH SCHOOL				NORTHERN HIGH SCHOOL				CALVERT COUNTY			
	90-91	91-92	92-93	93-94	90-91	91-92	92-93	93-94	90-91	91-92	92-93	93-94
High School Program Completion Rates												
University of Maryland System Requirements	40.9	43.1	33.7	38.0	52.2	56.8	57.1	63.1	47.2	49.3	46.1	49.9
Occupational Program Requirements	15.7	24.2	26.7	20.8	11.8	12.3	13.6	15.7	13.5	17.7	19.7	17.8
Both Sets of Requirements	2.0	4.6	5.3	10.7	1.6	0.9	2.2	3.4	1.7	2.6	3.6	6.8
Participation												
Attendance Rate* (Grades 7-12)	92.6	92.5	92.8	93.4	93.1	93.3	93.5	94.5	92.8	93.3	93.6	94.4
Dropout Rate (Grades 9-12)	3.0	2.6	2.8	3.7	1.7	2.1	2.5	2.1	2.3	2.8	3.0	3.5

* Attendance rates for Calvert and Northern High Schools are for grades 9-12; Calvert County attendance rates are for grades 7-12.

Exhibit II-5

CALVERT COUNTY PUBLIC SCHOOLS
MARYLAND FUNCTIONAL TEST AND SAT PERFORMANCE
1990-91 THROUGH 1993-94

AREA OF TEST PERFORMANCE	CALVERT HIGH SCHOOL				NORTHERN HIGH SCHOOL				CALVERT COUNTY			
	90-91	91-92	92-93	93-94	90-91	91-92	92-93	93-94	90-91	91-92	92-93	93-94
MFT Grade 9 Status (% Passing)												
Reading	98.3	97.5	100.0	99.1	97.5	98.7	99.8	99.2	97.9	98.1	99.9	99.0
Mathematics	70.4	75.3	97.4	92.9	77.8	81.1	92.5	95.1	74.2	78.3	94.9	93.5
Writing	77.1	92.2	99.8	96.5	80.8	96.1	98.4	98.4	79.0	94.0	99.1	97.2
Citizenship	68.5	80.8	92.9	93.3	81.9	84.8	94.2	95.1	75.4	82.8	93.6	93.8
MFT Grade 11 Status (% Passing)												
Reading	100.0	100.0	99.7	99.7	100.0	100.0	100.0	100.0	100.0	100.0	99.8	99.8
Mathematics	96.4	95.7	99.1	98.4	99.7	99.4	99.7	100.0	98.1	97.5	99.4	98.8
Writing	98.3	87.9	99.1	99.4	99.7	98.8	100.0	100.0	99.1	98.3	99.4	99.6
Citizenship	95.7	95.2	97.8	98.4	99.1	98.2	99.1	99.4	97.5	96.8	98.5	98.7
Passed All Tests	94.4	97.1	97.5	96.3	98.8	97.0	98.8	99.4	96.7	93.8	98.1	97.1
Scholastic Aptitude Test												
Verbal Mean	447	438	430	412	427	430	420	441	435	434	423	429
Math Mean	478	474	475	447	470	481	468	494	473	478	470	474
Combined	925	912	905	859	859	911	888	935	908	912	893	903

- The percentage of students meeting occupational requirements has increased from 13.5 to 17.8 percent of all students county-wide, from 1990-91 to 1993-94;

- The percentage of students meeting University of Maryland entrance requirements has increased from 52.2 to 63.1 percent among Northern High School graduates, from 1990-91 to 1993-94; and

- The percentage of students meeting both occupational and university requirements has increased since 1990-91, from 1.7 to 6.8 percent of all students county-wide.

Maryland Functional Tests (MFT). The MFTs assess whether students are attaining basic competencies in the areas of reading, mathematics, writing, and citizenship. Achieving these basic competencies is required for graduation. Trends in performance on the MFTs are presented in Exhibit II-5. The percentage of students passing the MFTs in grades 9 and 11 has increased from 1990-91 to 1993-94 in all areas, especially mathematics, writing, and citizenship. The most dramatic increases have occurred among first time test-takers in grade 9 when the impact of Tech Prep on academic performance should be negligible, other than any "trickle down" effect in making the middle school curriculum more rigorous. By grade 11, virtually all students have already attained these basic competencies so increases since 1990-91 have been small as Calvert County approaches 100 percent passing rates in all areas.

SAT Scores. It is difficult to judge the impact that Tech Prep should have on student performance on the SATs since the pool of students taking the tests from year to year is a strong factor in school- and county-wide performance. As indicated in Exhibit II-5, SAT verbal and mathematics performance has fluctuated slightly from year to year during the period from 1990-91 to 1993-94. However, SAT scores from Northern High School do show a significant increase for the 1993-94 school year, with verbal and mathematics scores the highest ever over the four-year period.

Student Attendance

Another school district goal in its implementation of Tech Prep was to help in its efforts to increase student participation in school, as indicated by daily student attendance rates and dropout rates. It was hoped that by making the school experience more meaningful for all students, students would attend school more regularly and not drop out. However, school attendance among secondary students is obviously subject to the influence of many factors and also the subject of the ongoing MSPP. Consequently, the modest increase in daily attendance rates for grades 9-12 students, from 92.8 percent in 1990-91 to 94.4 percent in 1993-94 should be interpreted very cautiously as only an indication that attendance is changing in the right direction. Similarly, the small increase in dropout rates from 2.3 percent before the implementation of Tech Prep to 3.5 percent in 1993-94 should not be viewed with serious alarm, but rather should be studied further. These trends in attendance and dropout rates are shown in Exhibit II-4.

Post-Secondary Decisions

Ultimately, the goal of Tech Prep is to better prepare students for post-secondary education or the world of work after they finish high school. It is not possible to fully examine student outcomes in this area until students who have completed the full four-year Tech Prep sequence have entered post-secondary education or the labor force. Preliminary indications of student preparation for community college work are included in the case study of Charles County Community College (see Chapter V). Exhibit II-6 shows trends in documented post-secondary decisions among high school graduates from the MSPP data reported for 1992 through 1994 graduates. These data are based on annual exit surveys of all graduating seniors. These data indicate modest county-wide increases in the one of the post-secondary decisions most likely to be effected by Tech Prep: attendance at a two-year college, with slight decreases or no change in other relevant post-secondary decisions. Specifically, the data show that:

- The percentage of students attending two-year colleges after high school **increased slightly** from 15 percent of 1992 graduates to 18.8 percent of 1994 graduates, with a more consistent increase among Calvert High School graduates;

- The percentage of students entering employment related to their high school

Exhibit II-6

CALVERT COUNTY PUBLIC SCHOOLS
POST-SECONDARY DOCUMENTED DECISIONS
CLASSES OF 1992 THROUGH 1994
Percent of Students Responding

DOCUMENTED DECISIONS TO:	CALVERT HIGH SCHOOL			NORTHERN HIGH SCHOOL			CALVERT COUNTY		
	1992	1993	1994	1992	1993	1994	1992	1993	1994
Attend a four year college	27.5	18.9	21.1	38.1	32.7	42.4	33.2	26.3	32.1
Attend a two year college	12.2	17.5	19.7	17.5	21.3	17.8	15.0	19.5	18.8
Attend a specializec. school/training	4.9	3.2	5.4	4.5	4.6	2.2	4.7	4.0	3.8
Enter employment (related to program)	14.6	12.1	8.8	5.7	5.6	3.2	9.9	8.6	5.9.
Enter employment (unrelated to program)	12.2	15.0	10.5	10.9	10.5	8.6	11.5	12.6	9.5
Enter Military	2.8	7.5	4.8	1.5	4.3	2.9	2.1	5.8	3.8
Enter full-time employment ar d school	2.1	2.1	3.1	3.0	2.5	2.5	2.6	2.3	2.8
Enter part-time employment and/or school	16.4	16.4	20.7	16.3	17.9	12.4	16.3	17.2	16.4
Other or no response	7.3	7.1	5.8	2.4	0.6	8.0	4.7	3.6	6.9

programs **decreased slightly** from 9.9 percent among 1992 graduates to 5.9 percent among 1994 graduates;

- The percentage of students entering the military after high school has **fluctuated slightly** from 2.1 to 5.8 percent among 1992, 1993, and 1994 graduates; and

- The percentage of students pursuing specialized training after high school has remained fairly low and stable at 4 to 5 percent.

III. CASE STUDY #2: CHARLES COUNTY PUBLIC SCHOOLS

A. Overview of Tech Prep Components

The Charles County Tech Prep model includes three career pathways: College Prep, Tech Prep, and Occupational Prep. Articulation agreements with the Charles County Community College allow students to earn college credits for classes successfully completed in high school. Each component is discussed briefly below.

College Prep

The College Prep pathway is intended for students planning to pursue post-secondary education in a 4-year institution of higher education. A four-year course of study includes academic classes to meet the admission requirements of 4-year colleges and universities. Intensive study and special emphasis is placed on foreign languages, advanced sciences, English, mathematics, and social studies. Students are encouraged to enroll in honors and Advanced Placement (AP) classes whenever possible. Additionally, a Tech Prep sequence of courses may be integrated into a College Prep schedule.

Tech Prep

The Tech Prep pathway is designed to assure that high school students acquire more technically-oriented knowledge and skills. The coordinated sequence of academic and career preparation courses begins in the ninth grade, and prepares students for post-secondary education at the community colleges and technical institutions. Students also may choose to continue their education at four-year colleges and universities.

Tech Prep students may choose a program of study from three career clusters: Business/Computer Technology; Engineering/Technical; and Health and Human Services. Each cluster contains multiple specializations, including:

Business/Computer Technology:

- Accounting;
- Business Administration;
- Computer Technology; and

- Secretarial.

Engineering/Technical:
- Drafting and Design;
- Electronics; and
- Principles of Technology.

Health and Human Services:
- Child Care Preparation;
- Health Occupations; and
- Fashion Merchandising.

Occupational Prep

The Occupational Prep pathway prepares students for direct job entry. Special emphasis is placed on training in specific skills in business, industry, and technology. The four-year plan includes courses which can be taken at the home school and the Career and Technology Center (CTC). Occupational Prep students may choose from a variety of career clusters, including: air conditioning, heating, and refrigeration; auto body; automotive technology; carpentry; cosmetology; culinary arts; printing trades (graphic arts); industrial electricity; masonry; and welding. Additionally, Occupational Prep students may choose to continue their education at a community college or trade school.

Articulated Courses with the Community College

The Charles County school system has negotiated articulation agreements with the Charles County Community College since 1985, to allow students to receive college credit for courses completed in high school. As of 1993-94, high school students could earn college credits for classes in each of the Tech Prep clusters (i.e. Business/Computer Technology, Engineering/Technical, and Health and Human Services). College credits are granted only for those courses accepted by the college program in which the student enrolls, and students must receive a grade of "B" or better for the high school credits to articulate.

Role of the Career and Technology Center (CTC)

Only 11th and 12th grade students attend the CTC for classes. In Charles County, the first cohort of Tech Prep students (i.e., those who have

chosen a career pathway) were in 10th grade in 1993-94, and had not yet arrived at the CTC. However, the CTC has been preparing for the arrival of the first cohort of Tech Prep students, by implementing the following changes:

- Development of Applied Mathematics classes for each career area;
- Expanding the role of the Vocational Evaluator; and
- Increasing communication with the community college.

B. Implementation Strategies

In this section, the strategies used by Charles County to implement Tech Prep are described for each of the program's major components:

- Counseling;
- Pathways and career clusters;
- Integration of technical and academic content into an applied curriculum; and
- Articulated programs.

Additionally, factors which have facilitated implementation of Tech Prep and barriers to implementation are discussed.

Counseling

Secondary counselors have been included in the development and implementation of Tech Prep from the early stages. For example, counselors assisted in developing student planning guides, attended committee meetings to learn about Tech Prep, and then made presentations to faculty and parents. Because of counselors' early involvement in planning for Tech Prep, counseling appears to be the most fully implemented component of Tech Prep in Charles County.

One principal stated that Tech Prep currently is 95 percent the counselors' responsibility. He felt that the counselors' role is to assure that students know all the options available under Tech Prep, help them find the best fit between their strengths and interests, and understand Tech Prep's implementation and purpose.

Activities. All Charles County students participate in the same counseling activities to prepare them to choose a Tech Prep pathway and develop a 4-year plan. Counselors visit the feeder schools to speak with 8th graders about Tech Prep's purpose, options, and articulation. In addition, counselors give presentations at parents' nights, PTA meetings, and in social studies classes, and coordinate visits for students to the Career and Technology Center. When asked how they have attempted to promote Tech Prep among students and parents, 86 percent of the counselors responding to the survey had conducted one or more promotional activities. Specifically:

- Seventy-one (71) percent have conducted Tech Prep orientation for parents and students;
- Fifty-seven (57) percent have conducted small group meetings for parents and students to develop 4-year plans;
- Fifty-seven (57) percent have facilitated student visits to the Career and Technology Center;
- Twenty-nine (29) percent have developed bulletin boards or posters in their school; and
- Fourteen (14) percent have developed brochures or other literature for parents and students.

Career and Technology Center. The CTC fulfills several special counseling roles related to Tech Prep. First, the Vocational Evaluator targets special needs students, and helps them develop a career plan in which they can be successful. He identifies students' strengths and needs by administering vocational assessments, job samples, and work samples, and introduces students to a variety of career choices. Second, the Vocational Evaluator holds a Summer Enrichment Camp of Careers, to promote gender equity among Tech Prep clusters. Over a week's time, students spend a day with a

teacher in each cluster area. Students complete vocational inventories, discuss the results, and are exposed to clusters they may have avoided (e.g., child care or cosmetology for boys; automotive technology or electronics for girls).

Pathways and Career Clusters

As of 1993-94, Tech Prep in Charles County only had been implemented with 9th and 10th grade students. The partial implementation is reflected in staff perceptions of restructuring efforts. Fewer than half of the counselors responding to the survey (43 percent) recognized that the curriculum had been restructured around career pathways and/or clusters. The restructuring efforts are even less evident across all areas of the curriculum—only 27 percent of responding teachers cited restructuring in their subject area.

Although not yet fully implemented, efforts are underway for all Charles County students to select a career pathway and corresponding cluster. Four-year plans have been developed for nine (9) Tech Prep and ten (10) Occupational Prep clusters, as well as the College Prep pathway. The restructuring efforts are designed to encourage students to enroll in higher level mathematics, science, and language arts courses, and to assure that students obtain more technically-oriented knowledge and skills. The coordinated sequence of academic and vocational courses begins in the ninth grade, and prepares students for life-long learning, including advanced study at community colleges and technical institutions. Students also may choose to continue their education at 4-year colleges and universities.

Integration of Technical and Academic Content into an Applied Curriculum

A primary characteristic of Tech Prep is the integration of technical and academic content. Interview respondents provided several examples of integrated academic and technical content, including:

- Applied Mathematics courses taught at the CTC show how mathematics is used in each of the various career areas (e.g. separate class for cosmetology, carpentry, electronics, child care students);
- The Automotive Technology teacher collaborates with the Applied Mathematics

teacher to integrate math into lesson plans; and

- The Language Links program integrates business education, English, and career technology education.

Additionally, teachers and administrators indicated that all classes are being modified to accommodate the use of computers and other appropriate technology.

However, survey data again indicate that the integration of academic and technical content may not yet be evident in all curricular areas:

- Thirty-five (35) percent of responding teachers reported integrating academic and vocational/technical course content;
- Twenty-seven (27) percent of teachers reported using applied academic curricula;
- Twenty (20) percent of teachers reported providing instruction in advanced technical skills; and
- Only 11 percent of responding teachers reported team teaching with academic and vocational teachers.

Additionally, Charles County has added an Applied Mathematics course to the curriculum. The course is taught at the Career and Technology Center, and includes a separate class for students in each of the career areas (e.g., child care, cosmetology, carpentry, automotive technology). The Applied Mathematics component is included once a week in each of the career courses, and students receive one mathematics credit. The Applied Mathematics course is designed to teach students how mathematics is used in their chosen career area, and focuses on hands-on lab work and activities. There is no specific book available for the mathematics related to each trade. Therefore, the Applied Mathematics curricula are based primarily on the CORD and Delmar curricula, with supplemental lesson plans and activities developed by the teacher. Additionally, the Applied Mathematics teacher works closely with teachers of the career classes to determine appropriate equipment use and activities.

Articulated Programs

With the implementation of Tech Prep, Charles County has increased the number of classes articulated with the Charles County Community College. As of 1993-94, students could receive college credit for successful completion of the following high school classes:

- Advanced Accounting: Computer Applications;
- Child Care;
- Applied Computer Technology;
- Electronics I and II;
- Word Processing;
- Principles of Technology; and
- Drafting.

This articulation process is more widely recognized by the counseling staff than by the teaching staff:

- Nearly half (43 percent) of the counselors responding to the survey reported the articulation between the secondary and community college curricula as a curriculum change; but
- Only 21 percent of responding teachers reported articulated curriculum in their subject area.

Facilitation of and Barriers to Implementation

Interview respondents were asked to describe facilitators and barriers to the implementation of Tech Prep. Many factors (both facilitators and barriers) related to support (or lack thereof) from parents, teachers, and district administrators. Each set of factors is described below.

Facilitators. Respondents felt generally that cooperation and support from teachers, counselors, and administrators were key to the successful implementation of Tech Prep. Specifically, they cited the following factors as facilitators to implementation:

- Counselors and teachers buying into the program;
- Cooperation between academic and technical teachers;
- Support from teachers and principal;
- Effective people in key positions in the district and Consortium administration; and
- Supportive team approach from central office and teachers.

Additionally, some respondents felt that specific promotional efforts facilitated implementation:

- Good marketing materials (e.g., videos, brochures);
- Availability of in-service time; and
- Good program organization, promotion, and documentation.

Finally, respondents felt that the integration of disciplines helped to promote ownership from multiple curricular areas.

Barriers. In general, interview respondents felt that the major barriers to implementation resulted from negative attitudes, lack of knowledge about Tech Prep, philosophical differences, lack of funds, and lack of support. Respondents indicated the following specific barriers:

- Resistance from parents who want their children in College Prep;
- Parents' misunderstanding and confusion about Tech Prep;

- Resistance to change;
- Difficulty infusing a large organization with new concepts;
- Lack of funding for materials and staff; and
- Lack of district support.

Some interview respondents mentioned the level of perceived support from principals, district administrators, and other teachers and counselors as a facilitator of implementation, while others cited lack of support as a barrier to implementation. Survey respondents also were asked to indicate the level of support they received in implementing Tech Prep, and responding counselors expressed a greater perception of support. Most commonly reported by teachers and counselors were insufficient staff development, planning time, and professional development. Specifically:

Areas of Support	% of Respondents Indicating Sufficient Level of Support	
	Counselors (N=7)	Teachers (N=66)
Support from Principal	100	50
Support from (other) Teachers	100	50
Support from Central Administration	100	45
Materials	83	41
Support from (other) Counselors	80	38
Staff Development	67	41
Professional Development Time	40	N/A
Planning Time	N/A	33

C. Institutional Outcomes

This section addresses the institutional outcomes that have resulted from the implementation of Tech Prep in the following areas:

- Curriculum;

- Staff development;
- Counseling strategies and methods;
- Relationship with the community college;
- Relationship with the local business community;
- Staff attitudes;
- Logistical impacts; and
- Other programs affecting Tech Prep outcomes.

Curriculum

Staff interviewed reported three major changes to the curriculum resulting from the implementation of Tech Prep:

- Increased emphasis on mathematics in traditionally technical classes;
- Addition of Applied Mathematics component at the CTC for each career area; and
- Increased technology use across the curriculum.

However, the survey results indicate that a relatively small proportion of staff are aware of curriculum changes related to Tech Prep thus far, and counselors are more aware of curriculum changes than are teachers. Specifically:

- Forty-three (43) percent of responding counselors, and 27 percent of responding teachers reported that the curriculum had been restructured around career pathways and clusters;

- Forty-three (43) percent of counselors, and 21 percent of teachers reported articulation of the secondary curriculum with the community college curriculum; and

- Twenty-nine (29) percent of counselors and 20 percent of teachers reported seeing integration of academic and technical content.

Finally, twenty-nine (29) percent of counselors and 21 percent of teachers reported having seen no changes to the curriculum, with teachers responding only regarding their own subject area.

Some interview respondents also mentioned examples of cross-disciplinary integration of course content. However, they felt that those outcomes were not necessarily attributable to Tech Prep, but a reflection of current educational philosophy. Roughly one-third of survey respondents (29 percent of counselors and 32 percent of teachers) reported seeing more academic content integrated across disciplines.

Staff Development

Comprehensive staff development for teachers, counselors, and administrators is crucial to the successful implementation of Tech Prep. Some interview respondents stated that in-service training currently focuses on integrated instruction, but that movement is not necessarily due to the implementation of Tech Prep. Rather, they felt that the district was heading in that direction prior to Tech Prep. Survey results indicate that most teachers and counselors feel that Tech Prep has had little impact on staff development over the last three years:

Changes in Staff Development in the Last 3 Years	% of Respondents	
	Counselors (N=7)	Teachers (N=66)
Topics covered are more relevant to instruction.	29	27
Staff development activities are held more frequently.	14	24
There have been more opportunities to attend conferences or training institutes.	14	9
There have been no changes in staff development.	57	41

However, interview respondents named several specific staff development activities which have come about with the implementation of Tech Prep:

- Visits to the CTC;
- Presentations by initial committee members on Tech Prep components and potential impact on students;
- Attendance and presentations at National Tech Prep Network (NTPN) conferences;
- In-service workshops for teachers on applied mathematics; and
- Other in-service workshops, covering topics such as computer familiarity, integrating academic and vocational content, and employability qualities.

Survey data indicate that all counselors, but only 58 percent of teachers have participated in any staff development activities on Tech Prep-related topics. Most staff have participated in staff development on general information about Tech Prep, rather than in-service training on specific strategies for implementing Tech Prep in the classroom:

Staff Development Topics	% of Respondents	
	Counselors (N=7)	Teachers (N=66)
General information about Tech Prep	86	41
Integrating academic and vocational content	14	17
How mathematics, science, and/or communications competencies are applied in the work setting	14	9
Developing curricula and instruction to promote hands-on learning	N/A	11

Finally, survey data indicate that some staff also have received in-service training in strategies which are important to Tech Prep, but are not unique components of Tech Prep, such as:

In-Service Topics	% of Respondents	
	Counselors (N=7)	Teachers (N=66)
Recognizing and accommodating different learning styles	43	32
Using multiple teaching strategies	N/A	23
Methods for teaching diverse populations	N/A	20
Effective ways to raise and achieve higher expectations	14	9

Counseling Strategies and Methods

The earliest impact of the implementation of Tech Prep can be seen in Charles County's counseling strategies and methods. Survey results show that the heavier impact on counseling than teaching strategies may be due to the greater involvement of counselors in Tech Prep planning, start-up, and implementation activities. All of the counselors, but only 38 percent of responding teachers reported involvement in planning and implementation activities during the last three years. Specifically:

Planning and Implementation Activities	% of Respondents	
	Counselors (N=7)	Teachers (N=66)
Spoke to parents or students about Tech Prep	100	11
Attended local in-service workshops or training on Tech Prep	71	17
Served on a planning or steering committee for Tech Prep	29	5

Interview respondents discussed several new counseling strategies and methods which are being put in place to prepare students, teachers, and parents for full implementation of Tech Prep. For example:

- Familiarizing students with Tech Prep options, and helping them find the best fit between their strengths and interests;
- Holding parents' nights to discuss Tech Prep pathways and options;
- Developing a career plan folder in 9th grade;
- Updating students' 4-year plans each fall;
- Arranging student visits to the CTC; and
- Administering vocational assessments, job samples, and work samples to introduce special needs students to a variety of careers, and determine a plan appropriate to their strengths and needs.

Instructional Strategies and Methods

Based on interview comments, instructional strategies and methods have changed little as a result of Tech Prep for most Charles County teachers. Teachers of technical courses indicated that they traditionally have used

strategies advocated by Tech Prep in their classes, such as: hands-on lab work, and use of work place examples in classroom activities. And with the exception of Applied Mathematics (offered at the CTC), applied classes have not yet been implemented in Charles County, thus offering fewer opportunities for changes in instructional strategies and methods.

Finally, some staff have associated the incorporate current technology in instruction with Tech Prep (e.g., greater computer usage; and using automotive service manuals on CD-ROM). However, most staff felt that these kinds of changes in their teaching would have come about even without the implementation of Tech Prep.

The survey data also suggest that many of the instructional strategies emphasized by Tech Prep currently are not being implemented by all teachers. Among teachers responding to the survey, the use of strategies advocated by a number of educational reform movements were most common. For example:

- Seventy-seven (77) percent reported using cooperative learning techniques;
- Seventy-six (76) percent reported varying their teaching strategies to meet diverse learning styles; and
- Seventy-three (73) percent reported using hands-on learning opportunities.

On the other hand, use of those strategies most closely associated with Tech Prep was less prevalent among responding teachers:

- Fifty-six (56) percent indicated using instruction relevant to the world of work;
- Forty-seven (47) percent reported integrating career development activities into instruction;
- Thirty-five (35) percent reported integrating academic and vocational course content; and
- Twenty-seven (27) percent said they had used applied academic curricula.

Another desired result of Tech Prep is closer communication and cooperation among academic and vocational teachers. However, survey data indicate that this collaboration is not yet occurring among the majority of responding teachers:

- Twenty-seven (27) percent reported involvement in interdisciplinary planning and teaching;
- Fourteen (14) percent reported collaborating with academic and vocational teachers to develop course content;
- Seven (7) percent reported participating in joint planning time for academic and vocational teachers; and
- Thirty-three (33) percent reported that they had not participated in any of the listed collaborative instructional activities this year.

Relationship with the Community College

Interview respondents discussed several activities which suggest that the relationship with Charles County Community College (CCCC) has changed:

- Increased number of articulation agreements;
- Presentations in high schools by CCCC advisors;
- Student tours of CCCC;
- Talent Search (sponsored by CCCC through a U.S. Department of Education Title IV grant) to seek out and encourage students whose parents did not attend college to consider pursuing a college degree;

- Use of CCCC facilities and equipment for COBAL unit of computer technology class; and

- Increased meetings between school principals and CCCC career and technical education administrative staff.

Relationship with the Local Business Community

Principals at both schools interviewed said that local businesses had taken a greater role in their schools' programs. However, both stated that the change in relationship could not wholly be attributed to the implementation of Tech Prep. Examples of cooperation with local businesses included:

- Stores in the local mall provide job shadowing opportunities for students;

- A local architecture firm is planning to teach classes at the school, and work with students and staff. Students also will visit the firm to learn about architecture jobs;

- Local hospital has set up a mentoring program; and

- A local gravel mine will be given to the CTC in three years.

The survey responses indicate that the majority of teaching and counseling staff do not have contact with the business community. With the exception of involvement in the planning and implementation of Tech Prep, teachers have had greater contact with business and industry representatives than have counselors. Specifically:

Activities with Community Business Representatives	% of Respondents	
	Counselors (N=7)	Teachers (N=66)
Scheduled a representative from business/industry to visit any of my classes this year	N/A	42
Had contact with a business/industry representative in a field related to the Tech Prep curriculum this year	29	39
Participated in Tech Prep meetings with business or community leaders	14	5

Additionally, 14 percent of responding counselors indicated that student trips to employer work sites had occurred during the past year.

Staff Attitudes

During the interviews, many staff indicated that their first impression of Tech Prep was that is was another passing educational "fad." However, they reported a positive change in attitude as they became better informed of Tech Prep's purposes and options. Staff opinions are that Tech Prep:

- Focuses students on preparation for life;
- Course sequencing builds on prior learning;
- Fits the population and meets students' needs;
- Motivates students with integrated content; and
- Provides more options for all students.

Although the attitudinal responses were overwhelmingly positive, some staff feel that it is too early to determine whether or not Tech Prep is effective.

Survey data also indicate positive staff attitudes toward Tech Prep. However, counselors and teachers differ somewhat in their perception of the range of students for which Tech Prep is beneficial. Counselors more so than teachers see Tech Prep as beneficial for "general track" and college-bound

students. In contrast, a higher percentage of teachers than counselors see Tech Prep as beneficial for all students. Specifically:

Attitude Item	% of Respondents	
	Counselors (N=7)	Teachers (N=66)
Tech Prep is beneficial to the former general "track" students	86	75
Tech Prep is appropriate for college-bound students	83	69
Tech Prep is beneficial for all students	29	67

All responding counselors and most teachers (85 percent) agreed that Tech Prep helps to orient students to current work place requirements. However, they differed in their perceptions of Tech Prep's additional benefits to students. Specifically:

- Eight-six (86) percent of counselors and 68 percent of teachers agreed that Tech Prep will effectively prepare students for post-secondary education and/or future employment; and

- Forty (40) percent of counselors and 48 percent of teachers felt that Tech Prep has increased the academic rigor of courses for the former general "track" students.

Finally, a few staff responding to the survey expressed negative attitudes toward Tech Prep:

- None of the 16 percent of teachers felt that Tech Prep is just another short-lived educational fad; and

- Seventeen (17) percent of counselors and 16 percent of teachers felt that Tech Prep has not changed vocational education.

Despite these few negative sentiments and the incomplete implementation status, most staff (83 percent of counselors and 75 percent of teachers) support the continuation of the Tech Prep program.

Logistical Impacts

There have been minimal logistical impacts with the implementation of Tech Prep in Charles County, possibly because the program has only been partially implemented thus far. Only two specific issues were mentioned in interviews:

- Taking students out of their career classes once a week for Applied Mathematics; and
- Sending the computer technology class to the community college for COBOL instruction.

Other Programs Affecting Tech Prep Outcomes

Interview respondents were asked about additional programs which may affect Tech Prep outcomes. Although no specific programs were mentioned, respondents discussed several general educational movements which may account for any early indicators of Tech Prep's success. Specifically, respondents cited:

- Minority achievement initiatives;
- Increased preparation for Scholastic Aptitude Tests (SATs); and
- Maryland School Performance Program (MSPP).

D. Student Outcomes

Tech Prep was introduced with several student outcome goals, in the areas of attitudes, program and course enrollment, academic performance, attendance, and post-secondary decisions. However, it is somewhat premature

to ask what secondary student outcomes have been achieved with the implementation of Tech Prep. First, the program has not been fully implemented. It was first introduced in Charles County in the 1992-93 school year and consequently, the first students to complete the full four-year program will not graduate from high school until Spring 1996. Second, it is impossible to attribute any student outcomes specifically to the Tech Prep program for two reasons:

- The absence of any comparison group of similar students who have not had the Tech Prep experience; and
- The simultaneous existence of other national, state, county, or school-level programs attempting to achieve similar outcomes.

However, it is appropriate to begin examining staff perceptions of student attitude change, and trends over time which can indicate whether program and course enrollment, student performance, attendance, and post-secondary intentions are at least moving in the expected directions. If indicators of these outcomes suggest movement in the desired direction, administrators can be more comfortable that Tech Prep is working. If, on the other hand, there is no indication of change or change is in undesired directions, now is the time to review and revise program efforts.

Student Attitudes

Staff perceptions of student attitudes were assessed in interviews with teachers, counselors, and administrators, and in surveys of teachers and counselors. Overall, staff felt that when students' interests are satisfied, they will be more motivated in their classes. However, Tech Prep is in such early stages of implementation that student attitude changes cannot yet be expected.

Staff Interviews. Teachers, counselors, and administrators discussed their perceptions of student attitudinal changes which may be attributable to Tech Prep. Generally, respondents indicated that it is too early to attribute changes to Tech Prep. However, they speculated that with full implementation, students would:

- Recognize the importance of taking classes in multiple subject areas to strengthen their career cluster,

- Be motivated by more problem-solving, hands-on activities;
- Focus on career plans; and
- Increase expectations for their own achievement.

Staff Surveys. Surveys of teachers and counselors included two items about student attitude change since the implementation of Tech Prep. Survey responses support the interview perceptions that there has been little change in student attitudes thus far, but counselors have seen more change than teachers. Specifically, the data show that:

- Forty (40) percent of responding counselors and 34 percent of responding teachers agreed that students are more focused on career goals; and
- Thirty-three (33) percent of counselors but only 9 percent of teachers felt that students exhibit a more business-like, purposeful attitude.

Program and Course Enrollment

With the advent of Tech Prep, the school system anticipated that program and course enrollment patterns would change. One obvious area to look for enrollment changes is in programs that had previously existed but that might receive renewed interest from students as a result of Tech Prep implementation, specifically:

- Career programs articulated with the community college;
- Career and technology programs not articulated with the community college; and
- Courses at the Career and Technology Center.

Exhibit III-1 presents the student data available which permit the examination of trends in the above-listed areas of program enrollment.

Exhibit III-1

CHARLES COUNTY PUBLIC SCHOOLS
CAREER AND TECHNOLOGY PROGRAM AND CENTER ENROLLMENTS 1989-90 THROUGH 1993-94
Percent (and Number) Enrolled

AREA OF ENROLLMENT	YEAR OF ENROLLMENT				
	89-90	90-91	91-92	92-93	93-94
Articulated Career Programs[1]	33.7 (1731)	37.9 (2066)	40.1 (2215)	37.5 (2131)	32.9 (1930)
Non-articulated Career and Technology Programs[2]	5.7 (294)	5.5 (301)	5.4 (297)	4.9 (276)	4.2 (248)
Career and Technology Center	8.3 (428)	8.1 (442)	8.0 (441)	7.5 (428)	6.4 (376)
TOTAL ENROLLMENT (All students Grades 9-12)	5131	5447	5525	5681	5870

[1]Includes programs in the following areas: Applied Computer Technology, Stenography, Office Clerk, Health Occupations, Child Care, Electronics, Drafting and Design, and Principles of Technology.

[2]Includes programs in the following areas: Cosmetology, Culinary Arts, Masonry, Carpentry, Industrial Electricity, HVAC, Auto Body, Auto Technology, Graphic Arts, and Welding.

Specifically, county-wide data are presented from several years before the implementation of Tech Prep (1989-90 school year) through the 1993-94 school year. The data presented and discussed below indicate that student outcomes are **not** moving in the expected directions in these program enrollment areas.

Articulated Career Programs. As previously discussed, Charles County offers several programs that provide articulated credit at Charles County Community College. The percentage of students enrolled in these programs had been increasing through the 1991-92 school year to about 40 percent of all students, but has shown a modest decrease since the implementation of Tech Prep, down to about 33 percent of all students in 1993-94.

Career and Technology Center and Non-articulated Programs. Although the primary emphasis of Tech Prep has been on program articulation with the community college, the school district is also interested in the effects of increased career planning through the student four-year plans on student enrollments in career and technology programs at the Career and Technology Center. The percentage of students enrolled in these non-articulated programs has decreased slightly from roughly 5-6 percent of all students from 1989-90 through 1991-92, to 4-5 percent of students since the implementation of Tech Prep. Similarly the total enrollments at the Career and Technology Center have decreased from roughly 8 percent to 6-7 percent.

Another obvious area for change is student enrollment in those areas where new courses or programs have been created, at least in part as a result of Tech Prep implementation:

- Applied courses;
- Technology education courses; and
- Selection of a Tech Prep pathway.

Exhibit III-2 presents the data available in these three areas for the last three school years (from the first year of Tech Prep implementation in 1992-93 through the 1994-95 school year). Although somewhat incomplete, most of the data available do suggest that student enrollments are moving in the expected directions.

Applied Courses. Thus far, Charles County has only introduced one new applied course, the Applied Mathematics Program offered at the Career and Technology Center. The percentage of students enrolled in this course has

Exhibit III-2

CHARLES COUNTY PUBLIC SCHOOLS
TECH PREP COURSE AND PATHWAY ENROLLMENTS
1992-93 THROUGH 1994-95
Percent (and Number) Enrolled

AREA OF ENROLLMENT	YEAR OF ENROLLMENT		
	92-93	93-94	94-95
Applied Mathematics Course[3]	1.9 (107)	2.2 (130)	2.4 (142)
Technology Education Courses	6.7 (381)	(88)[4]	NA
Tech Prep Pathway[5]	5.8 (328)	10.0 (588)	21.4 (1252)
TOTAL ENROLLMENT (All students Grades 9-12)	5681	5870	5845

NA – Not available

[3]The applied math program is offered only at the Career and Technology Center.

[4]District only provided number of Tech Prep students taking technology education courses; consequently, percentage of enrollment has not been calculated.

[5]Number of students in enrolled in tech prep pathways includes 9th graders in 1992-93, 9th-11th graders in 1993-94, and 9th-12th graders in 1994-95.

increased very slightly each year, from 1.9 percent in 1992-93 to 2.4 percent in 1994-95.

Technology Education Courses. Enrollments in technology education courses should be increasing in recent years, in part because of the influence of Tech Prep but also because of new State of Maryland graduation requirements which include one credit in technology education. Unfortunately, at this time Charles County has only provided completed technology education enrollment data for the 1992-93 school year, so it is impossible to examine any trends over time.

Tech Prep Pathway. As a result of Tech Prep, students must now elect to follow a pathway in one of three areas: College Prep, Tech Prep, or Occupational Prep. The number of students selecting the Tech Prep pathway has increased from 328 9th graders (5.8 percent of grade 9-12 enrollment) in 1992-93 to 1252 9th-12th graders (21.4 percent of grade 9-12 enrollment) in 1994-95. It is difficult to determine whether this actually represents an increase in the overall percentage of students selecting a Tech Prep pathway without looking at grade level enrollments for these same years. On the other hand, these numbers do suggest that schools are now encouraging all high school students to select pathways and not just entering freshman.

Finally, the consortium school districts had also hoped that Tech Prep would increase enrollments in advanced level academic courses, especially science and mathematics. Unfortunately Charles County was only able to provide enrollment data in Advanced Placement courses for the 1993-94 school year, and does not designate courses as college prep. It would be necessary to have enrollments in college prep courses and AP courses before and after Tech Prep implementation to make any judgements about trends in these areas.

Student Performance

With the implementation of Tech Prep, the school district had hoped to improve student performance in several areas. First and most obviously, they expected that restructuring the curriculum around career pathways and clusters would increase the high school program completion rates, particularly for students meeting the occupational program requirements. Second and less directly, they thought that improving the academic rigor of courses for all students would increase student pass rates on the Maryland Functional Tests, the number of students meeting university entrance requirements, and possibly student scores on the Scholastic Aptitude Tests (SAT). However, it should be noted that student performance in these same areas has been the focus of the

Maryland School Performance Program (MSPP). Consequently, it is impossible to attribute any changes in student academic performance specifically to Tech Prep.

Exhibits III-3 and III-4 present student data trends from 1989-90 through 1993-94 in each of these areas where data were available.

Program completion rates. Trends in high school program completion rates, presented in Exhibit III-3, indicate a dramatic fluctuation in the percentage of students county-wide who have met occupational program requirements before and after Tech Prep implementation. On the other hand, the percentage of students meeting university entrance requirements has increased slightly since Tech Prep implementation in 1992-93. Finally, although the numbers are small, there has been a marked decrease in the numbers of students meeting both program completion requirements. Specifically:

- The percentage of students meeting occupational requirements has gone from 23 percent in 1990-91 to 51.7 percent in 1991-92 to 7.7 percent in 1993-94. This dramatic fluctuation suggests either data reporting errors or changes in the way occupational program requirements are defined;

- The percentage of students meeting University of Maryland entrance requirements has increased from 30.6 to 37.2 percent of all students county-wide, from 1991-92 to 1993-94; and

- The percentage of students meeting both occupational and university requirements has decreased from 10 to less than 1 percent of all students from 1991-92 to 1993-94.

Maryland Functional Tests (MFT). The MFTs assess whether students are attaining basic competencies in the areas of reading, mathematics, writing, and citizenship. Achieving these basic competencies is required for graduation. Trends in performance on the MFTs are presented in Exhibit III-4. The percentage of students passing the MFTs in grades 9 and 11 has steadily increased from 1989-90 to 1993-94 in all areas. The largest increases have occurred among first time test-takers in grade 9 when the impact of Tech Prep on academic performance should be negligible, other than any "trickle

Exhibit III-3

CHARLES COUNTY PUBLIC SCHOOLS
STUDENT PERFORMANCE AND PARTICIPATION DATA
1989-90 THROUGH 1993-94
Percentage of Students Enrolled

PERFORMANCE AND PARTICIPATION	YEAR OF ENROLLMENT				
	89-90	90-91	91-92	92-93	93-94
High School Program Completion Rates					
University of Maryland System Requirements	NA	37.2	30.6	35.4	37.2
Occupational Program Requirements	NA	23.0	51.7	11.3	7.7
Both Sets of Requirements	NA	12.7	10.0	2.0	0.8
Participation					
Attendance Rate (Grades 7-12)	92.0	91.4	92.0	91.7	91.8
Dropout Rate (Grades 9-12)	4.6	3.7	3.5	3.2	3.7
TOTAL ENROLLMENT (All students Grades 9-12)	5131	5447	5525	5681	5870

NA – Not available

Exhibit III-4

CHARLES COUNTY PUBLIC SCHOOLS
MARYLAND FUNCTIONAL TEST PERFORMANCE
1989-90 THROUGH 1993-94
Percentage of Students Passing

MARYLAND FUNCTIONAL TESTS	YEAR TEST TAKEN				
	1989-90	1990-91	1991-92	1992-93	1993-94
Grade 9 Status					
Reading	93.2	92.7	96.2	98.0	98.3
Mathematics	78.4	83.5	83.3	88.2	88.5
Writing	93.6	88.7	92.9	96.4	95.4
Citizenship	81.2	81.2	85.6	93.5	92.9
Grade 11 Status					
Reading	na	96.7	99.5	99.1	99.8
Mathematics	na	87.8	98.0	97.5	98.7
Writing	na	98.4	98.7	98.9	99.3
Citizenship	na	89.5	98.7	97.9	99.2
Passed All Tests	na	79.1	96.6	96.5	97.8

na – Not applicable

down" effect in making the middle school curriculum more rigorous. By grade 11, virtually all students have already attained these basic competencies so increases since 1991-92 have been small as Charles County approaches 100 percent passing rates in all areas.

SAT Scores. It is difficult to judge the impact that Tech Prep should have on student performance on the SATs since the pool of students taking the tests from year to year is a strong factor in county-wide performance. Unfortunately, Charles County was not able to provide these data for trend analysis.

Student Attendance

Another school district goal in its implementation of Tech Prep was to help in its efforts to increase student participation in school, as indicated by daily student attendance rates and dropout rates. It was hoped that by making the school experience more meaningful for all students, students would attend school more regularly and not drop out. However, school attendance among secondary students is obviously subject to the influence of many factors and also the subject of the ongoing MSPP. In addition, Charles County did not begin implementing Tech Prep until the 1992-93 school year.

Charles County data indicate fairly stable daily attendance rates around 92 percent from 1989-90 through 1993-94. Dropout rates have varied from 3.2 to 4.6 percent over the same period with no apparent trends during the time when Tech Prep was introduced. These trends in attendance and dropout rates are shown in Exhibit III-3.

Post-Secondary Decisions

Ultimately, the goal of Tech Prep is to better prepare students for post-secondary education or the world of work after they finish high school. It is not possible to fully examine student outcomes in this area until students who have completed the full four-year Tech Prep sequence have entered post-secondary education or the labor force. Preliminary indications of student preparation for community college work are included in the case study of Charles County Community College (see Chapter 5). Exhibit III-5 shows preliminary trends in documented post-secondary decisions among high school graduates from the MSPP data reported for 1992 through 1994 graduates. These data are based on annual exit surveys for all graduating seniors. In the areas most likely to be effected by Tech Prep, the trends are inconsistent. Specifically, the data show that:

Exhibit III-5

CHARLES COUNTY PUBLIC SCHOOLS

POST-SECONDARY DOCUMENTED DECISIONS
CLASS OF 1992 THROUGH 1994

Percentage of Students Responding

GRADE 12 DOCUMENTED DECISIONS TO:	YEAR OF GRADUATION		
	1992	1993	1994
Attend a 4-year college	27.1	28.0	32.8
Attend a 2-year college	23.1	22.4	19.3
Attend a specialized school or pursue specialized training	3.5	3.5	3.3
Enter employment (related to high school program)	8.7	5.4	4.4
Enter employment (unrelated to high school program)	10.5	10.3	9.2
Enter the military	4.7	5.5	3.5
Enter full-time employment and school	3.2	2.4	3.6
Enter part-time employment and/or school	14.2	14.1	16.5
Other and no response	4.9	8.3	7.3

- The percentage of students attending two-year colleges after high school **decreased slightly** from 23.1 percent of 1992 graduates to 19.3 percent of 1994 graduates;

- The percentage of students entering employment related to their high school programs **decreased** from 8.7 percent among 1992 graduates to 4.4 percent among 1994 graduates; on the other hand,

- The percentage of students pursuing specialized training (3 to 4 percent) and entering the military (4 to 6 percent) after high school has remained fairly low and constant among 1992 through 1994 graduates.

IV. CASE STUDY #3: ST. MARY'S COUNTY PUBLIC SCHOOLS

A. Overview of Tech Prep and Its Components

All high school students in the St. Mary's County Public Schools participate in the Tech Prep program. The county high schools offer Tech Prep programs in four career clusters. Each cluster offers a coordinated sequence of academic and technology courses to enable students to acquire technically-oriented knowledge and skills. Each career cluster is designed to prepare students for lifelong learning, including advanced study at community colleges, technical institutions, and four-year colleges and universities, and/or direct entry into the world of work.

The objectives of the St. Mary's Tech Prep program are to:

- Provide each student with a focused program of studies in a career cluster that leads to success in higher education, the world of work, or both;
- Incorporate higher-level critical thinking and problem-solving skills into all curricular areas;
- Integrate academic and technical content and connecting content among all subject areas;
- Increase the number of students completing challenging academic courses;
- Connect high school and post-secondary programs;
- Increase expectations for learning in all courses, resulting in higher achievement for students; and
- Emphasize interactive instructional strategies and application of knowledge to real-life situations.

As students enroll in high school, they must elect a four-year sequence in one of four Tech Prep career clusters: three technology clusters and a college prep cluster which are briefly described below.

Applied Business/Management Technologies

The Business/Management cluster is for students who are interested in career opportunities in business, marketing, and management fields. Specific career specializations include:

- Accounting;
- Data Processing;
- Graphic Arts/Printing;
- Marketing;
- Office Technologies; and
- Paralegal Studies.

Applied Engineering/Mechanical Technologies

The Engineering/Mechanical cluster is for students who are interested in matching their academic and problem-solving skills with hands-on learning experiences in the related fields of engineering, manufacturing, and building trades. Specific career specializations include:

- Agriscience;
- Automotive Body Repair;
- Automotive Technology;
- Carpentry;
- Drafting;
- Electronics;
- Horticulture;

- Industrial Engineering;
- Masonry;
- Plumbing/HVAC;
- Residential Wiring;
- Sheet Metal; and
- Welding.

Applied Health/Human Service Technologies

The Health/Human Services cluster is for students with an interest in working with people and servicing their needs in the related fields of health care, child care, food service, and specialty human service industries. Specific career specializations include:

- Allied Health;
- Child Care;
- Cosmetology;
- Culinary Arts;
- Fine Arts; and
- Nursing.

Four-Year College/University

The Four-Year College/University cluster requires academic courses which prepare students for post-secondary education in a four-year institution of higher education. Students are encouraged to enroll in honors and Advanced Placement (AP) classes whenever possible. Additionally, technology courses may be integrated into a Four-Year College/University cluster schedule. Specific career specializations include:

- Humanities; and
- Science/Math.

Articulated Courses with Community College

The St. Mary's County Public Schools have negotiated articulation agreements with the Charles County Community College, to award college credit for hign school courses. College credits are granted only for those courses accepted by the college program in which the student enrolls, and students must receive a grade of "B" or better for the high school credits to articulate. In addition, these courses carry a time limit, such that students must apply for the community college credit within 18 months to three years of course completion in high school or graduation.

Role of St. Mary's County Technical Center

The St. Mary's County Technical Center provides educational programs for students to become skilled craftspeople or technicians. Emphasizing occupational techniques and skills, the ultimate goal of all courses is successful employment in the chosen occupation. Students attending the technical center spend part of the day at their home high school and part of the day at the technical center. Programs in each of the technology clusters are offered at the technical center. The Technical Center is located on the same campus as Leonardtown High School, thus making it easier to coordinate staff and student activities between these two schools than with Chopticon and Great Mills High Schools.

Decline in Technical Center enrollments during the mid-1980's was a key factor behind the school district's decision to implement Tech Prep. Both the business and education communities were concerned about the Technical Center's image as a "dumping ground" for students with achievement and discipline problems, whose graduates performed poorly in the work place. With the implementation of Tech Prep, both the role and the image of the Technical Center has changed and its enrollment has increased. For example:

- Technical Center teachers have worked closely with academic teachers from the high schools to facilitate the integration of academic and technical content in all course curricula;

- All ninth graders are required to take the Introduction to Technologies course corresponding to their chosen career cluster. These classes are offered at the high schools in a Technology Laboratory which represents a local investment in integrating the career cluster process with technology and academic expectations;

- Tenth grade students, still uncertain about their career choices, are encouraged to enroll in Applied Technology Exploration (ATEX), a career exploration program offered at the Technical Center;

- With an increased emphasis on academics in all tech center classes, the Technical Center is now seen by the community as a place where students are learning usable academic and job skills;

- Attracted by programs in graphics, drafting, and electronics, the number of college-bound students enrolled in classes at the Technical Center has increased; and

- Enrollments at the Technical Center have increased from serious underutilization at 272 students in 1989-90 to long waiting lists and 657 enrolled students in 1994-95.

B. Implementation Strategies

The implementation of Tech Prep in St. Mary's County had early roots in their participation as a Southern Regional Education Board (SREB) pilot school district. However, incoming ninth graders first had to select a career cluster in 1991-92. In this section, the strategies used by St. Mary's County to implement Tech Prep are described for each of the program's major components:

- Counseling;

- Pathways and career clusters;
- Integration of technical and academic content into an applied curriculum; and
- Articulated programs.

Additionally, factors which have facilitated implementation of Tech Prep and barriers to implementation are discussed.

Counseling

Counseling was one of the first components of Tech Prep to be implemented, both in terms of the counseling staff's early involvement in planning Tech Prep and promoting it to teachers, students, and their parents.

Overview of Career Education Program. The St. Mary's County Public Schools have a K-12 career education program which stresses that career planning is a lifelong process that does not end with a high school diploma. Career awareness activities begin in the elementary grades, with classroom speakers from the community discussing various careers and the academic skills they require.

The middle school component focuses on career exploration designed to provide students with information on a wide range of career opportunities. Assessments of student aptitudes, abilities, and interests, through such measurements as the Differential Aptitude Test (DAT) in October of 8th grade, are integrated with a variety of career exploration experiences. Counselors meet individually with students to discuss the test results and to develop a preliminary four-year educational plan for high school. Career speakers, research projects, job shadowing, and other learning experiences are combined with effective counseling practices to assist students in making informed decisions and setting goals. Many of these activities take place during eight-week career units in eighth grade social studies classes. Student career folders are developed in middle school to record students' experiences in their career searches.

In preparation for high school registration, middle school counseling activities also include orientation programs for students and parents, visits from high school counselors, and a presentation from the Technical Center.

The high school counseling program continues to offer career exploration opportunities and a career preparation focus. High School Career

Centers provide students with direct access to career resources. The high school curriculum expands career knowledge and experience through a variety of activities in many subject areas. During each of their high school years, students meet with school staff members to review career folders and discuss educational/career plans. Guidance counselors, administrators, and teachers are available to assist students as they explore options and make program decisions. The career folder serves as a valuable resource for student planning and as documentation for the school of students' career searches.

As students reach their senior year, the career folder evolves into a career portfolio, including evidence of career exploration, course work, and student products. Seniors supplement their portfolios through the development of resumes and the documentation of skills and special talents designed to demonstrate to post-secondary employers or continuing education institutions levels of student proficiency and their plans to succeed. This portfolio is a graduation requirement for students in the class of 1995 and thereafter.

Counselor Involvement. Perhaps because of counselors' early involvement in planning for Tech Prep, counseling appears to be one of the more fully implemented component of Tech Prep in St. Mary's County. Secondary counselors have been included in the development and implementation of Tech Prep from the earliest stages. For example:

- Several counselors attended the initial presentation by a North Carolina school district on Tech Prep's goals, processes, and implementation issues;

- Counselors have participated in introducing Tech Prep to teachers, parents, students, and the local business community;

- Counselors have worked with teachers, administrators, curriculum developers, and local business representatives to develop career clusters which meet the educational and employment needs of St. Mary's County students and employers; and

- Counselors assisted in developing career folders, which document student four-year educational plans and the senior career portfolio outcome.

Activities. All St. Mary's County students participate in the same counseling activities to prepare them to choose a Tech Prep pathway and develop a four-year educational plan. Counselors visit the feeder schools to speak with eighth graders about Tech Prep's purpose, options, and articulation. In addition, counselors give presentations at parents' nights, PTA meetings, and in social studies classes, and coordinate visits for students to the Technical Center.

When asked how they have attempted to promote Tech Prep among students and parents, all of the counselors responding to the survey had conducted one or more promotional activities. Specifically:

- Eighty-two (82) percent have facilitated student visits to the Technical Center;
- Sixty-four (64) percent have conducted Tech Prep orientation for parents and students;
- Fifty-five (55) percent have developed bulletin boards or posters in their school;
- Forty-six (46) percent have conducted small group meetings for parents and students to develop 4-year plans; and
- Twenty-seven (27) percent have developed brochures or other literature for parents and students.

Technical Center. The Technical Center counseling staff fulfill several special counseling roles related to Tech Prep. First, the Vocational Support Services Team (VSST) targets special needs students (e.g., special education, at-risk, pregnant students) and helps them develop a career plan in which they can be successful. They identify students' strengths and needs by administering vocational assessments, provide in-class support, and introduce students to a variety of career choices.

Career Clusters

Beginning with the 1991-92 school year, all incoming ninth graders were required to select one of the four career clusters described in the Overview. Beginning in 1993-1994, all ninth graders were also required to take an Introduction to Technologies class that corresponded to their chosen career

cluster. In addition, tenth grade students still unsure of their career cluster are encouraged to enroll in Applied Technology Exploration (ATEX), a career exploration program offered at the Technical Center.

The career clusters described in the Overview were developed with input from teachers, counselors, administrators, and local business representatives. The clusters were designed to fulfill requirements for current employment opportunities, prepare students for further education, and infuse rigorous academic content into traditionally technical courses. In general, staff recognize that the curriculum has been restructured around these clusters. Almost all of the counselors responding to the survey (91 percent) recognized that the curriculum had been restructured around career clusters. However, the restructuring efforts are somewhat less evident across all areas of the curriculum—only 54 percent of teachers responding to the survey cited restructuring in their subject area.

Integration of Technical and Academic Content into an Applied Curriculum

A primary characteristic of Tech Prep is the integration of technical and academic content. Interview respondents provided several examples of integrated academic and technical content and use of applied curricula, including:

- Continued use of applied curricula developed when St. Mary's County served as an SREB pilot site (e.g., Applied Mathematics, Principles of Technology, Chemistry in the Community);
- Development of additional applied courses which integrate academic and applied content (e.g., Applied Communications);
- Recognition of commonalities in what academic and applied courses are already teaching (e.g., business and English teachers instruct students on how to write a business letter);
- Continued integration of academic and vocational instruction by teachers at the Technical Center;

- Use of academic teachers on loan to the Technical Center to cover increased enrollment; and

- Tech Prep's emphasis on raising expectations and academics for vocational students, with the integration of academics into technical education.

At the same time, many staff commented that academic teachers still need to be more applied in their instruction. And survey data indicate that the integration of academic and technical content may not yet be evident in all curricular areas. Almost all counselors (91 percent) and teachers (88 percent) responding to the survey agree that integrating academic and vocational content is crucial to Tech Prep success. However, implementation of academic and technical integration is less prevalent:

- Only (43) percent of responding teachers reported integrating academic and vocational/technical course content;

- Twenty-nine (29) percent of teachers reported using applied academic curricula; and

- Twenty (20) percent of teachers reported providing instruction in advanced technical skills.

Where integration of academic and technical content has not occurred, the explanation may be due in part to lack of staff development on the topic and time for joint instructional activities among academic and technical teachers. For example, the survey data revealed that:

- Only 31 percent of responding teachers had participated in staff development activities on integrating vocational and academic content;

- Only 16 percent of teachers reported participating in collaboration among academic or vocational teachers to develop course content;

- Only 8 percent of teachers reported participating in team teaching with academic and vocational teachers; and

- Only 6 percent of responding teachers participated in joint planning time for academic and vocational teachers.

Articulated Programs

With the implementation of Tech Prep, St. Mary's County has increased the number of classes articulated with the Charles County Community College each year. As of 1993-94, students could receive college credit for successful completion of the following high school courses:

- Keyboarding Applications;
- Computerized Keyboarding Applications;
- Electronic Office Procedures;
- Speedwriting;
- Accounting 1 and 2;
- Data Processing 1 and 2;
- Marketing 1 and 2;
- Drafting I;
- Electronics I and II; and
- Allied Health Careers 1 and 2.

Articulation efforts have been limited to specific areas, and, therefore, have not involved a broad range of teachers. Thus, this articulation process appears to be more widely recognized by the counseling staff than by the teaching staff:

- Eighty-two (82 percent) of the counselors responding to the survey reported articulation between the secondary and

community college curricula as a curricular change since Tech Prep implementation; but

- Only 17 percent of responding teachers reported such articulation in their subject area.

The relatively small percentage of teachers aware of articulation with community college courses in their subject area is better understood in light of the small number of teachers, in specialized curriculum areas, participating in joint curriculum development with the community college staff. This is illustrated in the following survey item responses:

- Only 6 percent of responding teachers reported that they had helped to develop content articulation between secondary and community college courses;

- Only 9 percent of the teachers reported participating in staff development activities on promoting cooperation between secondary and post-secondary staff; and

- Only 12 percent of teachers reported contact with their community college counterpart in the last year.

Facilitation of and Barriers to Implementation

Interview respondents were asked to describe facilitators and barriers to the implementation of Tech Prep.

Facilitators. Respondents consistently mentioned the leadership and support from administrators as key to the successful implementation of Tech Prep. Specifically, they cited the following factors as facilitators to implementation:

- Forward-thinking, dynamic, and enthusiastic leadership from high school and central office administrators who believed in the program, promoted it, and supported it through release time for workshops and conference attendance;

- The Superintendent's vision of Tech Prep as system change, curriculum reform, and a way to restructure high schools, rather than one of many individual programs;

- Prior involvement in SREB (with its complimentary goals of raising expectations and academics for vocational students), and the access it provided to conferences and student data which showed the success of applied instructional methods;

- Professional development opportunities for teachers and counselors to visit other Tech Prep programs and attend conferences;

- Involvement of Technical Center staff who hosted student and faculty visits to demonstrate how academic instruction could be tied to vocational/technical instruction;

- Involvement of the local government and business community, first in development of the program concept, and later in development of a curriculum emphasizing emerging career opportunities to give students better access to high paying jobs; and

- Change in county economy and demographics from primarily an agrarian community to one that is dependent on high technology for jobs (e.g., military bases, federal government).

Barriers. In general, interview respondents felt that the major barriers to implementation stemmed from resistance to change among staff and the community; concerns that Tech Prep was not meeting the needs of all students (particularly high- and low-achieving students); and the lack of resources to for adequate staffing, materials, training and planning time to support the program. Respondents indicated the following specific barriers:

- Resistance to change by teachers and counselors, some who feel that educational

reform has been overdone, especially after the previous controversy over implementing a seven-period day;

- Resistance by some parents who feel that the only route to success for their children is college, that college-bound students do not benefit from technology courses, and that eighth grade is too early to select a career cluster;

- Some resistance in the community about the school systems' seriousness in implementing Tech Prep and the public's misunderstanding of Tech Prep as an attempt to "water down" the curriculum;

- Concerns among staff that Tech Prep is not meeting the needs of special education and low-achieving students who cannot handle the increased academic emphasis in vocational courses, and require more adaptation of counseling and instructional materials (especially lab materials and algebra);

- Lack of common planning time for teachers in different content areas, and for academic and technical teachers to work together;

- Lack of resources for adequate materials to support the program (e.g., materials and equipment to support labs in classrooms, field trips to job sites);

- Lack of sufficient staffing to support all aspects of the program (e.g., more counselors to work on individual student career goals; more teachers to reduce class size in higher-level mathematics for a greater range of students; more opportunities for 11-12th graders to enroll in programs at the Technical Center); and

- Need for additional curriculum and staff development workshops.

Survey respondents also were asked to indicate the adequacy of the support they had received in implementing Tech Prep. Responding counselors expressed a greater perception of support than did teachers. Teachers were more likely than counselors to perceive the support they had received as insufficient, particularly in the area of planning time, but also in terms of support from counselors and central administration, staff development, and materials. Specifically:

Areas of Support	% of Respondents Indicating Sufficient Level of Support	
	Counselors (N=11)	Teachers (N=90)
Support from Principal	91	70
Support from (Other) Teachers	70	61
Materials	91	49
Staff Development	91	49
Support from Central Administration	82	48
Support from (Other) Counselors	91	47
Planning Time	N/A	25
Professional Development Time	90	N/A

C. Institutional Outcomes

This section addresses the institutional outcomes that have resulted from the implementation of Tech Prep in the following areas:

- Curriculum;
- Staff development;
- Counseling strategies and methods;
- Instructional strategies and methods;

- Relationship with the community college;
- Relationship with the local business community;
- Staff attitudes;
- Logistical impacts; and
- Other programs affecting Tech Prep outcomes.

Curriculum

Staff interviewed reported several curriculum changes resulting primarily from the implementation of Tech Prep, including the following specific changes:

- Complete revision of the Program of Studies to center the curriculum around the four Tech Prep career clusters;
- A complete overhaul of the math curriculum, including the elimination of general, consumer, and remedial math, and the requirement that all students take algebra, geometry, and applied math;
- More of an applied emphasis throughout the curriculum with less emphasis on theory, especially in mathematics (Applied Math 1 and 2), but also in science (Chemistry in the Community and Principles of Technology) and language arts (Applied Communications) and through the career technology labs;
- Higher expectations for student outcomes and skills, particularly in mathematics where condensing the options and requiring higher-level thinking skills made the courses more challenging; and

- Integration of writing and computers into all instruction.

However, staff also noted that the new state graduation requirements for students entering ninth grade in 1993-94 also have encouraged changes in the curriculum, because they include credits in algebra and geometry, technology education, and advanced technology or foreign language.

While the survey results indicate that counselors are more aware of curriculum changes than are teachers, they also show that a relatively small proportion of teachers are aware of curriculum changes in their subject area related to Tech Prep thus far. This is not an unanticipated finding since articulation efforts have been limited to specific areas and have not involved a broad range of teachers. Specifically:

Areas of Curriculum Change	% of Respondents Reporting Change	
	Counselors (N=11)	Teachers (N=90)
Curriculum restructured around career pathways and/or clusters	91	54
Integration of academic and technical content	91	34
Articulation of secondary curriculum with community college curriculum;	82	17
Academic content integrated across disciplines	64	16

Finally, none of the counselors but 43 percent of teachers reported having seen no changes to the curriculum, with teachers responding regarding only their own subject area.

Some interview respondents also mentioned more opportunities for cross-disciplinary integration of course content (e.g., business and math, business and English). However, they felt that these curriculum changes were not entirely attributable to Tech Prep, but also a reflection of current educational philosophy. Curriculum changes regarding the integration of academic content across disciplines was more apparent to counselors than teachers. Sixty-four (64) percent of counselors responding to the survey but only 16 percent of teachers reported seeing more academic content integrated across disciplines, with teachers commenting only on their subject area.

Staff Development

Comprehensive staff development for teachers, counselors, and administrators is crucial to the successful implementation of Tech Prep. Interview respondents named several specific staff development activities which have come about with the implementation of Tech Prep:

- Several SREB-related activities (e.g., attendance and presentations at SREB workshops and conferences, speakers like Eugene Bottoms);
- Site visits for teachers and counselors to Tech Prep programs in North Carolina and South Carolina;
- Local in-service workshops covering a general orientation to Tech Prep as well as specific topics for teachers and counselors (e.g., integrated activities, different learning styles, career counseling);
- Attendance and presentations at state and national conferences and workshops (e.g., national Tech Prep conference in Baltimore, CORD workshop on applied math);
- Visits by academic teachers to observe and co-teach Technical Center classes;
- Summer curriculum development workshops which brought together teachers in all disciplines, academic and vocational teachers, and industry representatives; and
- Teacher internships with businesses.

On the other hand, the staff interviewed disagreed somewhat on whether these activities represented significant change in staff development for all staff since the implementation of Tech Prep. Several staff reported that local staff development activities are now more broadly focused (county- rather than school-wide), and have a Tech Prep agenda, or at least are covering more Tech Prep-related issues (e.g., different learning styles, computer literacy, academic and vocational integration). Some staff reported

more opportunities to learn about Tech Prep through conference attendance and presentations, as well as site visits. Other teachers said they had not seen much change in staff development, but rather a reorganization and reemphasis of the same information, coupled with the use of Tech Prep terminology.

Survey results indicate the perception of change in staff development by counselors more so than by teachers. While 81 percent of counselors have seen some change in staff development in the last three years, only 57 percent of teachers reported any change. And with respect to the specific areas of change addressed in the survey, most teachers and counselors feel have not seen change in staff development activities over the last three years:

Changes in Staff Development in the Last 3 Years	% of Respondents	
	Counselors (N=11)	Teachers (N=90)
There have been more opportunities to attend conferences or training institutes.	46	23
Topics covered are more relevant to instruction.	36	18
Staff development activities are held more frequently.	27	10

Survey data indicate that almost all staff (91 percent of counselors and 88 percent of teachers) have participated in some staff development activities on Tech Prep-related topics. However, most staff have participated in staff development on general information about Tech Prep, rather than in-service training on specific strategies for implementing Tech Prep in the classroom:

Staff Development Topics	% of Respondents	
	Counselors (N=11)	Teachers (N=90)
General information about Tech Prep	82	64
Integrating academic and vocational content	18	31
How math, science, and/or communications competencies are applied in the work setting	9	13
Developing curricula and instruction to promote hands-on learning	N/A	28

Finally, survey data indicate that some staff also have received in-service training in strategies which are important to Tech Prep, but are not unique components of Tech Prep, such as:

In-Service Topics	% of Respondents	
	Counselors (N=11)	Teachers (N=90)
Recognizing and accommodating different learning styles	27	27
Using multiple teaching strategies	N/A	21
Effective ways to raise and achieve higher expectations	27	17
Methods for teaching diverse populations	N/A	16

Counseling Strategies and Methods

The earliest institutional impact of Tech Prep implementation can be seen in St. Mary's County's counseling program. Interview respondents discussed several new counseling strategies and methods which were put in place to prepare students, teachers, and parents for the implementation of Tech Prep. For example:

- Familiarizing students and parents with Tech Prep options through individual and group sessions, and helping them find the best fit between student strengths and interests;
- Revising student career folders, updating students' four-year plans annually, and developing portfolios for students at graduation;
- Arranging student visits to the Technical Center;
- Using in-class career assessments at the Technical Center;
- Providing more students with vocational counseling and evaluation;
- Focusing the counseling of all students, rather than just college-bound students, on

post-secondary career and educational options; and

- Involving social studies teachers in career counseling at all grades.

The survey data also indicate that career development and counseling activities essential to the successful implementation of Tech Prep generally have been conducted in county schools this past year. For example,

- Ninety-one (91) percent of counselors responding to the survey reported using a "program of studies" to help develop students' educational plans;

- Eighty-two (82) percent reported individual career development counseling, and career awareness and exploration for students in Tech Prep;

- Seventy-three (73) percent said that students had access to or used career exploration software;

- Sixty-four (64) percent reported development of individual plans for Tech Prep students, indicating courses to be taken at the secondary and post-secondary levels; and

- Fifty-five (55) percent said that career development activities had been integrated into academic and/or vocational courses.

On the other hand, more specialized counseling activities were reported less frequently:

- Thirty-six (36) percent of responding counselors reported support services for Tech Prep students with special needs;

- Twenty-seven (27) percent reported special career development classes, and use of special career counseling materials

developed especially for Tech Prep students; and

- Eighteen (18) percent said that work-site learning had been integrated with school-site learning.

Finally, counselors responding to the surveys indicated some changes in their counseling strategies and a positive effect on both themselves and students since the implementation of Tech Prep. Specifically,

- Fifty-five (55) percent of counselors said that they now encourage students to take higher levels of math and science courses;

- Seventy-three (73) percent reported feeling more able to help students with post-secondary and career goals; and

- Seventy-three (73) percent said that students seek career guidance more often since the implementation of Tech Prep.

Survey results suggest that the earlier impact on counseling than teaching strategies may be due to the greater involvement of counselors in Tech Prep planning, start-up, and implementation activities. All of the counselors, and 78 percent of responding teachers reported involvement in some planning and implementation activities during the last three years. However, looking at specific planning activities, there was a significantly higher percentage of counselors than teachers who have been involved. Specifically:

Planning and Implementation Activities	% of Respondents	
	Counselors (N=11)	Teachers (N=90)
Attended local in-service workshops or training on Tech Prep	100	46
Spoke to parents or students about Tech Prep	82	38
Attended state/regional workshops or training on Tech Prep	64	13
Participated in Tech Prep meetings with business or community leaders	46	18
Attended national conference on Tech Prep	27	0
Served on a planning or steering committee for Tech Prep	18	7
Presented material at national Tech Prep conference	18	4
Conducted workshops or training on Tech Prep	18	3

Instructional Strategies and Methods

Teachers and administrators were asked about changes in instructional strategies as a result of Tech Prep implementation. Interview respondents characterized learning as more student-oriented rather than teacher-centered under Tech Prep, and cited several examples of increases in teaching methods which are encouraged by Tech Prep programs. For example:

- More integrated instruction across both academic and technical disciplines, with team-teaching across disciplines (e.g., English and social studies), and bringing other content areas into each discipline's instruction (e.g., teaching math and English in business classes);

- Increase in joint instructional activities between the Technical Center and academic teachers, who have traditionally taught the same principles using different terminology;

- Use of more applied academic instruction at the Technical Center (e.g., measurement in carpentry, writing assignments in all classes);

- More hands-on, lab-like activities and use of manipulatives in math classes; and

- More integration of computers and communications skills (writing) in all courses (e.g., business).

Teachers of technical courses said that they have continued to use strategies advocated by Tech Prep by (e.g., hands-on lab work, use of work place examples in classroom activities). Interview respondents also cited increased usage of several instructional strategies which have been advocated by other educational reform movements beside Tech Prep: cooperative learning techniques, varied teaching strategies, use of applications in real world, increased use of computer labs.

However, the survey data suggest that many of the instructional strategies emphasized by Tech Prep currently are not being implemented by teachers across all subject areas. While 63 percent of teachers responding to the survey indicated using instruction relevant to the world of work,

- Forty-three (43) percent reported integrating academic and vocational course content;

- Thirty-seven (37) percent reported integrating career development activities into instruction;

- Twenty-nine (29) percent said they had used applied academic curricula;

- Twenty-one (21) percent said they had scheduled a representative from business or industry to visit classes; and

- Twenty (20) percent reported using instruction in advanced technical skills.

On the other hand, the use of strategies advocated by a number of educational reform movements were most common. Among teachers responding to the survey:

- Seventy (70) percent reported varying their teaching strategies to meet diverse learning styles;

- Sixty-eight (68) percent reported using hands-on learning opportunities; and

- Sixty-three (63) percent reported using cooperative learning techniques.

Another desired result of Tech Prep is closer communication and cooperation among academic and vocational teachers. However, survey data indicate that this collaboration is not yet occurring regularly among responding teachers:

- Sixteen (16) percent of teachers responding to the survey reported involvement in interdisciplinary planning and teaching;

- Sixteen (16) percent said that they had participated in collaboration with academic and vocational teachers to develop course content;

- Eight (8) percent reported participating in team teaching with academic and vocational teachers;

- Six (6) percent reported participating in joint planning time for academic and vocational teachers; and

- Finally, fifty-one (51) percent reported that they had not participated in any of the listed collaborative instructional activities this year.

Relationship with the Community College

Administrators were asked about the school district's relationship with the community college and how it had changed with the implementation of Tech Prep. Interview respondents mentioned the following activities which suggest a growing partnership between St. Mary's County Public Schools and the Charles County Community College:

- A completely revised Program of Studies which describes a sequence of possible post-

secondary courses at the community college toward a certificate, associate degree, or apprenticeship program in each career cluster and area of specialization;

- Joint workshops with community college staff to work out articulation agreements; and

- Joint staff development activities (e.g., speakers like Dale Parnell).

On the other hand, the survey data indicate that although most secondary counseling staff are aware of articulation with community college curricula, the majority of staff have had little training in working with post-secondary staff or actual contact with community college staff:

Relationship with Community College	% of Respondents	
	Counselors (N=11)	Teachers (N=90)
Seen secondary curriculum articulated with community college curricula	82	17
Participated in staff development on promoting cooperation between secondary and post-secondary staff	18	9
Had contact with community college counterpart	N/A	12
Helped develop articulation between secondary and community college curricula/courses	0	6

Relationship with the Local Business Community

Administrators interviewed agreed that Tech Prep had heightened their school district's relationship with the local business community, particularly in the program planning stages when the business community was heavily involved. In the initial planning stages, the school district developed partnerships with local business and worked closely with employers to identify good employee skills. Representatives of local businesses were also involved in reviewing curricula and providing guidance in developing appropriate career clusters. School district officials were aware of the importance of "selling" the Tech Prep concept to the business community and spoke at rotaries, and the county and regional technology councils about the program.

However, the survey responses indicate that the majority of teaching and counseling staff do not have contact with the business community. Generally, counselors have had greater contact with business and industry representatives than have teachers. Specifically:

Activities with Community Business Representatives	% of Respondents	
	Counselors (N=11)	Teachers (N=90)
Participated in Tech Prep meetings with business or community leaders	46	18
Scheduled representatives from business or industry to visit classes	27	21
Had contact with a business/industry representative in a field related to Tech Prep curriculum or class taught this year	9	28
School conducted student trips to employer work sites during the past year	27	N/A

Staff Attitudes

During the interviews, some staff said that they had initially viewed Tech Prep as another gimmick or label for what had previously been advocated by educational reformers nationally and in their district. Other staff were initially concerned that lower ability students could not handle the higher academic demands of the revised Tech Prep curricula which now included algebra for all students. Finally, some staff mentioned initial concerns that eighth and ninth graders were too young to select a career cluster. Although some staff still remained concerned about these latter two issues, most interview respondents reported a positive change in attitude as they became better informed of Tech Prep's purposes and options. Still many staff feel that it is too early to determine whether or not Tech Prep is effective. Several staff voiced the opinions that Tech Prep:

- Focuses students on preparation for life;
- Fits the population and meets students' needs;
- Motivates students with integrated and applied content; and

- Provides more options for all students.

Survey data also indicate positive staff attitudes toward Tech Prep. However, counselors and teachers differ somewhat in their perception of the range of students for which Tech Prep is beneficial. A higher percentage of counselors than teachers see Tech Prep as beneficial for "general track" students, college-bound students, and all students. Specifically:

Attitude Item	% of Respondents	
	Counselors (N=11)	Teachers (N=90)
Tech Prep is beneficial to the former general "track" students.	100	88
Tech Prep is appropriate for college-bound students.	73	56
Tech Prep is beneficial for all students.	64	57

Generally, counselors were also more likely than teachers to see additional benefits of Tech Prep for students. Specifically:

Attitude Item	% of Respondents	
	Counselors (N=11)	Teachers (N=90)
Tech Prep will effectively prepare students for post-secondary education and/or future employment.	82	58
Tech Prep has increased the academic rigor of courses for former general "track" students.	82	53
Tech Prep helps to orient students to current work place requirements.	73	74

Finally, teachers were more likely than counselors to express negative attitudes toward Tech Prep:

- Nineteen (19) percent of teachers and none of the counselors felt that Tech Prep is just another short-lived educational fad; and

- Twelve (12) percent of teachers and none of the counselors felt that Tech Prep has not changed vocational education.

Despite these few negative sentiments, most staff responding to the surveys (100 percent of counselors and 82 percent of teachers) support the continuation of the Tech Prep program.

Logistical Impacts

When administrators were asked about any logistical problems brought about by Tech Prep, they most frequently mentioned scheduling, facilities, and staffing issues. Specifically, they cited the logistical difficulties of:

- Creating a schedule at the Technical Center to accommodate the schedules of three comprehensive high schools;
- Offering Technology Exploration classes at the Technical Center, which requires bus transportation for students at two of the high schools;
- Providing sufficient staff and facilities at the Technical Center to accommodate all of the students interested, especially 11th and 12th graders;
- Building enough technology labs in the comprehensive high schools to accommodate all interested students; and
- Staffing courses which only a limited number of staff have been trained to teach (e.g., Applied Math, Technology Education).

Other Programs Affecting Tech Prep Outcomes

Administrators and teachers were asked about additional programs which may have affected the implementation of Tech Prep or its outcomes. Interview respondents mentioned several programs or initiatives, most of which are being implemented by the school district at the same time as Tech Prep, that complement Tech Prep with similar goals and objectives. Specifically, they discussed the following programs and initiatives:

- Prior involvement in SREB which focused on raising expectations and academics for vocational students, and provided student data which showed the success of applied instructional methods;

- Maryland's Student Performance Program (MSPP) which holds schools accountable for some of the same objectives (i.e., achievement, attendance, lower dropout rates) and encourages similar instructional techniques (i.e., applied academics, integrated curriculum, diverse assessment), but also distracts some attention from Tech Prep by requiring that students pass the Maryland Functional Tests;

- New state graduation requirements which include algebra and geometry for all students, a technology education course, and two years of advanced technology or foreign language;

- Concurrent involvement in Roots and Wings, a program being piloted in four elementary schools which emphasizes similar instructional strategies (e.g., integrated learning, applied academics, alternate assessments, and opportunities for career exploration);

- Maryland's Tomorrow which complements Tech Prep because it focuses at-risk students on important job and life skills;

- The concurrent push for increased use of computers and technology in instruction;

- Involvement in the Middle States evaluation, several objectives of which match Tech Prep objectives; and

- The Technical Center's participation in Vocational and Industrial Clubs of America (VICA), a vocational honor society.

D. Student Outcomes

Tech Prep was introduced with several student outcome goals, in the areas of attitudes, program and course enrollment, academic performance, attendance, and post-secondary decisions. However, it is somewhat premature to ask what secondary student outcomes have been achieved with the implementation of Tech Prep. First, the program has not been fully implemented. It was first introduced in St. Mary's County in the 1991-92 school year and consequently, the first students to complete the full four-year program will not graduate from high school until Spring 1995. Second, it is impossible to attribute any student outcomes specifically to the Tech Prep program for two reasons:

- The absence of any comparison group of similar students who have not had the Tech Prep experience; and

- The simultaneous existence of other national, state, county, or school-level programs attempting to achieve similar outcomes.

However, it is appropriate to begin examining staff perceptions of student attitude change, and trends over time which can indicate whether program and course enrollment, student performance, attendance, and post-secondary intentions are at least moving in the expected directions. If indicators of these outcomes suggest movement in the desired direction, administrators can be more comfortable that Tech Prep is working. If, on the other hand, there is no indication of change, or change is in undesired directions, now is the time to review and revise program efforts.

Student Attitudes

Staff perceptions of student attitudes were assessed in interviews with teachers, counselors, and administrators, and in surveys of teachers and counselors.

Staff Interviews. Some interview respondents said that it was still too soon to see changes in student attitudes until they had completed the full four-year sequence. But several staff had noticed some changes in student attitudes and behavior. for example,

- Students appear more goal-oriented, more focused on their courses, and more aware of post-secondary education and career options;
- Students now value the hands-on, job-oriented instruction offered at the Technical Center;
- Students see connections between what they are learning in their courses and real-world jobs; and
- Students participating in labs appear more confident, outgoing, independent and self-directed.

Staff Surveys. Surveys of teachers and counselors included two items about student attitude change since the implementation of Tech Prep. Survey responses indicate that there has been some change in student attitudes thus far, with a higher percentage of counselors than teachers reporting change. Specifically, the data show that:

- Eighty-two (82) percent of responding counselors and 54 percent of responding teachers agreed that students are more focused on career goals; and
- Sixty (60) percent of counselors but only 14 percent of teachers felt that students exhibit a more business-like, purposeful attitude.

Program and Course Enrollment

With the advent of Tech Prep, the school system anticipated that program and course enrollment patterns would change. One obvious area to look for enrollment changes is in programs that had previously existed but that

might receive renewed interest from students as a result of Tech Prep implementation, specifically:

- Career programs articulated with the community college;
- Career and technology programs not articulated with the community college; and
- Technical Center enrollment.

Exhibit IV-1 presents the student data available which permit the examination of trends in the above-listed areas of program enrollment. Specifically, county-wide data are presented from a few years before the implementation of Tech Prep (1989-90 school year) through the 1994-95 school year (where available). The data presented and discussed below indicate that student outcomes are generally moving in the expected directions in these program enrollment areas.

Articulated Career Programs. As previously discussed, St. Mary's County offers several programs that provide articulated credit at the Charles County Community College. The percentage of students enrolled in these programs had been increasing through the 1991-92 school year to about 40 percent of all students, but has shown a modest decrease since the implementation of Tech Prep, down to about 33 percent of all students in 1993-94.

Non-articulated Programs. Although the primary emphasis of Tech Prep has been on program articulation with the community college, the school district is also interested in the effects of increased career planning through the student four-year plans on student enrollments in non-articulated career and technology programs. The percentage of students enrolled in these non-articulated programs has remained fairly stable at 7 to 9 percent of enrollment from 1989-90 through 1993-94.

Technical Center. The school district expected that Tech Prep would increase the utilization of the Technical Center by making more students aware of the opportunities to pursue technical programs, with courses offered both at their home school and at the Technical Center. As anticipated, student enrollment in courses offered at the Technical Center has increased since Tech Prep was implemented, from roughly 8-9 percent before Tech Prep (1989-90 and 1990-91) to 19 percent in 1994-95. Over the same six-year period, there also have been slight enrollment increases in the courses offered at the Center which relate directly to the implementation of Tech Prep:

Exhibit IV-1

ST. MARY'S COUNTY PUBLIC SCHOOLS
CAREER AND TECHNOLOGY PROGRAM, COURSE, AND CENTER ENROLLMENTS
1989-90 THROUGH 1994-95
Percent (and Number) of Students Enrolled

AREA OF ENROLLMENT	YEAR OF ENROLLMENT					
	89-90	90-91	91-92	92-93	93-94	94-95
Articulated Career Programs[1]	1.6 (53)	38.4 (1272)	40.8 (1325)	36.0 (1148)	32.8 (1121)	NA
Non-articulated Career and Technology Programs[2]	6.9 (227)	8.1 (270)	7.6 (247)	9.4 (298)	8.4 (288)	NA
Career and Technology Center-Total	8.3 (272)	8.8 (292)	15.4 (500)	16.1 (512)	19.1 (652)	18.8 (657)
Applied Technology Exploration (ATEX) Course	NA	NA	5.7 (184)	7.1 (225)	7.7 (263)	6.9 (243)
Career Courses	8.3 (272)	8.8 (292)	9.7 (316)	9.0 (287)	11.4 (389)	11.8 (414)
TOTAL ENROLLMENT (All Students Grades 9-12)	3277	3314	3247	3187	3414	3503

NA - Not available

[1]Includes programs in the following areas: Keyboarding Applications, Computerized Keyboarding Applications, Electronic Office Production, Speedwriting, Accounting, Data Processing, Marketing, Drafting, Electronics, and Allied Health.

[2]Includes programs in the following areas: Agriscience, Auto Body Repair, Automotive Technology, Carpentry, Cosmetology, Culinary Arts, Graphics and Printing, Horticulture, Industrial Engineering Technology, Masonry, Plumbing/HVAC, Residential Wiring, Sheet Metal, and Welding.

- Enrollment in Applied Technology Exploration (ATEX) course has increased from 6 to 8 percent; and

- Enrollment in career courses has increased from 9 to 12 percent.

Another obvious area for change is student enrollment in those areas where new courses or programs have been created, at least in part as a result of Tech Prep implementation:

- Applied Tech Prep clusters;

- Technology education courses; and

- Applied courses.

Exhibits IV-2 and IV-3 present the data available in these three areas for the last two school years. Although somewhat incomplete, most of the data available do suggest that student enrollments are moving in the expected directions.

Applied Tech Prep Clusters. With the implementation of Tech Prep in St. Mary's County, students must now select a cluster in one of four areas: either four-year college/university (College Prep), or in one of three applied technologies: Business/Management, Engineering/Mechanical, or Health and Human Services. The data presented in Exhibit IV-2 indicate that enrollment in these four areas has remained fairly stable over the last two years. About 45 percent of students are selecting the college prep cluster, while the remaining students are evenly divided among the applied technology clusters. It is impossible to determine whether these data reflect an increase in the overall percentage of students preparing for four-year college or applied careers since Tech Prep because there are no comparable data available from previous years.

Technology Education Courses. Enrollments in technology education courses should be increasing in recent years, in part because of the influence of Tech Prep, but also because of new State of Maryland graduation requirements which include one credit in technology education. The St. Mary's county data presented in Exhibit IV-2 indicate that the percentage of students enrolling in the technology education courses has increased in each of the three applied technology clusters, from a total of 18 percent in 1993-94 to roughly 33 percent in 1994-95.

Exhibit IV-2

ST. MARY'S COUNTY PUBLIC SCHOOLS
TECH PREP CLUSTER AND COURSE ENROLLMENTS
1993-94 AND 1994-95
Percent (and Number) of Students Enrolled

AREA OF ENROLLMENT AND YEAR	CLUSTER			
	Applied Business/Management Technologies	Applied Engineering/Mechanical Technologies	Applied Health & Human Services Technologies	Four-Year College/University
Cluster Enrollment				
1993-94 (Total = 3414)	15.7 (536)	20.9 (713)	16.6 (567)	46.8 (1597)
1994-95 (Total = 3503)	17.3 (606)	21.2 (741)	16.0 (560)	45.6 (1597)
Technology Education Enrollment				
1993-94 (Total = 3414)	4.9 (168)	7.0 (240)	6.0 (205)	na
1994-95 (Total = 3503)	9.6 (335)	11.1 (389)	12.1 (425)	na

na - Not applicable

143

Exhibit IV-3

ST MARY'S COUNTY PUBLIC SCHOOLS
COURSE ENROLLMENTS
1989-90 THROUGH 1994-95
Percent (and Number) of Students Enrolled

AREA OF ENROLLMENT	YEAR		
	1989-90	1993-94	1994-95
All Applied Courses[3]	na	NA	11.0 (387)
Advanced Level Academic Courses			
English CP/AP	39.2 (1285)	47.4 (1619)	47.6 (1667)
Social Studies CP/AP	45.5 (1491)	51.0 (1740)	52.4 (1837)
Mathematics CP/AP	49.5 (1622)	64.5 (2201)	63.5 (2225)
Science CP/AP	34.6 (1135)	48.0 (1640)	43.0 (1506)
Foreign Languages	32.6 (1067)	40.8 (1393)	41.8 (1466)
TOTAL DISTRICT ENROLLMENT (All Students Grades 9-12)	3277	3414	3503

NA - Not available
na - Not applicable

[3]Includes the following courses: Applied Mathematics I and II, Chemistry in the Community, and Principles of Technology I and II.

Applied Courses. Although applied courses were first introduced into the county curriculum with SREB, St. Mary's County was only able to provide enrollment data for 1994-95. These data, which have been included in Exhibit IV-3, indicate that 11 percent of students are enrolled in the following applied courses in 1994-95: Applied Math, Chemistry in the Community, and Principles of Technology.

Finally, the consortium school districts had also hoped that Tech Prep would increase enrollments in **advanced level academic courses**, especially science and mathematics. Exhibit IV-3 presents the number and percentage of students enrolled in college prep (CP) or advanced placement (AP) courses for English, social studies, mathematics, science, and foreign languages. These data indicate consistent increases in the percentage of students enrolled in advanced academic level courses before Tech Prep implementation in 1989-90 to the last two school years. The improvement has been greatest in mathematics, with the percentage of student enrolled in CP or AP courses increasing from roughly 50 percent in 1989-90 to 64 percent in 1994-95.

Student Performance

With the implementation of Tech Prep, the school district had hoped to improve student performance in several areas. First and most obviously, they expected that restructuring the curriculum around career clusters would increase the high school program completion rates, particularly for students meeting the occupational program requirements. Second and less directly, they thought that improving the academic rigor of courses for all students would increase student pass rates on the Maryland Functional Tests, the number of students meeting university entrance requirements, and possibly student scores on the Scholastic Aptitude Tests (SAT). However, it should be noted that student performance in these same areas has been the focus of the Maryland School Performance Program (MSPP). Consequently, it is impossible to attribute any changes in student academic performance specifically to Tech Prep.

Exhibits IV-4 and IV-5 present student data trends from 1989-90 through 1993-94 in each of these areas where data were available.

Program Completion Rates. Trends in high school program completion rates, presented in Exhibit IV-4, indicate increases in the percentage of students county-wide who have met occupational program requirements before and after Tech Prep implementation. The percentage of students meeting university entrance requirements has increased from 1990-91 to 1992-93, but then decreased in 1993-94. Finally, although the numbers are small, there has

Exhibit IV-4

ST. MARY'S COUNTY PUBLIC SCHOOLS
STUDENT PERFORMANCE AND PARTICIPATION DATA
1989-90 THROUGH 1993-94
Percentage of Students Enrolled

PERFORMANCE AND PARTICIPATION	YEAR OF ENROLLMENT				
	89-90	90-91	91-92	92-93	93-94
High School Program Completion Rates					
University of Maryland System Requirements	NA	33.7	34.8	40.7	29.5
Occupational Program Requirements	NA	11.8	21.8	20.7	24.2
Both Sets of Requirements	NA	1.9	1.8	4.9	6.2
Participation					
Attendance Rate (Grades 9-12)	89.2	89.7	92.6	93.6	92.5
Dropout Rate (Grades 9-12)	7.2	6.0	5.4	4.2	3.6
TOTAL ENROLLMENT (All Students Grades 9-12)	3277	3314	3247	3187	3414

NA - Not available

Exhibit IV-5

ST. MARY'S COUNTY PUBLIC SCHOOLS
MARYLAND FUNCTIONAL TEST (MFT) AND SAT PERFORMANCE
1989-90 THROUGH 1993-94

AREA OF TEST PERFORMANCE	YEAR TEST TAKEN				
	1989-90	1990-91	1991-92	1992-93	1993-94
MFT Grade 9 Status (% students passing)					
Reading	94.8	96.6	98.4	97.8	98.1
Mathematics	68.1	73.9	77.6	76.4	81.9
Writing	85.4	60.6	87.0	93.5	85.6
Citizenship	72.9	74.6	83.6	85.0	83.2
MFT Grade 11 Status (% students passing)					
Reading	na	99.5	99.7	99.5	99.7
Mathematics	na	96.5	96.8	96.5	96.1
Writing	na	95.1	98.5	98.9	99.4
Citizenship	na	96.7	97.6	97.9	96.7
Passed All Tests	na	91.2	94.6	94.5	93.1
Scholastic Aptitude Test (SAT)					
Verbal	422	413	426	425	NA
Math	457	458	476	478	NA
Total	879	871	902	903	NA

na - Not applicable
NA - Not available

been an increase in the numbers of students meeting both program completion requirements. Specifically:

- The percentage of students meeting occupational requirements has doubled from about 12 percent in 1990-91 to 24 percent in 1993-94;

- The percentage of students meeting University of Maryland entrance requirements increased from 33.7 to 40.7 percent of all students county-wide, from 1990-91 to 1992-93, but then decreased to 29.5 percent in 1993-94 (the county many want to examine this change in trend further); and

- The percentage of students meeting both occupational and university requirements has increased from 2 percent to 6 of all students from 1990-91 to 1993-94.

Maryland Functional Tests (MFT). The MFTs assess whether students are attaining basic competencies in the areas of reading, mathematics, writing, and citizenship. Achieving these basic competencies is required for graduation. Trends in performance on the MFTs are presented in Exhibit IV-5. The percentage of students passing the MFTs in grades 9 and 11 has steadily increased from 1989-90 to 1993-94 in all areas, especially in mathematics, writing, and citizenship. The largest increases have occurred among first time test-takers in grade 9 when the impact of Tech Prep on academic performance should be negligible, other than any "trickle down" effect in making the middle school curriculum more rigorous. By grade 11, virtually all students have already attained these basic competencies so increases since 1990-91 have been small as St. Mary's County approaches 100 percent passing rates in all areas.

SAT Scores. It is difficult to judge the impact that Tech Prep should have on student performance on the SATs since the pool of students taking the tests from year to year is a strong factor in county-wide performance. The trend data for St. Mary's County SAT scores presented in Exhibit IV-5 indicate relatively stable mean reading scores since 1989-90, but a modest increase of about 20 points in mathematics.

Student Attendance

Another school district goal in its implementation of Tech Prep was to help in its efforts to increase student participation in school, as indicated by daily student attendance rates and dropout rates. It was hoped that by making the school experience more meaningful for all students, students would attend school more regularly and not drop out. However, school attendance among secondary students is obviously subject to the influence of many factors and also the subject of the ongoing MSPP.

St. Mary's County data indicate a modest increase in daily attendance rates from roughly 90 percent to 93 percent from 1989-90 through 1993-94. Dropout rates have decreased from 7.2 to 3.6 percent over the same period. These positive trends in attendance and dropout rates are shown in Exhibit IV-4.

Post-Secondary Decisions

Ultimately, the goal of Tech Prep is to better prepare students for post-secondary education or the world of work after they finish high school. It is not possible to fully examine student outcomes in this area until students who have completed the full four-year Tech Prep sequence have entered post-secondary education or the labor force. Preliminary indications of student preparation for community college work are included in the case study of Charles County Community College (see Chapter 5). Exhibit IV-6 shows trends in documented post-secondary decisions among high school graduates from the MSPP data reported for 1992 through 1994 graduates.

These data are based o annual exit surveys of all graduating seniors. The post-secondary decisions most likely to be affected by Tech Prep have been examined. The trends show slight but insignificant decreases in the number of vocational students pursuing these post-secondary options. Specifically, the data show that:

- The percentage of students attending two-year colleges after high school **decreased slightly** from 16 percent of 1992 graduates to 14.2 percent of 1994 graduates;
- The percentage of students entering employment related to their high school programs **decreased slightly** from 11.2

ERIC

Exhibit IV-6

ST. MARY'S COUNTY PUBLIC SCHOOLS
POST-SECONDARY DECISIONS
CLASSES OF 1992 THROUGH 1994
Percentage of Students Responding

GRADE 12 DOCUMENTED DECISIONS TO:	YEAR OF GRADUATION		
	1992	1993	1994
Attend a 4-year college	22.2	29.1	25.7
Attend a 2-year college	16.0	13.4	14.2
Attend a specialized school or pursue specialized training	4.0	5.1	3.7
Enter employment (related to high school program)	11.2	8.4	9.0
Enter employment (unrelated to high school program)	11.5	9.1	13.9
Enter the military	9.1	10.3	7.6
Enter full-time employment and school	3.3	4.0	4.7
Enter part-time employment and/or school	13.6	15.4	14.5
Other and no response	9.0	5.3	6.6

percent among 1992 graduates to 9 percent among 1994 graduates;

- The percentage of students entering the military after high school **decreased slightly** from 9.1 to 7.6 percent among 1992 and 1994 graduates; and

- The percentage of students pursuing specialized training after high school has **remained fairly low and stable at** 4 to 5 percent.

V. CASE STUDY #4: CHARLES COUNTY COMMUNITY COLLEGE

As a partner in the Southern Maryland Educational Consortium with three neighboring school districts (Charles, Calvert, and St. Mary's), the Charles County Community College (CCCC) initiated the development of Tech Prep in 1989. Tech Prep coordinates the high school and community college career programs, with the goal of providing graduates with the technically-oriented knowledge and skills required in today's work place. A high school student may select a Tech Prep pathway and/or cluster, which prescribes a coordinated sequence of academic and technical courses, beginning in ninth grade and generally extending through community college graduation. Some high school courses may qualify the student for advanced standing in the college program through articulation agreements between the school districts and the community college. Work-based opportunities are also an integral component of the Tech Prep program at the community college. The college has received grant funds from the Maryland State Department of Education, Division of Career Technology and Adult Learning, and a U.S. Department of Education Demonstration Project to support Tech Prep.

A. Overview of Tech Prep at the Community College

At the community college-level, Tech Prep essentially consists of four components:

- **Articulation** between secondary and community college courses and programs;
- **Advisement strategies** which meet the needs of Tech Prep students;
- **Curriculum and instructional methods** which meet the needs of students who have experienced an applied curriculum, and integrated academic and technical content at the secondary level; and
- **Work-based learning** opportunities.

These four components are described in more detail in the following section on the implementation of Tech Prep.

B. Implementation Process and Status

The Charles County Community College has been involved in the Tech Prep planning and implementation process from the beginning when their college president joined the superintendents of the three surrounding school districts to form the Southern Maryland Educational Consortium in 1989. Community college administrators have long been familiar with the problem of students ill-prepared for college or jobs who end up enrolling in community college 10 years after finishing high school. They saw Tech Prep as a solution to the dilemma of producing better prepared high school graduates who can continue and complete a technically oriented program at the community college or go on to a four-year institution, and ultimately be qualified for a good job. The community college also recognized the potential benefits Tech Prep offers in terms of local economic development.

The community college has been very active in obtaining federal and state funds to support the development and implementation of Tech Prep in the tri-county area. They have written successful grant proposals to obtain Perkins monies (Carl D. Perkins Vocational and Applied Technology Act) which have supported articulation efforts and a Tech Prep advisor at the community college, and U.S. and Maryland Department of Education funds which have supported staff development and programming in the secondary schools and community college.

At this time, the Charles County Community College is in the initial stages of implementing the community college components of Tech Prep. Students who have completed the full four years of the secondary Tech Prep program will first enroll in the community college in the Fall of 1995. However, in preparation for these Tech Prep students, some work on each component is underway. In this section, the implementation strategies used and the current implementation status are briefly described for each of Tech Prep's community college components: articulation, advisement, curriculum and instructional methods, and work-based learning opportunities. In addition, factors which have facilitated and hindered the implementation of Tech Prep at the community college are discussed, and staff perceptions regarding the major challenges that remain are presented.

Articulated Programs/Courses

Community college articulated career programs are certificate and degree programs sequenced with eleventh and twelfth grade secondary courses. Students from public high schools in the tri-county area may receive college credit for courses they have taken under articulation agreements between the college and these school systems. Each school district has negotiated articulation agreements with the community college for specific courses in their high schools. These courses are listed in each school district's case study (see Chapters 2 - 4).

Articulation agreements between the community college and the surrounding school districts were first developed in 1985, pre-dating Tech Prep. In anticipation of the implementation of Tech Prep at the secondary level, divisional faculty meetings were held in 1991 and 1992 to expand articulation agreements, and propose course sequences to guide the secondary system as they revised their programs of study. In 1993 an articulation form was developed specifically for the transfer of credit by Tech Prep students. Although some articulation agreements were in place before Tech Prep, now more programs are being articulated. Currently, articulation only applies to career programs, but the community college is considering expanding it application to transfer programs. The state of Maryland is presently discussing whether four-year institutions of higher education (IHEs) should accept credits from community colleges that were earned in high schools through articulation agreements. Some IHEs are questioning whether high school credits accepted by community colleges should count toward a bachelor's degree.

The articulation process is the major component of Tech Prep at the community college because it is the mechanism that ties the secondary and community college curricula together. However, thus far only a small number of students have taken advantage of articulation to receive community college credit for courses taken in high school. The community college does not fully understand why more students are not enrolling with these articulated credits in hand, but staff interviewed offered three possible explanations:

- Students may not sufficiently recognize or understand the articulation process;
- Secondary and community college counselors may not have adequately promoted the articulation process among incoming students; and

- Roughly half of all community college students intend to transfer to four-year IHEs, and consequently are not interested in receiving credit for courses taken in high school because they currently are not transferrable to IHEs.

Advisement

As part of the implementation of Tech Prep at the community college, administrators have anticipated that changes will need to made in advisement strategies for entering Tech Prep students. At this point in time, the community college is still waiting for four-year completers of secondary Tech Prep programs. However, the community college advisement staff have begun to prepare for Tech Prep, through the staff development activities described later in this chapter as well as through joint activities with secondary counseling staff, particularly around the articulation process. And starting in 1994-95, the community college has brought in a Tech Prep specialist to serve as an academic advisor to facilitate the implementation of Tech Prep advisement at the community college level. Changes in advisement strategies and methods are discussed further in the next section on the institutional outcomes of Tech Prep.

Curriculum and Instructional Methods

Again, administrators are anticipating changes in the community college curriculum and instructional methods with the arrival of students who have experienced four years of Tech Prep in high school, where technical and academic content have been integrated into a more applied curriculum. At this point, the implementation of any new curriculum or teaching methods at the community college level is just beginning. Thus far, as a result of Tech Prep, the community college has continued to develop articulation agreements with the secondary schools which have impacted the community college curriculum in articulated program areas. In addition, the community college has developed new programs in both the Division of Career and Technical Education and the Division of Arts and Sciences and applied courses in several areas. Tech Prep has also fostered the integration of technology into the curriculum, and encouraged instructional methods which involve increased use of computer applications and more class discussion. Changes in the curriculum and instructional strategies are discussed in more detail in the next section on the institutional outcomes of Tech Prep.

Work-Based Learning Opportunities

The community college provides work-based learning opportunities through its cooperative education program, which combines classroom study with a supervised work experience in a professional environment. Students work for one or two semesters (225 hours per semester) at a job related to their program of study. They earn three academic credits each semester for knowledge and skills gained from work performed on the job, and are also paid a salary. Cooperative education experiences are available to students in all academic areas, with the exception of nursing and allied health, which include their own work-based practicum experiences.

Facilitation of and Barriers to Implementation

Facilitators. Administrators, faculty, and advisors were also asked about the factors that have facilitated the implementation of Tech Prep at the community college. Most frequently mentioned were factors relating to the current educational climate, the administrative leadership, success of Tech Prep at the secondary level, and the availability of federal funding. Specifically, community college staff cited the following factors as facilitators of Tech Prep implementation:

- An educational climate characterized by continued poor outcomes among high school students, including high dropout rates and the lack of adequate job preparation;
- The changing economic climate, demanding different skills in the work place;
- The willingness of the secondary schools and the community college to recognize that their existing curricula were not focused and needed to change;
- The close match between Tech Prep and the college's mission, which was revised in 1991 to include a commitment to economic development;
- The availability of federal money behind this national initiative;

- Visionary leadership on the part of community college, school district, and consortium administrators, as well as the local business community;

- The flexibility of the consortium's Tech Prep model which allowed three very different counties to share ideas and develop individualized approaches; and

- The success Tech Prep had already experienced in the high schools and the subsequent support it has received from most educators and parents.

Barriers. When asked what factors hindered the implementation of Tech Prep, staff most frequently mentioned resistant attitudes among the faculty, concerns about the tracking implications of Tech Prep, and the lack of resources to support full implementation. Specifically, community college staff cited the following barriers to Tech Prep implementation:

- Lack of proactive preparation on the part of the community college as it waits for Tech Prep students to arrive;

- Lack of faculty commitment, involvement, and development;

- Resistant attitudes among academic faculty who see Tech Prep lowering academic standards and limiting potential for students who should go on to four-year IHEs;

- Perception that Tech Prep sets up early (eighth grade) forced tracking between career and college prep students;

- Lack of continued funding until Tech Prep is fully implemented;

- Lack of resources to support Tech Prep (e.g., more release time for faculty, more staff training, full-time administrator); and

- Problems with the articulation process (i.e., amount of time required to develop and finalize an articulation agreement, lack of articulation with four-year IHEs).

Major Challenges and Suggestions

In response to these perceived barriers, staff were also asked what they saw as the major challenges facing the college in order to fully implement Tech Prep and their suggestions regarding what the college should do to prepare for incoming Tech Prep students. Specific suggestions were that the college:

- Study results from other Tech Prep programs and trends in the three consortium counties to plan next steps at the community college;

- Provide additional in-service training and materials for faculty, to modify instruction in both technical and academic subjects, in order to prepare for students who have been taught differently in high school;

- Base program development on skill sets, determining skills sets required by the market place, assessing these skills among high school graduates, and then teaching the remaining skill sets);

- Revise advisement methods to match Tech Prep needs;

- Develop a mechanism for tracking Tech Prep students, in high schools to plan for enrollment shifts, and in the community college to examine student outcomes;

- Work on recruitment activities (e.g., encourage student visits to the community college);

- Increase involvement of department chairs and faculty in Tech Prep; and
- Develop a contingency plan if no state and federal funds are available to support Tech Prep, including the increased use of college operating funds.

C. Institutional Outcomes

With the full implementation of Tech Prep, the community college expects to see institutional outcomes in the following areas:

- Curriculum;
- Staff development;
- Advisement strategies and methods;
- Instructional strategies;
- Relationship with the local public schools; and
- Staff attitudes.

This section presents the findings from interviews with community college staff regarding institutional outcomes in these six areas, as well as other programs which may have affected the implementation of Tech Prep or its outcomes.

Curriculum

When asked how community college courses or programs had changed with the implementation of Tech Prep, several staff commented that they had not seen any dramatic changes yet. Rather, staff expect curriculum changes in response to student needs, and students completing a four-year secondary sequence of Tech Prep courses have not arrived at the community college yet. One administrator said that the community college is planning to develop additional programs and build advanced skills into courses, but must wait to

see higher-level skills in the students enrolling. Other staff felt that the development of articulation agreements between the secondary schools and the community college had in fact already impacted the community college curriculum in articulated program areas by aligning college courses more closely to the secondary curriculum. Staff also commented on specific changes in certain curricular areas; for example,

- The development of new programs in the Division of Career and Technical Education (e.g., physical therapy assisting), more so than in the Division of Arts and Sciences;

- The development and revision of courses in several areas: mathematics (Contemporary Algebra), nursing (introductory course), data processing, and paralegal studies; and

- The integration of more technology into the curriculum, especially in English classes (e.g., teaching writing classes in the computer lab, using multi-media for teaching and student assignments).

Staff also commented that some of these changes may have occurred without Tech Prep, but felt that Tech Prep has made the college more aware of the need to change the curriculum.

Staff also noted that other areas of the curriculum have experienced little change, for example:

- Tech Prep has not seriously impacted the child care curriculum because course work in this area is dictated primarily by the state's child care governing body; and

- Nursing has not seen a lot of change because it is already an applied discipline with significant lab components, required practicum experiences, and class work based on real case studies.

In general, the staff commented on the need to make classes more practical and less academic, to accommodate different learning styles, and to

use more technology. Finally, faculty made several discipline-specific suggestions of needed changes in the curriculum in response to Tech Prep:

- Develop specific **mathematics** courses for Tech Prep students, based on the level of mathematics they have mastered in high school, and the level required in the workplace;

- Although **science** courses already include hands-on lab components, develop more real-world laboratory experiences (e.g., visiting real rock formations for a geology course);

- Develop a technical **physics** course with a more applied text, more labs, and less lecture (once it is established that there is a demand for such a course); and

- Integrate more academic skills into the **nursing** curriculum (e.g., use of language for documentation, critical thinking skills for nurses making front-line decisions, mathematics for pharmaceutical therapy).

Staff Development

Staff were asked what professional development activities they had participated in to prepare for Tech Prep and about any additional staff development needs. The staff interviewed mentioned some general presentations on Tech Prep-related topics, joint activities with secondary staff, and conference attendance as their major sources of professional development on Tech Prep. For example, some staff specifically cited the training they had received on different learning styles, and the integration of technology into the curriculum. Several staff commented on the effectiveness of joint training activities with secondary staff, such as the summer workshop entitled "Teaching Tomorrow's Work Force," which allowed arts and sciences faculty and high school teachers to look at current jobs. Staff also have been encouraged to attend and present at national conferences, such as the National Tech Prep Network Spring Conference in Baltimore and "High Schools that Work" in Nashville. A few staff mentioned other specific activities which have contributed to their professional development on Tech Prep:

- Participating in the DACUM process to develop courses or programs in allied health, paralegal studies, applied mathematics, and environmental technology;

- Presentations by outside experts such as the speaker from CORD on applied learning;

- A mini-grant to support faculty development on the integration of technology into all curricular areas;

- Provision of computers for all faculty;

- Faculty mentoring; and

- Updates for faculty on grant and consortium activities.

Finally, staff had several suggestions for additional staff development activities they would like to see made available to facilitate the implementation of Tech Prep:

- More opportunities for joint training activities between community college and secondary staff;

- More release time for conferences and to work with their secondary and community college colleagues;

- Additional training on applied instruction, diverse learning styles, workforce needs, and integrating technology into the curriculum;

- More training opportunities for all community college staff, including part-time faculty and staff on all campuses;

- Increased utilization of the faculty resource center which provides computer software support; and

- More information on the students who are coming to the community college from high school Tech Prep programs.

Advisement Strategies and Methods

As students who have experienced four years of Tech Prep in high school begin enrolling in the community college, both administrators and advisors agree that advising methods and strategies need to change. But thus far, there has been little change because only a few students have taken advantage of articulation agreements. Currently, the community college is reviewing their advisement and career counseling efforts to determine whether they will meet the needs of Tech Prep students.

The community college has already undertaken some advisement activities to prepare for the arrival of Tech Prep students. Advisement staff conduct recruitment sessions in the three counties for secondary students considering enrolling at the community college. Information on Tech Prep articulation has been integrated into these sessions. And starting in 1994-95, the community college has hired a Tech Prep academic advisor to facilitate implementing Tech Prep advisement at the community college level. This advisor is working in the high schools to recruit and counsel twelfth graders and incoming Tech Prep students at the community college. Finally, administrators and advisors reported the following community college plans regarding advisement of Tech Prep students:

- Moving the advisor's role away from course registration and toward more career counseling;

- Providing additional coordination between high school counselors and community college advisors; and

- Integrating Tech Prep articulation into the state's electronic articulation data base (ARTSYS) which is currently available only for two- to four-year college articulation.

Both administrators and advisors offered several suggestions for needed changes in community college advisement in response to Tech Prep:

- Advisors should work with high school counselors to become more familiar with the secondary curriculum and the skills students are bringing;

- The community college should provide workshops for high school counselors on college courses, articulation, and transfer credits;

- Advisors need to understand employment opportunities and career paths for students not transferring to four-year IHEs;

- Advisors need to improve their case management skills; and

- Advisors need more opportunities to share information with their community college colleagues (e.g., regular meetings).

Instructional Strategies and Methods

Administrators and faculty also anticipate the need to change teaching methods as students who have experienced Tech Prep in high school bring different learning styles and more experience using technology into the community college classroom. Staff have already noticed the beginnings of change in instructional strategies. For example,

- Mathematics instruction is more applied;

- Computer applications have expanded from primarily word processing to the use of networks for student communication and collaboration;

- Instruction is becoming more student-centered with more time spent on discussion rather than lecture; and

- Some instructors have split class assignments to accommodate both the needs of students

planning to transfer to four-year IHEs and students entering the work force.

However, both administrators and faculty see the need for further changes in teaching methods, including additional use of technology (e.g., distance learning, integration of computers into all classes), and increased efforts to make instruction more applied, integrated and lab-oriented, and less structured.

Relationship with the Local Public School Systems

Tech Prep has helped the community college develop a closer, more cooperative relationship with the public schools, administratively through the formation of the SMEC, and out of necessity as the secondary and community college curricula have become more closely aligned. Previously, some barriers have existed between the community college and the public schools as each wrestled with responsibility for disappointing outcomes among some of their students. Tech Prep has helped to break down these barriers, brought community college and secondary staff together, and encouraged shared responsibility for life-long learning and student outcomes. Finally, through the consortium, Tech Prep has expanded the number and variety of contacts between community college and secondary staff. For example, community college and secondary staff have:

- Collaborated on program development, curriculum alignment, and articulation agreements;
- Participated in joint staff development activities (e.g., last summer's workshop "Teaching Tomorrow's Workforce"); and
- Visited businesses in the tri-county area to better understand local employment needs.

When individual staff were asked whether they had worked with any of the public school systems on Tech Prep, several cited specific examples:

- Faculty worked with St. Mary's County on their Southern Regional Education Board grant for work-based learning;

- Faculty are working with Calvert County to develop a program in Emergency Medical Services;

- Advisors work with Charles County to coordinate programming between the district and the community college through an umbrella committee (Experience the College); and

- Advisors spoke to staff at the Charles County Career and Technology Center about articulation with community college courses.

Staff Attitudes

Given that Tech Prep has not been fully implemented in the community college, it is not surprising that staff attitudes toward the program are slow to change. Some faculty at first saw Tech Prep as just another educational fad or as another reworking of vocational education. Other staff were concerned that Tech Prep had not been clearly defined, and consequently, that the three counties were approaching the program very differently. Finally, some staff have long felt that the high schools were not preparing students adequately for college-level work. Staff are now reporting more positive attitudes toward Tech Prep, as they develop closer relationships with secondary staff and see that high school courses are becoming more rigorous, which in turn should result in students who are better prepared academically for community college work.

Other Programs Affecting Tech Prep Outcomes

Administrators were asked about other programs which may have affected the implementation of Tech Prep or its outcomes. Interview respondents mentioned several programs or initiatives, that complement Tech Prep with similar goals and objectives. Several respondents cited the Southern Maryland Early Intervention Program (SMEIP), a collaborative effort among the three counties and three IHEs (University of Maryland, St. Mary's College, and Charles County Community College), which is supported by a grant from the Maryland Higher Education Commission. This program provides early intervention to disadvantaged students by laying out a course of study early in their high school program, and then offering a variety of support services (e.g.,

tutoring, mentoring, campus visits, student/faculty dialogues, financial aid workshops, college admission nights) to assist them in completing a program. This early educational planning is being enhanced through the four-year student plans each county requires as students select a Tech Prep pathway and/or cluster.

In addition to SMEIP, interview respondents mentioned other programs and initiatives, occurring at the community college and national levels, which complement Tech Prep and may result in similar outcomes:

- The current thrust in community college education to define general education as skills needed in the work force;
- The LYNC (Launch Your Nursing Career) summer program which offers high school students paid hands-on experience in hospitals combined with community college coursework;
- Goals 2000: Educate America Act which emphasizes life-long learning; and
- School-to-Work Opportunities Act, which attempts to connect high schools, community colleges, four-year IHEs, and the world of work.

D. Student Outcomes

Tech Prep has several student outcome goals, both at the secondary and post-secondary levels. The community college expects that with the full implementation of Tech Prep, there will be changes in student attitudes, enrollment and retention patterns, program and degree focus, and academic performance. However, at this point, it is premature to ask what community college student outcomes have been achieved with the implementation of Tech Prep. First, the program has not been fully implemented. It was first introduced in St. Mary's and Calvert Counties in the 1991-92 school year and in Charles County in 1992-93. Consequently, the first students to complete the full four-year secondary program will not graduate from high school until Spring 1995, and will not be eligible to enroll in the Charles County

Community College until Fall 1995. Second, it is impossible to attribute any student outcomes specifically to the Tech Prep program for two reasons:

- The absence of any comparison group of similar students who have not had the Tech Prep experience; and

- The simultaneous existence of other national, state, county, or school-level programs attempting to achieve similar outcomes.

However, it is reasonable to begin examining student outcome trends with the assumption that students who have experienced two years of Tech Prep in St. Mary's and Calvert Counties could have entered the community college in the Fall 1993, and may have begun to demonstrate changes in the desired directions. Consequently, the study asked staff about their perceptions of student attitude change, and examined data since 1992 in enrollment and retention, program and degree focus, and academic performance to determine whether data trends are at least moving in the expected directions. If indicators of these outcomes suggest movement in the desired direction, administrators can be more comfortable that Tech Prep is beginning to work. If, on the other hand, there is no indication of change or change is in undesired directions, now is the time to review and revise program efforts.

Student Attitudes

Community college staff were asked whether they had noticed any differences in recent community college students, especially those receiving credit through high school articulation. Staff interviewed were either unaware of how many students had received articulated credits or said that few students had taken advantage of articulation. Most staff commented that it was too early to see any differences in student attitudes or behavior at the community college level. However, some staff have noted the following differences in recent high school graduates (who have experienced two years of Tech Prep):

- They are more like the adult learners the community college has always served in their degree of career awareness and education focus;

- Students are more comfortable with technology (e.g., Internet, CD-Rom, on-line services);

- Students are more task-oriented. and better able to work collaboratively in groups; and

- Students appear better prepared in mathematics and science (e.g., they do not need to take developmental math).

Student Data Trends

The Charles County Community College (CCCC) collects and reports comprehensive enrollment and performance information on the progress of high school graduates in their first year of college, for the Maryland Higher Education Commission. Exhibit V-1 presents data from the High School Graduate System and Student Outcomes and Achievement Reports for graduates from the tri-county area over the last three years (the classes of 1992 through 1994). Exhibit V-2 presents the same data for graduates of St. Mary's Public Schools, one of the districts which has implemented Tech Prep since 1991-92 and consequently, has two-year Tech Prep graduates who enrolled in CCCC during the 1993-94 school year. These data permit the examination of trends in the areas of enrollment and retention, program and degree focus, and academic performance from before the implementation of Tech Prep through the first year that two-year Tech Prep graduates could enroll in the community college.

Enrollment and Retention. With the implementation of Tech Prep in the tri-county area, it is expected that the number of high school graduates enrolling at CCCC will increase. Furthermore, with the focus of Tech Prep on students completing a two-year community college program, it is expected that a higher percentage of these recent high school graduates will enroll as full-time rather than part-time students and will attend continuously for the full two years. The data presented in Exhibits V-1 and V-2 indicate that while the number of recent tri-county graduates enrolling in community college has decreased slightly, the percentage of students enrolling full-time and continuing into the spring semester has increased from 1992 to 1994, particularly among St. Mary's County graduates. Specifically,

- The number of high school graduates enrolling in CCCC the following fall semester has actually decreased slightly over

Exhibit V-1

CHARLES COUNTY COMMUNITY COLLEGE
DATA ON POTENTIAL TECH PREP STUDENT OUTCOME INDICATORS FOR TRI-COUNTY HIGH SCHOOL GRADUATES, 1992-1994

INDICATORS	HS GRADUATION CLASS		
	1992	1993	1994
Enrollment and Retention			
Number of Students Enrolled*	707	705	687
Full-time Students*	59%	62%	63%
Full-time Fall Attendance	57%	59%	59%
Full-time Spring Attendance	51%	52%	54%
Fall-Spring Retention*	78%	79%	80%
Type of Degree Sought			
Certificate	4%	5%	4%
Associate	72%	66%	68%
No degree	24%	29%	28%
Curriculum Code			
Transfer to 4-year Institution (0100)	60%	55%	52%
Undeclared/Non-Degree Seeking (0200)	23%	25%	24%
Associate Degree (0300)	12%	12%	16%
Certificate (0400)	4%	5%	4%
Remediation Required*			
Mathematics	22%	28%	24%
English	27%	22%	29%
Reading	20%	17%	20%
Performance			
Mean Cumulative Credit Hours	14.6	15.0	14.7
Mean Cumulative GPA*	2.22	2.24	2.27

*These items and all 1994 data were based on CCCC 1992-94 Student Outcomes and Achievement Report. 1992 and 1993 data for other indicators came from the 1992-93 CCCC High School Graduate System Report.

Exhibit V-2

CHARLES COUNTY COMMUNITY COLLEGE
DATA ON POTENTIAL TECH PREP STUDENT OUTCOME INDICATORS FOR ST. MARY'S COUNTY HIGH SCHOOL GRADUATES, 1992-1994

INDICATORS	HS GRADUATION CLASS		
	1992	1993	1994
Enrollment and Retention			
Number of Students Enrolled*	183	174	151
Full-time Students*	51%	49%	60%
Full-time Fall Attendance	49%	51%	56%
Full-time Spring Attendance	45%	44%	50%
Fall-Spring Retention*	74%	78%	79%
Type of Degree Sought			
Certificate	5%	3%	5%
Associate	67%	64%	69%
No degree	28%	33%	26%
Curriculum Code			
Transfer to 4-year Institution (0100)	54%	50%	48%
Undeclared/Non-Degree Seeking (0200)	28%	27%	22%
Associate Degree (0300)	13%	14%	21%
Certificate (0400)	5%	3%	5%
Remediation Required*			
Mathematics	25%	26%	17%
English	29%	16%	25%
Reading	15%	17%	19%
Performance			
Mean Cumulative Credit Hours	12.9	13.2	15.0
Mean Cumulative GPA*	2.11	2.18	2.32

*These items and all 1994 data were based on CCCC 1992-94 Student Outcomes and Achievement Report. 1992 and 1993 data for other indicators came from the 1992-93 CCCC High School Graduate System Report.

the last three years, for Charles and St. Mary's Counties alone, while Calvert County enrollment has increased;

- The percentage of high school graduates attending CCCC full-time has increased from 59 to 63 percent for tri-county graduates and from 51 to 60 percent for St. Mary's County graduates from 1992 to 1994; and

- The percentage of high school graduates continuing into the second semester of community college has increased slightly among tri-county and from 74 to 79 percent among St. Mary's County graduates over this three-year period.

Degree Sought and Program Focus. Students completing the 4 + 2 Tech Prep sequence should enter community college with the intention of completing a certificate program or an associate degree in a specific field. Consequently, with the implementation of Tech Prep, the composition of the community college student population should change somewhat, with the percentage of students seeking an associate degree or certificate increasing and the percentage of students not seeking a degree or planning to transfer to a four-year IHE decreasing. The data presented in Exhibits V-1 and V-2 on the type of degree sought show fluctuations in these percentages over the last three years and do not indicate consistent trends in the expected directions. However, when students' program focus is based on curriculum codes, the data indicate decreases in the percentage of students planning to transfer to a four-year IHE and those not seeking a degree, and an increase in the percentage of students seeking an associate degree. These three-year trends are more predominant for recent graduates of St. Mary's County Public Schools than for students from all of the tri-county schools. For example, among St. Mary's County graduates,

- The percentage of students planning to transfer from CCCC to four-year IHEs decreased from 54 to 48 percent from 1992 to 1994;

- The percentage not seeking a degree decreased from 28 to 22 percent; and

- The percentage seeking an associate degree increased from 13 to 21 percent.

Academic Performance. Students participating in Tech Prep are expected to be better prepared academically for community college work because of the emphasis on more academic rigor in all secondary courses. This should result in fewer students requiring remedial course work upon entry into community college and possibly higher grades and a larger number of credit hours completed during the first year. Data on the percentage of students requiring remediation in mathematics, presented in Exhibit V-2, indicate that St. Mary's County 1994 graduates are better prepared in mathematics than their 1992 counterparts with a reduction from 25 to 17 percent. This trend is encouraging since the most dramatic changes in St. Mary's secondary curriculum have occurred in mathematics (see Chapter 4). However, data for graduates from all tri-county schools and in English and reading do not show trends in the desired directions. St. Mary's County graduates also show increases in the mean number of credit hours earned and in their cumulative GPA during their first year of community college, while these trends are not evident in the tri-county data (again, see Exhibits V-1 and V-2).

VI. OVERVIEW OF SECONDARY SURVEY RESULTS

A. Purpose, Topics, and Reporting

The primary sources of staff data for the secondary case studies were interviews and surveys. The interviews permitted in-depth discussions with district administrators, principals, teachers, and counselors who had been involved in the planning and implementation of Tech Prep. The surveys provided information about the implementation and outcomes of Tech Prep from a broader range of respondents, that is, all teachers and counselors in the sample schools.

Both the interviews and the surveys covered a wide variety of topics, but the surveys provided more quantifiable results regarding the extent of implementation and institutional outcomes. Copies of the teacher and counselor surveys appear in Appendix B. Survey questions covered staff involvement in Tech Prep, implementation levels and institutional outcomes of Tech Prep, and attitudes toward Tech Prep. Specifically the surveys included the following topics:

- Staff involvement in the planning and implementation of Tech Prep:
- Participation in staff development activities;
- Changes in staff development and curriculum;
- Teaching strategies and methods;
- Collaborative instructional activities;
- Support to implement Tech Prep; and
- Staff attitudes toward Tech Prep.

The survey results have been incorporated in the individual case studies of each school district (see Chapters 2 through 4). This chapter presents the survey findings across the three school districts, and compares the responses of technical and academic teachers as well as teachers and counselors.

B. Sample and Distribution

The surveys were administered to all teachers and counselors in the sample schools: the three (3) career and technical centers and the six (6) high schools. In addition, middle school counselors in the feeder schools received surveys. Surveys were distributed by the Tech Prep coordinators in each district at staff meetings during the first week of June 1994, and returned by the third week of June as part of each staff member's end-of-school checklist. Surveys were returned by 262 teachers and 27 counselors, representing 55 percent of all surveys distributed. Response rates varied across school districts, from 40 to 66 percent completed, and between counselors and teachers, with 59 and 54 percent completed, respectively. Although survey results from the entire sample would be viewed with more confidence, response rates over 50 percent are considered good for surveys administered to school staff. The specific response rates for teachers and counselors are presented for each school district in Appendix C.

C. Analysis of Results by Subgroups

Analysis of the survey results focused on three comparisons among sample subgroups: school districts, teacher types, and staff roles.

School Districts

Teacher responses were compared across the three school districts because of the very different approaches each district had taken to Tech Prep and the later implementation of Tech Prep in Charles County. It was anticipated that indicators of Tech Prep implementation and outcomes might be lower for Charles County staff who had implemented Tech Prep one year later in their schools. The statistical significance of variation among the school districts was determined with a Chi-Square test. However, any conclusions from the Charles County staff surveys should be viewed with additional caution because of their lower response rates (below 50 percent).

Teacher Types

Teachers were categorized as either academic or technical/vocational, based on the subject areas they taught. This resulted in classifying 66 percent

of the teachers who responded to the surveys as academic and 27 percent as technical/vocational teachers[1]. Since Tech Prep was designed primarily for the former "general track" student, it was expected that technical/vocational teachers might be more involved in Tech Prep implementation and more aware of institutional outcomes, than academic teachers. A Chi-Square test was also used to determine the statistical significance of differences between academic and technical teachers.

Staff Roles

Staff responses of teachers and counselors were also compared for those questions included on both surveys. Since counselors had been heavily involved in the planning of Tech Prep, especially in developing the four-year student plans, it was anticipated that they might show higher levels of implementation than the teachers (who were predominantly academic rather than technical/vocational). Response differences between teachers and counselors were not tested for statistical significance because of the small number of counselors in the sample pool, and consequently, any conclusions based on these comparisons should be viewed cautiously.

D. Summary of Results

In this section, the survey results are summarized for each survey topic, including comparisons across school districts, and between academic and technical teachers and teachers and counselors. Tabulations of the survey results are presented in Appendix E.

---

[1]Teachers of technology courses (i.e., business, engineering, health and human services, or occupational technologies, or technology education) were considered technical/vocational teachers. Teachers of the traditional academic subjects (i.e., English, fine arts, foreign languages, health, mathematics, physical education, practical arts, science, or social studies) were categorized as academic teachers. Teachers of "other subject areas" who could not be identified as technical or academic were eliminated from this comparison.

Involvement in Implementation

Two sections of the staff surveys included items which reflect staff involvement and exposure to Tech Prep, in terms of planning, implementation and staff development.

Staff Involvement in Planning and Implementation. Across all three school districts, 70 percent of teachers responding to the survey had been involved in some Tech Prep planning and implementation activities during the last three years. In all three districts, the most common Tech Prep activities among both teacher and counselors were advising students on Tech Prep and attending local in-service training on Tech Prep. There were statistically significant differences in involvement across the three districts, with higher percentages of Calvert and St. Mary's teachers indicating participation in planning and implementation than teachers from Charles County for five of the listed activities (see Exhibit E-1). Involvement was also higher for technical than academic teachers on all items, with statistically significant differences on eight items (see Exhibit E-2). Finally, counselors appear to have been more involved than the total sample of teachers on all but one planning and implementation activity (see Exhibit E-3).

Participation in Staff Development Activities. In all three school districts, the majority of teachers responding to the survey had participated in some staff development activities on Tech Prep-related topics. However, the most common topic of such staff development was general information about Tech Prep, rather than specific training on strategies or methods critical in program implementation. Generally, higher percentages of teachers from Calvert and St. Mary's Counties had received in-service training on Tech Prep-related topics than had Charles County teachers, with statistically significant variation on three of the listed topics (see Exhibit E-4). Participation rates in staff development related to Tech Prep were also higher among technical than academic teachers on all topics listed (with statistically significant differences on all but two topics)—see Exhibit E-5. And although counselors (96 percent) were more likely than teachers (81 percent) to have participated in at least one Tech Prep staff development activity, there were few differences among teachers and counselors on those topics which appeared on both surveys (see Exhibit E-6).

Implementation Status and Institutional Outcomes

Several sections of the survey provided indicators of the extent to which Tech Prep had been implemented and had resulted in various institutional outcomes. Developers of Tech Prep anticipated institutional changes in the

areas of staff development and curriculum. In addition, program developers expected that with the implementation of Tech Prep, they would see the use of certain teaching strategies and collaborative instructional activities. Finally, program planners attempted to provide sufficient staff support to facilitate the implementation of Tech Prep. Survey results in each of these areas are examined below.

Changes in Staff Development. Teachers and counselors were asked if they had seen any changes in staff development activities in the last three years. Across all three school districts, 42 percent of the teachers responding to the survey indicated that they had seen some increases in staff development activities, either in frequency, relevance, or opportunities to attend conferences. There was some significant variation in teacher responses from the three districts, with Calvert County teachers most consistently noting some change in their staff development activities (see Exhibit E-7). In all three areas (frequency, relevance, and conference opportunities), technical teachers were more likely to note changes in staff development than were academic teachers, and a higher percentage of counselors reported change than did all teachers (see Exhibits 8 and 9).

Changes in Curriculum. Teachers were also asked whether they had seen any changes in the curriculum in their subject area. Across the three districts, 70 percent of the teachers responding to the survey reported some change in the curriculum, most frequently citing the curriculum restructuring around career pathways or clusters. There was statistically significant variation among the three districts, with Charles County teachers more frequently reporting the integration of academic content across disciplines, and teachers from Calvert and St. Mary's Counties more often indicating curriculum restructuring (see Exhibit E-7). Technical teachers and counselors more frequently reported curriculum change in each of the areas listed on the survey than did academic teachers and teachers in general (see Exhibits 8 and 9). However, counselor responses were not restricted to curriculum changes in their own subject area.

Teaching Strategies and Methods. With the implementation of Tech Prep, program planners had expected to see utilization of various instructional methods advocated by Tech Prep. Teachers were asked which of several different teaching strategies they had used during the past year. Across the three school districts, teachers who responded to the survey most frequently indicated use of several strategies which have been advocated by Tech Prep as well as other educational reform movements: hands-on learning opportunities (70 percent), cooperative learning techniques (70 percent), and variation in teaching to meet diverse learning styles (70 percent). Use of strategies specific to Tech Prep was also common but less frequently reported; for example:

- 58 percent of teachers said they had used instruction relevant to the world of work;
- 39 percent reported integration of career development activities into instruction;
- 36 percent reported integration of academic and vocational/technical course content; and
- 23 percent said they had used applied academic curricula.

Here, there were few significant different among the school districts (see Exhibit E-10). However, technical teachers were consistently and significantly more likely to report usage of the instructional strategies listed on the survey than were academic teachers (see Exhibit E-11).

Collaborative Instructional Activities. In order to effectively implement Tech Prep, teachers need to work with other professionals—their secondary colleagues as well as community college faculty and the business community. Teachers were asked which of several collaborative instructional activities they had personally participated in during the year. Roughly half of the teachers responding to the survey had participated in at least one of the collaborative instructional activities listed, most frequently contact with a business or industry representative (30 percent). There were few differences among the counties, with Charles County teachers most likely to have participated in at least one collaborative instructional activity, and more frequently having contact with the community college, than teachers from Calvert and St. Mary's Counties (see Exhibit E-12). However, technical teachers (82 percent) were significantly more likely to report participation in collaborative instructional activities than were their academic counterparts (39 percent); and this was true for each of the activities listed. Especially relevant are results for joint activities involving technical and academic teachers, where a much higher percentage of technical teachers are participating than are academic teachers (see Exhibit E-13).

Support to Implement Tech Prep. Teachers and counselors were asked if they had received sufficient support to implement Tech Prep in each of several areas. The majority of teachers reported sufficient support in all areas listed except planning time (only 32 percent). There was statistically significant variation among the three school districts, with higher percentages of Calvert and St. Mary's County teachers reporting sufficient support than did teacher from Charles County in all but one of the areas listed (see Exhibit

E-14). Technical teachers were significantly more likely to perceive the support they had received in all areas listed as sufficient than were academic teachers (see Exhibit E-15). Counselors also appeared to be more satisfied with the support they had received to implement Tech Prep than were teachers (see Exhibit E-16).

Staff Attitudes

The survey also included several items designed to tap staff attitudes toward Tech Prep. Among teachers, attitudes toward Tech Prep were generally very positive. From a list of 12 items, a majority of teachers across the three school districts expressed positive attitudes on all but one item: 14 percent of responding teachers felt that students exhibit a more business-like, purposeful attitude since the implementation of Tech Prep. Most telling is the finding that 77 percent of the responding teachers support continuation of the Tech Prep program.

There was statistically significant variation across the three districts on only two items. Charles County teachers were more likely to feel that Tech Prep had not changed vocational education and less likely to see students as more focused on career goals since the implementation of Tech Prep, than were teachers from the other two districts (see Exhibit E-17). A higher percentage of technical teachers consistently expressed positive attitudes toward Tech Prep than did academic teachers, with significant differences on five items (see Exhibit E-18). And counselors were more likely to indicate positive responses to attitudinal items than were teachers (see Exhibit E-19).

VII. OVERVIEW OF STUDENT OUTCOMES AND FUTURE DATA COLLECTION

A. Background

Tech Prep was introduced with several student outcome goals. At the secondary level, program developers expected changes in the areas of program and course enrollment, academic performance, attendance, and post-secondary decisions. Planners at the community college expected that with the full implementation of Tech Prep, there would be changes in student enrollment and retention patterns, program and degree focus, and academic performance. However, at this point, it is still premature to ask what secondary and post-secondary student outcomes have been achieved by Tech Prep. First, the program has not been fully implemented. It was first introduced in the 1991-92 school year in Calvert and St. Mary's Counties, and in 1992-93 in Charles County. Consequently, the first students to complete the full four-year program will not graduate from high school until Spring 1995. Second, it is impossible to attribute any student outcomes specifically to Tech Prep for two reasons:

- The absence of any comparison group of similar students who have not had the Tech Prep experience; and
- The simultaneous existence of other national, state, county, and school-level programs attempting to achieve similar outcomes.

However, it is appropriate to begin examining trends over time which can indicate whether course enrollment, student performance, attendance, and post-secondary intentions are at least moving in the expected directions at the secondary level. And, at the community college level, it is reasonable to begin looking at student outcome trends, with the assumption that students who have experienced two years of Tech Prep in St. Mary's and Calvert Counties could have entered the community college in the Fall 1993, and may have begun to demonstrate changes. If indicators of these outcomes suggest movement in the desired direction, administrators can be more comfortable that Tech Prep is working. If, on the other hand, there is no indication of change or change is in undesired directions, now is the time to review and revise program efforts.

B. Summary of Secondary Student Data Trends

Program and Course Enrollment

With the advent of Tech Prep, the consortium anticipated that program and course enrollment patterns would change. First, they expected to find enrollment increases in programs that had previously existed but that might receive renewed interest from students as a result of Tech Prep implementation, specifically:

- Career programs articulated with the community college,
- Career and technology programs not articulated with the community college; and
- Enrollment in the career and technology centers.

Trends in the above-listed areas of program enrollment were examined from before the implementation of Tech Prep (1989-90 school year) through the 1994-95 school year (where available). The data indicate that student outcomes are generally moving in the expected directions, especially in Calvert and St. Mary's Counties.

Articulated Career Programs. As previously described in the individual case studies, each county offers several programs that provide articulated credit at the Charles County Community College. The percentage of St. Mary's County students enrolled in these programs has increased since 1990-91, from 33 to 41 percent of all students enrolled over the last four years. Charles County enrollments in articulated programs have fluctuated at similar levels since 1989-90. There has been a modest enrollment increase in articulated career programs among Calvert County students, from 7 to 10 percent over the last four years.

Non-articulated Programs. Although the primary emphasis of Tech Prep has been on program articulation with the community college, the school district is also interested in the effects of increased career planning through the student four-year plans on student enrollments in non-articulated career and technology programs. The percentage of students enrolled in these non-articulated programs has remained fairly low and stable over the last five years, at 7 to 9 percent of enrollment in Calvert and St. Mary's Counties, and at 4 to 6 percent in Charles County.

Career and Technology Centers. The Calvert and St. Mary's County school districts expected that Tech Prep would increase the utilization of their career and technology centers by making more students aware of the opportunities to pursue technical programs, and by offering courses at both their home school and at the career centers. As anticipated, student enrollment in courses offered at the career centers has increased in these two counties since Tech Prep was implemented. For example, enrollment increased from roughly 8 percent before Tech Prep (1989-90 and 1990-91) to 19 percent in 1994-95.

Another obvious area for change is student enrollment in those areas where new courses or programs have been created, at least in part as a result of Tech Prep implementation:

- Tech Prep clusters or pathways;
- Technology education courses;
- Technology exploration courses; and
- Applied courses.

Although somewhat incomplete, most of the data available do suggest that student enrollments in these areas are moving in the expected directions.

Tech Prep Clusters or Pathways. With the implementation of Tech Prep, students must select a cluster or pathway. While the data available for St. Mary's county show fairly stable enrollment in each cluster over the last two years, Calvert and Charles County enrollments in Tech Prep pathways show increases since 1990-91.

Technology Education Courses. Enrollments in technology education courses should be increasing in recent years, in part because of the influence of Tech Prep, but also because of new state graduation requirements which include one credit in technology education. In the two counties able to provide data for this indicator, there has been an increase in the percentage of students enrolling in the technology education courses, over the last two years in St. Mary's County, and over the last four years in Calvert County.

Technology Exploration Courses. Two of the school districts have also instituted new courses to assist students in exploring careers in the different technologies. In St. Mary's County, enrollment in the Applied Technology Exploration (AMEX) course has ranged from 6 to 8 percent of all students

since 1991-92. Enrollment in Calvert County's Exploring Technology course has increased from less than 1 percent when it was first introduced in 1991-92 to 8 percent of all students in 1994-95.

Applied Courses. The implementation of Tech Prep has included the development of applied courses in each county. Only Calvert County was able to provide enrollment data for several applied courses over multiple years. Their data show enrollment increases from 1990-91 through 1993-94, with a slight downward trend for 1994-95.

Finally, the consortium school districts had also hoped that Tech Prep would increase enrollments in **advanced level academic courses**, especially in science and mathematics. The percentage of students enrolled in college prep (CP) or advanced placement (AP) courses for English, Social Studies, Mathematics, Science and Foreign Languages were examined in each district. For the two counties with data available for this indicator (Calvert and St. Mary's), there have been increases in the percentage of students enrolled in advanced academic level courses since 1989-90 and 1990-91, with the greatest improvement in mathematics.

Student Performance

With the implementation of Tech Prep, the school districts had hoped to improve student performance in several areas. First and most obviously, they expected that restructuring the curriculum around career clusters would increase the high school program completion rates, particularly for students meeting the occupational program requirements. Second and less directly, they thought that improving the academic rigor of courses for all students would increase student pass rates on the Maryland Functional Tests, the number of students meeting university entrance requirements, and possibly student scores on the Scholastic Aptitude Tests (SAT). However, it should be noted that student performance in these same areas has been the focus of the Maryland School Performance Program (MSPP). Consequently, it is impossible to attribute any changes in student academic performance specifically to Tech Prep.

Program Completion Rates. Trends in high school program completion rates have been inconsistent and difficult to interpret in all three school districts. Calvert and St. Mary' County data indicate increases in the percentage of students meeting occupational program requirements, but recent decreases for students meeting university entrance requirements. The Charles County data were difficult to interpret because of dramatic fluctuations in the

percentage of students meeting occupational program requirements since 1990-91.

Maryland Functional Tests (MFT). The MFTs assess whether students are attaining basic competencies in the areas of reading, mathematics, writing, and citizenship. Achieving these basic competencies is required for graduation. The percentage of students passing the MFTs in grades 9 and 11 has steadily increased from 1989-90 to 1993-94 in all areas, especially in mathematics, writing, and citizenship. The largest increases have occurred among first time test-takers in grade 9 when the impact of Tech Prep on academic performance should be negligible, other than any "trickle down" effect in making the middle school curriculum more rigorous. By grade 11, virtually all students have already attained these basic competencies so increases since 1990-91 have been small, as all three districts approach 100 percent passing rates in all areas.

SAT Scores. It is difficult to judge the impact that Tech Prep should have on student performance on the SATs since the pool of students taking the tests from year to year is a strong factor in county-wide performance. Of the two counties able to provide data in this area, only St. Mary's SAT scores have shown any increases since 1990-91 (roughly 20 points in mathematics).

Student Attendance

Another consortium goal in its implementation of Tech Prep was to increase student participation in school, as indicated by improved daily student attendance rates and lower dropout rates. It was hoped that by making the school experience more meaningful for all students, students would attend school more regularly and not drop out. However, school attendance among secondary students is obviously subject to the influence of many factors and also a focus of the ongoing MSPP. Of the three counties, only St. Mary's data indicate changes in the desired directions: a modest increase in daily attendance rates and a decrease in the dropout rate since 1989-90.

Post-Secondary Decisions

Ultimately, the goal of Tech Prep is to better prepare students for post-secondary education or the world of work after they finish high school. It is not possible to fully examine student outcomes in this area until students who have completed the full four-year Tech Prep sequence have entered post-secondary education or the labor force. Trends in documented post-secondary decisions among high school graduates from the MSPP data were examined

for 1992 through 1994 graduates. These data are based on annual exit surveys of all graduating seniors.

For those post-secondary decisions most likely to be affected by Tech Prep, the trends were slight and inconsistent in all three counties, with relatively low percentages of respondents pursuing the following post-secondary options:

- Attending two-year colleges after high school (13 to 23 percent);
- Entering employment related to their high school programs (4 to 11 percent); and
- Pursuing specialized training after high school (3 to 5 percent).

C. Summary of Community College Student Data Trends

At the community college level, student data were examined from before the implementation of Tech Prep for 1992 high school graduates, through the first year that two-year Tech Prep graduates could enroll in the community college (1994 high school graduates). The Charles County Community College (CCCC) collects and reports comprehensive enrollment and performance information on the progress of high school graduates in their first year of college, for the Maryland Higher Education Commission (see the High School Graduate System and Student Outcomes and Achievement Reports). For this evaluation, trends were examined for all graduates from the tri-county area and for graduates of St. Mary's Public Schools, one of the districts which introduced Tech Prep in 1991-92 and consequently, has two-year Tech Prep completers who enrolled in CCCC during the 1993-94 school year. Specifically, trends were reported in three areas:

- Enrollment and retention;
- Degree sought and program focus; and
- Academic performance

Enrollment and Retention

With the implementation of Tech Prep in the tri-county area, it is expected that the number of high school graduates enrolling at the community college will increase. Furthermore, with the focus of Tech Prep on students completing a two-year community college program, it is expected that a higher percentage of these recent high school graduates will enroll as full-time rather than part-time students and will attend continuously for the full two years. The data (see Chapter 5, Exhibits 1 and 2) indicate that while the number of recent tri-county graduates enrolling in community college has decreased slightly, the percentage of students enrolling full-time and continuing into the spring semester has increased from 1992 to 1994, particularly among St. Mary's County graduates where Tech Prep was first introduced in 1991-92.

Degree Sought and Program Focus

Students completing the 4 + 2 Tech Prep sequence should enter community college with the intention of completing a certificate program or an associate degree in a specific field. Consequently, with the implementation of Tech Prep, the composition of the community college student population should change somewhat, with the percentage of students seeking an associate degree or certificate increasing, and the percentage of students not seeking a degree or planning to transfer to a four-year IHE decreasing. The data provided on the type of degree sought (see Chapter 5, Exhibits 1 and 2) do not indicate consistent trends over the last three years in the expected directions. However, based on student curriculum codes, it appears that the percentage of students seeking an associate degree has increased, and the percentage of students planning to transfer to four-year IHEs and those not seeking a degree has decreased. These three-year trends are more predominant for recent graduates of St. Mary's County Public Schools than for students from all of the tri-county school districts.

Academic Performance

Students participating in Tech Prep are expected to be better prepared academically for community college work because of the emphasis on more academic rigor in their secondary courses. This should result in fewer students requiring remedial course work upon entry into community college and possibly higher grades and a larger number of credit hours completed during the first year. Data on the percentage of students requiring remediation in mathematics (see Chapter 5, Exhibit 2) indicate that St. Mary's County 1994 graduates are better prepared in mathematics than their 1992 counterparts.

This trend is encouraging since the most dramatic changes in St. Mary's secondary curriculum have occurred in mathematics (see Chapter 4). However, data for graduates from all tri-county schools and in English and reading do not show trends in the desired directions. St. Mary's County graduates also show increases in the mean number of credit hours earned and in their cumulative GPA during their first year of community college, while these trends are not evident in the tri-county data (again, see Chapter 5, Exhibits 1 and 2).

D. Future Data Collection

Continue Systemic Trends

The examination of student outcomes achieved by Tech Prep was somewhat limited in this evaluation, by its timing (before four-year Tech Prep completers had graduated) and its reliance on extant data. The evaluation focused on systemic trends in student outcomes, by looking at the impact of Tech Prep on the outcomes of all students, and not just those students most directly affected by Tech Prep. However, for the most part, these aggregate data are readily available at both the secondary and community college levels, because of MSPP and the Maryland Higher Education Commission's reporting requirements. Consequently, it is recommended that the school districts and the community college continue to monitor the data trends examined in this report. Data systems staff in each county should be able to tabulate the basic enrollment data discussed above and the other indicators are available from MSPP and SOAR. In continuing to monitor these student trends, school districts should:

- Calculate trends as a percentage of enrollment, so that any changes will reflect new enrollment patterns rather than fluctuations in the total number of students;
- Examine trends by grade level where appropriate (e.g., enrollments for courses only offered in specific grades); and
- Focus on indicators of academic performance which are closest to Tech Prep program goals (e.g., enrollment in higher

level courses, and academic preparation for community college).

Target Tech Prep Students

Ideally, the data elements discussed in this report should be examined for those students most directly affected by Tech Prep, that is, students enrolled in the Tech Prep pathways and clusters. This would require that the cluster or pathway chosen by each student be included in the district's student database. This would permit the examination of student outcomes for different subgroups of students, and possibly the historical comparison of student outcomes for current Tech Prep students and former "general track" students. These efforts could be facilitated by the use computerized student databases that administrators and counselors can readily access, like the system currently being piloted in Calvert County.

Track Tech Prep Students

Once individual students can be flagged according to their Tech Prep experience, school districts should track these students through high school and after graduation. Student tracking could be facilitated by the use of unique identifying numbers for high school students that could be carried with them into post-secondary education, such as social security numbers. This individual student tracking could provide the community college with much needed information about the number of students they can expect to enroll who have taken articulated programs in high school or followed a particular Tech Prep cluster or pathway. Several community college staff reported that the college needs pipeline information on the students coming to the community college.

As these Tech Prep students enroll in community college, they should continue to be tracked on the indicators discussed in this report—enrollment and retention; program and degree focus; and academic performance. Finally, the data elements provided to the Maryland Higher Education Commission include the following additional indicators which would be useful in assessing student's academic preparation for community college work:

- Developmental course placement
- Level of first mathematics course taken and grade; and

- Level of first English course taken and grade received.

Track Longer-Term Outcomes

Ultimately, Tech Prep hopes to achieve better employment outcomes for students, by preparing them well for the higher tech jobs of the present and the future. Consequently, Tech Prep graduates should be tracked after high school, into college and into employment. Longer-term outcomes include continuing higher education, obtaining employment, completing a higher education program, retaining employment in a high-skilled job, employer satisfaction, and improved work performance of graduates. However, once students leave school, it becomes much more difficult to track their outcomes without their cooperation. One possibility is to work through local businesses and industry and retrospectively track students who were Tech Prep completers. Another option is to conduct a more intensive follow-up of a sample of Tech Prep completers and then maintain contact with these students for a period of five to ten years after graduation.

APPENDIX A

Interview Protocols

SMEC TECH PREP
ADMINISTRATOR INTERVIEW PROTOCOL
(District Level)

Interviewee's Name:

Position:

District:

Phone:

# of Years with District:

Interviewer:

Date of Interview:

Study Question #1: First, I'd like to ask you some questions about how Tech Prep has been implemented in your school district.

1. Briefly describe the Tech Prep program in your school district, and its components.

2a. What are your school district's short- and long-term goals for Tech Prep?

2b. Are those goals reflected in your school district's objectives? If so, how?

3. Describe the evolution of Tech Prep in your school district:

   - Planning (timelines, activities)
   - Where are you currently in the process
     - Ongoing refinements
     - Future plans
   - Partnership with community college (current status, next steps)
   - Input from:
     - Students
     - Parents
     - Local businesses
     - Other community involvement

4. Have you been involved in the planning and implementation processes? If so, in what way? When?

5. Did you do anything special to make teachers and counselors aware of Tech Prep, or to involve them in the planning and implementation process?

6. How are new teachers recruited and selected to teach Tech Prep classes?

   - Prior experience with Tech Prep?
   - Orientation process?

7. Did you attempt to "sell' Tech Prep to students, parents, and potential employers? If so, how?

8. What are the differences between Tech Prep and non-Tech Prep classes (including classes pre-Tech Prep), in terms of:

   - Content?
   - Format?

9. What differences (if any) are there between a Tech Prep and non-Tech Prep student, in terms of:

   - Course requirements?
   - Counseling strategies?
   - Additional services?
   - Any other differences?

Study Question #2: Now I'd like to ask some questions about institutional outcomes which may have resulted from the implementation of Tech Prep.

1a. How has Tech Prep changed your curriculum, in terms of:

- Restructuring around career pathways
- Integration of technical and academic content
- Articulation with the CC curriculum
- Teaching methods

1b. Describe the process for achieving these changes.

- Who was responsible for the changes?
- When did the changes occur?
- How did the changes occur?

1c. How are state graduation requirements reflected in the Tech Prep curriculum?

2a. Have your school district's staff development process and activities changed as a result of Tech Prep? If so, how?

- Format, content?
- Is staff development mandatory?
- Is it ongoing?

2b. What staff development activities has your staff participated in to prepare for Tech Prep? Which staff?

2c. What staff development activities have you participated in?

3. What changes have you observed in the teaching staff with the implementation of Tech Prep?

- Instructional practices
- Knowledge of Tech Prep goals and components
- Attitudes towards Tech Prep

4a. Have your school district's counseling approach or activities changed as a result of Tech Prep? If so, in what way?

4b. Describe the process for achieving these changes.

5. Has Tech Prep had any logistical impacts on your school district?

   - Master schedule?
   - Bus schedules?

6. Have there been changes to any other school district policies or processes resulting from the implementation of Tech Prep?

7a. Has Tech Prep changed your school district's relationships with:

   - The community college
     - Articulation agreements
     - Course sequencing
   - Local businesses and industry

   If so, how has it changed?

7b. Describe the process for achieving these changes.

Study Question #3: Finally, I'd like to discuss the student outcomes achieved by Tech Prep.

1. Have you observed changes in your students since the implementation of Tech Prep? If so, what kinds of changes?

   - Motivation
   - Attendance
   - Behavior
   - Attitudes toward school
   - Attitudes toward further education
   - Career awareness
   - Career focus
   - Other changes

Wrap-up Questions:

1a. What has been your overall impression of Tech Prep?

- Strengths
- Weaknesses
- Suggestions

2a. How did you first feel about having Tech Prep in your school district?

2b. Has your attitude changed? If so, how?

2c. What factors have influenced your attitudes toward Tech Prep?

3a. What factors have facilitated the implementation of Tech Prep?

3b. What barriers have you encountered?

4a. Are there any other programs or projects in your school district which may have affected the implementation of Tech Prep or its outcomes?

4b. If so, what programs or projects?

4c. How have they affected Tech Prep?

5. Do you have any additional comments regarding the implementation of Tech Prep and its outcomes?

SMEC TECH PREP
CURRICULUM COORDINATOR INTERVIEW PROTOCOL
(District Level)

Interviewee's Name:

Position:

District:

Phone:

# of Years with District:

Interviewer:

Date of Interview:

Study Question #1: First, I'd like to ask you some questions about how Tech Prep has been implemented in your school district.

1. Briefly describe the Tech Prep program in your district, and its components.

2. Describe the evolution of Tech Prep in your school district:

   - Planning (timelines, activities)
   - Where are you currently in the process
     - Ongoing refinements
     - Future plans
   - Partnership with community college (current status, next steps)
   - Input from:
     - Students
     - Parents
     - Local businesses and industry
     - Other community input

3. Have you been involved in the planning and implementation processes? If so, in what way? When?

4. What are the differences between Tech Prep and non-Tech Prep classes (including classes pre-Tech Prep), in terms of:

- Content?
- Format?

Study Question #2: Now I'd like to ask some questions about institutional outcomes which may have resulted from the implementation of Tech Prep.

1a. How has Tech Prep changed your district's curriculum, in terms of:

- Restructuring around career pathways
- Integration of technical and academic content
- Articulation with the CC curriculum
- Teaching methods

1b. Describe the process for achieving these changes.

- Who was responsible for the changes?
- When did the changes occur?
- How did the changes occur?

1c. How are state graduation requirements reflected in the Tech Prep curriculum?

2a. Have your district's staff development process and activities changed as a result of Tech Prep? If so, how?

- Format, content?
- Is staff development mandatory?
- Is it ongoing?

2b. What staff development activities have your staff participated in to prepare for Tech Prep? Which staff?

2c. What staff development activities have you participated in to prepare for Tech Prep?

Wrap-up Questions:

1. What has been your overall impression of the Tech Prep program?

   - Strengths
   - Weaknesses
   - Suggestions

2a. How did you first feel about having Tech Prep in your district?

2b. Has your attitude changed? If so, how?

2c. What factors have influenced your attitude toward Tech Prep?

3a. What factors have facilitated the implementation of Tech Prep?

3b. What barriers have you encountered?

4. Do you have any additional comments regarding the implementation of Tech Prep and its outcomes?

SMEC TECH PREP
COUNSELOR ADMINISTRATOR INTERVIEW PROTOCOL
(District Level)

Interviewee's Name:

Position:

District:

Phone:

# of Years with District:

Interviewer:

Date of Interview:

Study Question #1: First, I'd like to ask you some questions about how Tech Prep has been implemented in your school district.

1. Have you been involved in the planning and implementation processes? If so, in what way? When?

2. Have you attempted to promote Tech Prep among students? If so, what strategies have you used?

3. What are the differences between Tech Prep and non-Tech Prep classes (including classes pre-Tech Prep), in terms of:

   - Content?
   - Format?

4. What differences (if any) are there between a Tech Prep and non-Tech Prep student, in terms of:

- Career awareness?
- Course sequence?
- Counseling strategies?
- Curriculum?
- Additional services?
- Any other differences?

Study Question #2: Now I'd like to ask some questions about institutional outcomes which may have resulted from the implementation of Tech Prep.

1a. How has Tech Prep changed your curriculum, in terms of:

- Restructuring around career pathways
- Integration of technical and academic content
- Articulation with the CC curriculum
- Teaching methods

1b. Describe the process for achieving these changes.

- Who was responsible for the changes?
- When did the changes occur?
- How did the changes occur?

1c. How are state graduation requirements reflected in the Tech Prep curriculum?

2a. Have your district's counseling approach and activities changed as a result of Tech Prep? If so, how?

2b. Describe the process for achieving these changes.

3a. Have your district's staff development process and activities changed as a result of Tech Prep? If so, how?

- Format, content?
- Is staff development mandatory?
- Is it ongoing?

3b. What staff development activities have your staff participated in to prepare for Tech Prep? Which staff?

3c. What staff development activities have you participated in to prepare for Tech Prep?

Wrap-up Questions:

1. What has been your overall impression of the Tech Prep program?

   - Strengths
   - Weaknesses
   - Suggestions

2a. How did you first feel about having Tech Prep in your district?

2b. Has your attitude changed? If so, how?

2c. What factors have influenced your attitude toward Tech Prep?

3a. What factors have facilitated the implementation of Tech Prep?

3b. What barriers have you encountered?

4. Do you have any additional comments regarding the implementation of Tech Prep and its outcomes?

SMEC TECH PREP
ADMINISTRATOR INTERVIEW PROTOCOL
(School Level)

Interviewee's Name:

Position:

School:

District:

Phone:

# of Years with School:

# of Years with District:

Interviewer:

Date of Interview:

Study Question #1: First, I'd like to ask you some questions about how Tech Prep has been implemented in your school.

1. Briefly describe the Tech Prep program in your school, and its components.

2a. What are your school's short- and long-term goals for Tech Prep?

2b. Are those goals reflected in your school's objectives? If so, how?

3. Describe the evolution of Tech Prep in your school:

   - Planning (timelines, activities)
   - Where are you currently in the process
     - Ongoing refinements
     - Future plans
   - Partnership with community college (current status, next steps)
   - Input from:
     - Students
     - Parents
     - Local businesses
     - Other community involvement

4. Have you been involved in the planning and implementation processes? If so, in what way? When?

5. Did you do anything special to make teachers and counselors aware of Tech Prep, or to involve them in the planning and implementation process?

6. How are new teachers recruited and selected to teach Tech Prep classes?

   - Prior experience with Tech Prep?
   - Orientation process?

7. Did you attempt to "sell" Tech Prep to students, parents, and potential employers? If so, how?

8. What are the differences between Tech Prep and non-Tech Prep classes (including classes pre-Tech Prep), in terms of:

   - Content?
   - Format?

9. What differences (if any) are there between a Tech Prep and non-Tech Prep student, in terms of:

   - Course requirements?
   - Counseling strategies?
   - Additional services?
   - Any other differences?

Study Question #2: Now I'd like to ask some questions about institutional outcomes which may have resulted from the implementation of Tech Prep.

1a. How has Tech Prep changed your curriculum, in terms of:

- Restructuring around career pathways
- Integration of technical and academic content
- Articulation with the CC curriculum
- Teaching methods

1b. Describe the process for achieving these changes.

- Who was responsible for the changes?
- When did the changes occur?
- How did the changes occur?

1c. How are state graduation requirements reflected in the Tech Prep curriculum?

2a. Have your school's staff development process and activities changed as a result of Tech Prep? If so, how?

- Format, content?
- Is staff development mandatory?
- Is it ongoing?

2b. What staff development activities has your staff participated in to prepare for Tech Prep? Which staff?

2c. What staff development activities have you participated in?

3. What changes have you observed in the teaching staff with the implementation of Tech Prep?

- Instructional practices
- Knowledge of Tech Prep goals and components
- Attitudes towards Tech Prep

4a. Have your school's counseling approach or activities changed as a result of Tech Prep? If so, in what way?

4b. Describe the process for achieving these changes.

5. Has Tech Prep had any logistical impacts on your school?

   - Master schedule?
   - Bus schedules?

6. Have there been changes to any other school policies or processes resulting from the implementation of Tech Prep?

7a. Has Tech Prep changed your school's relationships with:

   - The community college
     - Articulation agreements
     - Course sequencing
   - Local businesses and industry

   If so, how has it changed?

7b. Describe the process for achieving these changes.

Study Question #3: Finally, I'd like to discuss the student outcomes achieved by Tech Prep.

1. Have you observed changes in your students since the implementation of Tech Prep? If so, what kinds of changes?

   - Motivation
   - Attendance (school)
   - Behavior
   - Attitudes toward school
   - Attitudes toward further education
   - Career awareness
   - Career focus
   - Other changes

Wrap-up Questions:

1a. What has been your overall impression of Tech Prep?

- Strengths
- Weaknesses
- Suggestions

2a. How did you first feel about having Tech Prep in your school?

2b. Has your attitude changed? If so, how?

2c. What factors have influenced your attitudes toward Tech Prep?

3a. What factors have facilitated the implementation of Tech Prep?

3b. What barriers have you encountered?

4a. Are there any other programs or projects in your school which may have affected the implementation of Tech Prep or its outcomes?

4b. If so, what programs or projects?

4c. How have they affected Tech Prep?

5. Do you have any additional comments regarding the implementation of Tech Prep and its outcomes?

SMEC TECH PREP
TEACHER INTERVIEW PROTOCOL
(School Level)

Interviewee's Name:

Classes Taught:

School:

District:

Phone:

# of Years with School:

# of Years with District:

Interviewer:

Date of Interview:

Study Question #1: First, I'd like to ask you some questions how Tech Prep has been implemented in your school.

1. Have you been involved in the planning and implementation processes? If so, in what way? When?

2. What are the differences between Tech Prep and non-Tech Prep classes (including classes pre-Tech Prep), in terms of:

   - Content?
   - Format?

3. Have your teaching methods and materials changed since you began teaching Tech Prep classes? If so, how?

4a. How were you first approached to teach Tech Prep classes?

- Volunteered
- Asked
- Required

4b. What, if anything, did your school do to encourage teachers to teach Tech Prep classes?

Study Question #2: Now I'd like to ask some questions about institutional outcomes which may have resulted from the implementation of Tech Prep.

1a. How has Tech Prep changed your curriculum, in terms of:

- Restructuring around career pathways
- Integration of technical and academic content
- Articulation with the CC curriculum
- Teaching methods

1b. Describe the process for achieving these changes.

- Who was responsible for the changes?
- When did the changes occur?
- How did the changes occur?

2a. Have your school's staff development process and activities changed as a result of Tech Prep? If so, how?

- Format, content?
- Is staff development mandatory?
- Is it ongoing?

2b. What staff development activities have you participated in to prepare for Tech Prep?

Study Question #3: Finally, I'd like to discuss the student outcomes achieved by Tech Prep.

1. Have you observed changes in your students since Tech Prep has been implemented? If so, what kinds of changes?

   - Motivation
   - Attendance (class)
   - Behavior
   - Attitudes toward school
   - Attitudes toward further education
   - Career awareness
   - Career focus
   - Other changes

Wrap-up Questions:

1a. What has been your overall impression of the Tech Prep program?

- Strengths
- Weaknesses
- Suggestions

2a. How did you first feel about having Tech Prep in your school?

2b. Has your attitude changed? If so, how?

2c. What factors have influenced your attitude toward Tech Prep?

3a. What factors have facilitated the implementation of Tech Prep?

3b. What barriers have you encountered?

4a. Are there any other programs or projects in your school which may have affected the implementation of Tech Prep or its outcomes?

4b. If so, what programs or projects?

4c. How have they affected Tech Prep?

5. Do you have any additional comments regarding the implementation of Tech Prep and its outcomes?

6. Please provide a syllabus for each Tech Prep class you teach.

SMEC TECH PREP
COUNSELOR INTERVIEW PROTOCOL
(High School Level)

Interviewee's Name:

Counseling Assignment:

School:

District:

Phone:

# of Years with School:

# of Years with District:

Interviewer:

Date of Interview:

Study Question #1: First, I'd like to ask you some questions about how Tech Prep has been implemented in your school.

1. Have you been involved in the planning and implementation processes? If so, in what way? When?

2. Have you attempted to promote Tech Prep among students? If so, what strategies have you used?

3. What are the differences between Tech Prep and non-Tech Prep classes (including classes pre-Tech Prep), in terms of:

   - Content?
   - Format?

4. What differences (if any) are there between a Tech Prep and non-Tech Prep student?

- Career awareness
- Course sequence
- Course requirements
- Counseling strategies
- Additional services
- Any other differences

Study Question #2: Now I'd like to ask some questions about institutional outcomes which may have resulted from the implementation of Tech Prep.

1a. How has Tech Prep changed your curriculum, in terms of:

- Restructuring around career pathways
- Integration of technical and academic content
- Articulation with the CC curriculum
- Teachning methods

1b. Describe the process for achieving these changes.

- Who was responsible for the changes?
- When did the changes occur?
- How did the changes occur?

1c. How are state graduation requirements reflected in the Tech Prep curriculum?

2a. Have your school's counseling approach and activities changed as a result of Tech Prep? If so, how?

2b. Describe the process for achieving these changes.

3. What staff development activities have you participated in to prepare for Tech Prep?

Study Question #3: Finally, I'd like to discuss the student outcomes achieved by Tech Prep.

1. Have you observed changes in your students since Tech Prep has been implemented? If so, what kinds of changes?

   - Motivation
   - Attendance
   - Behavior
   - Career awareness
   - Career focus
   - Interest in pursuing certain courses
   - Attitudes toward school
   - Attitudes toward further education
   - Other changes

Wrap-up Questions:

1. What has been your overall impression of the Tech Prep program?

   - Strengths
   - Weaknesses
   - Suggestions

2a. How did you first feel about having Tech Prep in your school?

2b. Has your attitude changed? If so, how?

2c. What factors have influenced your attitude toward Tech Prep?

3a. What factors have facilitated the implementation of Tech Prep?

3b. What barriers have you encountered?

4. Do you have any additional comments regarding the implementation of Tech Prep and its outcomes?

SMEC TECH PREP
COUNSELOR INTERVIEW PROTOCOL
(Middle School Level)

Interviewee's Name:

Counseling Assignment:

School:

District:

Phone:

# of Years with School:

# of Years with District:

Interviewer:

Date of Interview:

Study Question #1: First, I'd like to ask you some questions about how Tech Prep has been implemented in your school.

1. How are middle school students prepared for the Tech Prep program in high school?

   - Career awareness
   - Career counseling
   - Course sequences
   - Curriculum

2. Have you attempted to promote Tech Prep among students? If so, what strategies have you used?

Study Question #2: Now I'd like to ask some questions about institutional outcomes which may have resulted from the implementation of Tech Prep.

1a. Have your school's counseling approach or activities changed as a result of Tech Prep? If so, how?

1b. Describe the process for achieving these changes.

2. Has Tech Prep had any effect on the middle school curriculum? If so, how?

3. What staff development activities have you participated in to prepare for Tech Prep?

Study Question #3: Finally, I'd like to discuss the student outcomes achieved by Tech Prep.

1. Have you observed changes in your students since Tech Prep has been implemented? If so, what kinds of changes?

   - Motivation
   - Attendance
   - Behavior
   - Career awareness
   - Interest in pursuing certain courses
   - Attitudes toward school
   - Attitudes toward further education
   - Any other changes

Wrap-up Questions:

1. What has been your overall impression of the Tech Prep program?

   - Strengths
   - Weaknesses
   - Suggestions

2a. How did you first feel about having Tech Prep in your school?

2b. Has your attitude changed? If so, how?

2c. What factors have influenced your attitude toward Tech Prep?

3. Do you have any additional comments regarding the implementation of Tech Prep and its outcomes?

SMEC TECH PREP INTERVIEW OUTLINE
COMMUNITY COLLEGE ADMINISTRATOR

Interviewee's Name:

Title:

Phone:

# of Years with Community College:

Interviewer:

Date of Interview:

Study Question #1: First, I'd like to ask you some questions about how Tech Prep has been developed and implemented in the community college.

1. Briefly describe the Tech Prep program in the community college, and its components.

2a. What are the community college's short- and long-term goals for Tech Prep?

2b. Are those goals reflected in the college's Master Plan? If so, how?

3. Describe the evolution of the community college's involvement in Tech Prep:

   - How did the project begin?
   - Where are you currently in the process?

4. What incentives prompted the community college to participate in Tech Prep?

5. Have you been involved in the development and implementation of Tech Prep? If so, in what way? When?

6. What do you see as your future role in the implementation of Tech Prep?

7. Have you done anything special to make faculty and advisors aware of Tech Prep, or to involve them in the planning and implementation process?

8. How has the community college collaborated with the school systems in the planning and implementation of Tech Prep?

9a. How has Tech Prep been funded at the community college?

9b. What funding support is available for continued implementation?

10. What are the major challenges now facing the college in order to fully implement Tech Prep?

Study Question #2: Now I'd like to ask some questions about institutional outcomes which have resulted or may still result from the implementation of Tech Prep.

1. How has the implementation of Tech Prep affected the community college curriculum? What additional changes, if any, do you expect?

2a. Describe the relationship of the college and the public school systems prior to the development of Tech Prep.

2b. How, if at all, has Tech Prep changed the relationship between the college and the public school systems?

3. Have advising methods and strategies changed with the implementation of Tech Prep? If so, how? What additional changes, if any, do you expect?

4. Have teaching methods and strategies changed with the implementation of Tech Prep? If so, how? What additional changes, if any, do you expect?

5a. How has Tech Prep affected the college's staff development activities and processes? What additional changes, if any, do you expect?

5b. What staff development activities have been available to prepare staff for Tech Prep?

5c. What additional staff development activities would you like to have available?

6. What additional changes have occurred at the community college as result of Tech Prep? Do you expect additional changes?

Study Question #3: Finally, I'd like to discuss student outcomes that have been and may still be achieved by Tech Prep.

1. To date, Tech Prep students entering the college have been those receiving credit through high school articulation. What differences, if any, have you noticed in these students, in terms of:

   - Career awareness?
   - Program selection?
   - Advisement needs?
   - Any other differences?

2. Do you expect to observe additional changes in incoming community college students with the full implementation of Tech Prep? If so, what differences?

   - Motivation
   - Career awareness
   - Career focus
   - Program selection
   - Attitudes toward school
   - Attitudes toward further education
   - Attitudes toward employment
   - Graduation rates
   - Other changes

3. How will Tech Prep affect students planning to transfer to a 4-year institution?

Wrap-up Questions

1. What is your overall impression of Tech Prep?

   - Strengths
   - Weaknesses
   - Suggestions

2a. How did you first feel about having the community college involved in Tech Prep?

2b. Has your attitude changed? If so, why?

3a. What factors have facilitated the implementation of Tech Prep?

3b. What barriers have you to encountered?

4a. Are there any other programs or projects in the community college which may affect the implementation of Tech Prep or its outcomes? If so, what programs or projects (e.g., cooperative education program)?

4b. How have they affected Tech Prep?

5. Do you have any suggestions regarding what the community college should be doing to prepare for Tech Prep students?

6. Do you have any additional comments regarding the implementation of Tech Prep and its outcomes?

SMEC TECH PREP INTERVIEW OUTLINE
COMMUNITY COLLEGE FACULTY

Interviewee's Name:

Title and Department:

Courses Taught:

Phone:

# of Years with Community College:

Interviewer:

Date of Interview:

Study Question #1: First, I'd like to ask you some questions about how Tech Prep has been developed and implemented in the community college.

1. Briefly describe the Tech Prep program in the community college, and its components.

2. Have you been involved in the development and implementation of Tech Prep? If so, in what way? When?

3. What, if anything, did the community college do to encourage faculty to become involved in the development and implementation of Tech Prep?

4. What do you see as your future role in the implementation of Tech Prep?

5. Have you worked with any of the public school systems on Tech Prep? If so, which systems? Which staff (departments and titles, not names)?

Study Question #2: Now I'd like to ask some questions about institutional outcomes which have resulted or may still result from the implementation of Tech Prep.

1a. How have the community college courses and/or programs changed with the implementation of Tech Prep?

1b. What additional program or course changes do you expect?

2a. Have your teaching methods and materials changed with the implementation of Tech Prep? If so, how?

2b. What additional changes in teaching methods and materials do you expect?

3a. What staff development activities have you participated in to prepare for Tech Prep?

3b. What additional staff development activities would you like to have available?

Study Question #3: Finally, I'd like to discuss student outcomes that have been or may still be achieved by Tech Prep.

1. To date, Tech Prep students entering the college have been those receiving credit through high school articulation. What differences, if any, have you noticed in these students, in terms of:

   - Career awareness?
   - Program selection?
   - Advisement needs?
   - Any other differences?

2. Do you expect to observe changes in incoming community college students with the full implementation of Tech Prep? If so, what kinds of changes?

- Motivation
- Career awareness
- Career focus
- Program selection
- Attitudes toward school
- Attitudes toward further education
- Attitudes toward employment
- Graduation rates
- Other changes

Wrap-up Questions:

1. What is your overall impression of Tech Prep?

- Strengths
- Weaknesses
- Suggestions

2a. How did you first feel about having the community college involved in Tech Prep?

2b. Has your attitude changed? If so, why?

3a. What factors have facilitated the implementation of Tech Prep?

3b. What barriers have you encountered?

4. Do you have any suggestions regarding what the community college should be doing to prepare for incoming Tech Prep students?

5. Do you have any additional comments regarding the implementation of Tech Prep and its outcomes?

SMEC TECH PREP INTERVIEW OUTLINE
COMMUNITY COLLEGE ADVISOR

Interviewee's Name:

Title:

Advisement Assignment:

Phone:

# of Years with Community College:

Interviewer:

Date of Interview:

Study Question #1: First, I'd like to ask you some questions about how Tech Prep has been developed and implemented in the community college.

1. Briefly describe the Tech Prep program in the community college, and its components.

2. Have you been involved in the development and implementation of Tech Prep? If so, in what way? When?

3. What, if anything, did the community college do to encourage advisors to become involved in the development and implementation of Tech Prep?

4. What do you see as your future role in the implementation of Tech Prep?

5. Have you worked with any of the public school systems on Tech Prep? If so, which systems? Which staff (departments and titles, not names)?

Study Question #2: Now I'd like to ask some questions about institutional outcomes which have resulted or may still result from the implementation of Tech Prep.

1a. Have advising methods and strategies changed with the implementation of Tech Prep? If so, how?

1b. What additional changes in advising do you expect?

2a. What staff development activities have you participated in to prepare for Tech Prep?

2b. What additional staff development activities would you like to have available?

Study Question #3: Finally, I'd like to discuss student outcomes that have been or may still be achieved by Tech Prep.

1. To date, Tech Prep students entering the college have been those receiving credit through high school articulation. What differences, if any, have you noticed in these students, in terms of:

   - Career awareness?
   - Program selection?
   - Advisement needs?
   - Any other differences?

2. Do you expect to observe changes in incoming community college students with the full implementation of Tech Prep? If so, what kinds of changes?

   - Motivation
   - Career awareness
   - Career focus
   - Program selection
   - Attitudes toward school
   - Attitudes toward further education
   - Attitudes toward employment
   - Graduation rates
   - Other changes

3. How will Tech Prep affect students planning to transfer to 4-year institutions?

Wrap-up Questions:

1. What has been your overall impression of the Tech Prep program?

   - Strengths
   - Weaknesses
   - Suggestions

2a. How did you first feel about having the community college involved in Tech Prep?

2b. Has your attitude changed? If so, why?

3a. What factors have facilitated the implementation of Tech Prep?

3b. What barriers have you to encountered?

4. Do you have any suggestions regarding what the community college should be doing to prepare for incoming Tech Prep students?

5. Do you have any additional comments regarding the implementation of Tech Prep and its outcomes?

APPENDIX B

Teacher and Counselor Surveys

Southern Maryland Educational Consortium
Tech Prep Program

TEACHER SURVEY

The purpose of this survey is to find out about your involvement in the Tech Prep program and to get your opinions about Tech Prep and its implementation in your school district. To ensure confidentiality, please do ***not*** write your name on this survey.

Teaching Assignment

Please complete the following information about your teaching assignment *during the 1993-94 school year.*

1. School (Please check one)

Calvert County Schools	Charles County Schools	St. Mary's County Schools
☐ Calvert High School	☐ Thomas Stone High School	☐ Chopticon High School
☐ Northern High School	☐ Westlake High School	☐ Leonardtown High School
☐ Calvert Career Center	☐ Charles County Career and Technology Center	☐ St. Mary's County Technical Center

2. Grade levels taught (Check all that apply)

☐ 08 ☐ 09 ☐ 10 ☐ 11 ☐ 12

3. Subject areas taught (Check all that apply)

☐ English/Language Arts
☐ Fine Arts
☐ Foreign Languages
☐ Health
☐ Mathematics
☐ Physical Education
☐ Practical Arts
☐ Science
☐ Social Studies
☐ Business Technologies
☐ Engineering Technologies
☐ Health and Human Service Technologies
☐ Occupational Technologies
☐ Technology Education
☐ Other (Specify _____)

Background Information

1. How many years have you taught secondary school?

____ Total years ____ Years in this district

2. Please indicate whether you have taught any of the following courses in *the last three years*. (Check all that apply)

- ☐ Applied Biology
- ☐ Applied Physics
- ☐ Chemistry in the Community
- ☐ Applied Communications
- ☐ Applied Economics
- ☐ Applied Technology Exploration
- ☐ Introduction to Engineering/Mechanical Technologies
- ☐ Introduction to Business/Management Technologies
- ☐ Introduction to Health/Human Services Technologies
- ☐ None of the above-listed courses
- ☐ Applied Mathematics
- ☐ Applied Algebra/Elements of Algebra
- ☐ Applied Geometry/Elements of Geometry
- ☐ Principles of Technology
- ☐ Technology Education
- ☐ Fundamentals of Technology

Tech Prep: Involvement, Implementation, and Opinions

1. What has been your involvement in the planning and implementation of Tech Prep *during the last three years*? (Check all that apply)

- ☐ Served on planning or steering committee for Tech Prep
- ☐ Helped develop Tech Prep curriculum or course
- ☐ Helped develop content articulation between secondary and community college courses
- ☐ Taught Tech Prep (applied, integrated) course(s)
- ☐ Advised students on Tech Prep requirements and options
- ☐ Spoke to parents or students about Tech Prep
- ☐ Participated in Tech Prep meetings with business or community leaders
- ☐ Attended local in-service workshop(s)/training on Tech Prep
- ☐ Attended state/regional workshop(s)/training on Tech Prep
- ☐ Attended national conference on Tech Prep
- ☐ Conducted workshop(s)/training on Tech Prep
- ☐ Presented material at national Tech Prep conference
- ☐ Visited Tech Prep programs in other school districts
- ☐ Other (Please specify _____)
- ☐ Have not been involved in the planning or implementation of Tech Prep

2. Have you participated in any staff development activities (e.g., in-service workshops, seminars, conferences, training institutes) which addressed Tech Prep-related topics? (Check all that apply)

- ☐ General information about Tech Prep
- ☐ Integrating vocational and academic content
- ☐ Developing curricula and instruction to promote hands-on learning
- ☐ Recognizing and accommodating different learning styles
- ☐ Methods for teaching diverse populations
- ☐ Using multiple teaching strategies
- ☐ Effective ways to raise and achieve higher expectations
- ☐ Promoting cooperation between secondary and post-secondary staff
- ☐ How mathematics, science, and/or communications competencies are applied in the work setting
- ☐ Other (Please specify _____)
- ☐ Have not participated in any staff development activities on Tech Prep-related topics

3. Have you seen any changes in staff development activities *in the last three years*? (Check all that apply)

- ☐ Staff development activities are held more frequently.
- ☐ Topics covered are more relevant to instruction.
- ☐ There have been more opportunities to attend conferences or training institutes.
- ☐ Other (Please specify _____)
- ☐ I have not seen any changes in staff development activities in the last three years.

4. Have you seen any of the following changes in the curriculum *in your subject area*? (Check all that apply)

- ☐ Curriculum (i.e., course selection and sequencing) restructured around career pathways and/or clusters
- ☐ Technical and academic content integrated
- ☐ Academic content integra' ' across disciplines
- ☐ Secondary curriculum articulated with community college curriculum
- ☐ Have not seen any of the above changes in my subject's curriculum

5. Which of the following teaching strategies or methods have you used *this year*? (Check all that apply)

- ☐ Integration of academic and vocational/technical course content
- ☐ Interdisciplinary integration of academic content
- ☐ Instruction relevant to world of work (e.g., use of work-based learning examples)
- ☐ Integration of career development activities into instruction
- ☐ Scheduling a representative from business/industry to visit any of my classes
- ☐ Use of applied academic curricula
- ☐ Use of course objectives consistent with post-secondary pre-requisites
- ☐ Instruction in advanced technical skills
- ☐ Hands-on learning opportunities
- ☐ Competency-based learning
- ☐ Cooperative learning techniques
- ☐ Alternative assessments (e.g., portfolios, performance assessment)
- ☐ Variation in teaching to meet diverse learning styles
- ☐ Have not used any of the above strategies or methods this year

6. In which of the following instructional activities have you personally participated *this year*? (Check all that apply)

- ☐ Collaboration of academic and vocational teachers to develop course content
- ☐ Joint planning time for academic and vocational teachers
- ☐ Team teaching with academic and vocational teachers
- ☐ Involvement in interdisciplinary planning and teaching
- ☐ Contact with community college counterpart
- ☐ Contact with a business/industry representative in a field related to a class I teach
- ☐ Have not participated in any of the above instructional activities this year

7. Have you received sufficient support to implement Tech Prep? Please circle the letter indicating the level of support you have received in each of the following areas:

Level of support
O=Outstanding S=Sufficient I=Insufficient N=None

Areas of Support	Level of Support			
Materials	O	S	I	N
Staff development	O	S	I	N
Planning time	O	S	I	N
Support from other teachers	O	S	I	N
Support from counselors	O	S	I	N
Support from school principal	O	S	I	N
Support from central administration	O	S	I	N

8. Please circle your responses to the following statements using this scale:

SA = Strongly agree A = Agree U = Uncertain or neutral D = Disagree SD = Strongly disagree

	Agreement Scale				
Tech Prep is beneficial for *all* students.	SA	A	U	D	SD
Tech Prep is beneficial for the former general "track" students.	SA	A	U	D	SD
Tech Prep has increased the academic rigor of courses for the former general "track" students.	SA	A	U	D	SD
Integrating academic and vocational skills is crucial to Tech Prep success.	SA	A	U	D	SD
Tech Prep is just another short-lived educational innovation.	SA	A	U	D	SD
Tech Prep helps to orient students to current work place requirements.	SA	A	U	D	SD
Tech Prep has not changed vocational education.	SA	A	U	D	SD
Tech Prep will effectively prepare students for post-secondary education and/or future employment.	SA	A	U	D	SD
Tech Prep is not appropriate for college-bound students.	SA	A	U	D	SD
Students are more focused on career goals since the implementation of Tech Prep.	SA	A	U	D	SD
Students exhibit a more business-like, purposeful attitude in my classes since the implementation of Tech Prep.	SA	A	U	D	SD
I support the continuation of the Tech Prep program.	SA	A	U	D	SD

9. How has the implementation of Tech Prep in your school affected you?

10. What is your overall impression of Tech Prep? Likes? Dislikes?

11. What suggestions do you have for improving Tech Prep?

12. Other comments:

Please seal this survey in the envelope provided
and send it to your Tech Prep Coordinator via PONY mail
by June 22, 1994

THANK YOU FOR YOUR HELP

This survey was developed by COSMOS Corporation for the Southern Maryland Educational Consortium.
Some items were adapted from the following sources:
Local Tech Prep Implementation Survey (National Center for Research in Vocational Education)
Inventory of Local Tech-Prep Planning and Implementation (Mathematica Policy Research, Inc.)
Maryland Tech Prep Evaluation Project Teacher Survey (University of Maryland at College Park)

Southern Maryland Educational Consortium
Tech Prep Program

COUNSELOR SURVEY

The purpose of this survey is to find out about your involvement in the Tech Prep program and to get your opinions about Tech Prep and its implementation in your school district. To ensure confidentiality, please do *not* write your name on this survey.

Counseling Assignment

Please complete the following information about your counseling assignment *during the 1993-94 school year.*

1. School (Please check one)

Calvert County Schools	Charles County Schools	St. Mary's County Schools
☐ Calvert High School	☐ Thomas Stone High School	☐ Chopticon High School
☐ Northern High School	☐ Westlake High School	☐ Leonardtown High School
☐ Calvert Career Center	☐ Charles County Career and Technology Center	☐ St. Mary's County Technical Center
☐ Middle School (Specify_____)	☐ Middle School (Specify_____)	☐ Middle School (Specify_____)

2. Grade levels assigned (Check all that apply)

☐ 06 ☐ 07 ☐ 08 ☐ 09 ☐ 10 ☐ 11 ☐ 12

3. Number of students assigned to you _____

Background Information

1. How many years have you been a secondary school counselor?

____ Total years ____ Years in this district

2. In which of the following areas do you work with students? (Check all that apply)

☐ Career awareness and development
☐ Career/vocational aptitude testing
☐ Vocational support services
☐ Course selection
☐ Occupational objectives
☐ Post-secondary planning
☐ Job placement services
☐ Work-site learning experiences
☐ Counseling on personal issues
☐ Other (Please specify _____)

Tech Prep: Involvement, Implementation, and Opinions

1. What has been your involvement in the planning and implementation of Tech Prep *during the last three years*? (Check all that apply)

   ☐ Served on planning or steering committee for Tech Prep
   ☐ Helped develop Tech Prep curriculum pathways and clusters
   ☐ Helped develop articulation between secondary and post-secondary curricula
   ☐ Helped develop four-year individual student plans
   ☐ Taught career awareness/development classes
   ☐ Worked with teachers to integrate career development activities into instruction
   ☐ Scheduled representatives from business/industry to visit classes
   ☐ Trained teachers to advise students on Tech Prep requirements and options
   ☐ Spoke to parent or student groups about Tech Prep and the opportunities and choices it offers
   ☐ Participated in Tech Prep meetings with business or community leaders
   ☐ Attended local in-service workshop(s)/training on Tech Prep
   ☐ Attended state/regional workshop(s)/training on Tech Prep
   ☐ Attended national conference on Tech Prep
   ☐ Conducted workshop(s)/training on Tech Prep
   ☐ Presented material at national Tech Prep conference
   ☐ Visited Tech Prep programs in other school districts
   ☐ Other (Please specify _____)
   ☐ Have not been involved in the planning or implementation of Tech Prep

2. Have you participated in any staff development activities (e.g., in-service workshops, seminars, conferences, training institutes) which addressed Tech Prep-related topics? (Check all that apply)

   ☐ General information about Tech Prep
   ☐ Career development counseling
   ☐ Job placement assistance
   ☐ Labor market trends
   ☐ Methods of promoting Tech Prep and marketing to students, parents, and potential employers
   ☐ Recruitment, placement, and retention of students for Tech Prep
   ☐ School relationship with business/industry/labor
   ☐ School-to-work (work-site learning)
   ☐ Integrating vocational and academic content
   ☐ Effective ways to raise and achieve higher expectations
   ☐ Recognizing and accomodating different learning styles
   ☐ Promoting cooperation between secondary and post-secondary staff
   ☐ How mathematics, science, and/or communications competencies are applied in the work setting
   ☐ Other (Please specify _____)
   ☐ Have not participated in any staff development activities on Tech Prep-related topics

3. Have you seen any changes in staff development activities ***in the last three years***? (Check all that apply)

   ☐ Staff development activities are held more frequently.
   ☐ Topics covered are more relevant to instruction.
   ☐ There have been more opportunities to attend conferences or training institutes.
   ☐ Other (Please specify _____)
   ☐ I have not seen any changes in staff development activities in the last three years.

4. Have you seen any of the following changes in the curriculum? (Check all that apply)

- ☐ Curriculum (i.e., course selection and sequencing) restructured around career pathways and/or clusters
- ☐ Technical and academic content integrated
- ☐ Academic content integrated across disciplines
- ☐ Secondary curriculum articulated with community college curriculum
- ☐ Have not seen any of the above changes in the curriculum

5. Which of the following career development activities were conducted in your school this past year? (Check all that apply)

- ☐ Career awareness and exploration for students in Tech Prep
- ☐ Special career development classes
- ☐ Career development activities integrated into academic and/or vocational courses
- ☐ Work-site learning integrated with school-site learning
- ☐ Individual career development counseling
- ☐ Use of special career counseling materials developed especially for Tech Prep students
- ☐ Support services for Tech Prep students with special needs
- ☐ Use of a "program of studies" to help develop students' educational plans
- ☐ Development of individual plans for Tech Prep students, indicating courses to be taken at the secondary and post-secondary levels
- ☐ Student access to or use of career exploration software
- ☐ Student trips to employer work sites
- ☐ Job placement assistance for exiting students
- ☐ Contact with a business/industry representative in a field related to the Tech Prep curriculum
- ☐ Labor market analysis to inform curriculum development
- ☐ Other (Please specify _____)
- ☐ No career development activities were conducted in my school this past year.

6. How have you attempted to promote Tech Prep among students and parents? (Check all that apply)

- ☐ Developed bulletin boards/posters in school
- ☐ Developed brochures or other literature for students and parents
- ☐ Conducted Tech Prep orientation for parents and students
- ☐ Conducted small group meetings for parents and students to develop 4-year individual student plans
- ☐ Facilitated student visits to career and technology center
- ☐ Other (Please specify _____)
- ☐ Have not attempted to promote Tech Prep among students

7. Have you received sufficient support to implement Tech Prep? Please circle the letter indicating the level of support you have received in each of the following areas:

Level of support
O=Outstanding S=Sufficient I=Insufficient N=None

Areas of Support	Level of Support			
Materials	O	S	I	N
Staff development	O	S	I	N
Professional development time	O	S	I	N
Support from other counselors	O	S	I	N
Support from teachers	O	S	I	N
Support from school principal	O	S	I	N
Support from central administration	O	S	I	N

8. Please circle your responses to the following statements using this scale:

SA = Strongly agree A = Agree U = Uncertain or neutral D = Disagree SD = Strongly disagree

	Agreement Scale				
I encourage students to take higher levels of math and science courses than I did prior to the implementation of Tech Prep.	SA	A	U	D	SD
Tech Prep is beneficial for *all* students.	SA	A	U	D	SD
Tech Prep is beneficial for former general "track" students.	SA	A	U	D	SD
Tech Prep has increased the academic rigor of courses for former general "track" students.	SA	A	U	D	SD
Students seek career guidance more often since the implementation of Tech Prep.	SA	A	U	D	SD
I feel more able to help students with post-secondary and career goals since the implementation of Tech Prep.	SA	A	U	D	SD
Integrating academic and vocational skills is crucial to Tech Prep success.	SA	A	U	D	SD
Tech Prep is just another short-lived educational innovation.	SA	A	U	D	SD
Tech Prep helps to orient students to current work place requirements.	SA	A	U	D	SD
Tech Prep has not changed vocational education.	SA	A	U	D	SD
Tech Prep will effectively prepare students for post-secondary education and/or future employment.	SA	A	U	D	SD
Tech Prep is not appropriate for college-bound students.	SA	A	U	D	SD
Students are more focused on career goals since the implementation of Tech Prep.	SA	A	U	D	SD
Students exhibit a more business-like, purposeful attitude since the implementation of Tech Prep.	SA	A	U	D	SD
I support the continuation of the Tech Prep program.	SA	A	U	D	SD

9. How has the implementation of Tech Prep in your school affected you?

10. What is your overall impression of Tech Prep? Likes? Dislikes?

11. What suggestions do you have for improving Tech Prep?

12. Other comments:

Please seal this survey in the envelope provided
and send it to your Tech Prep Coordinator via PONY mail
by June 22, 1994

THANK YOU FOR YOUR HELP

This survey was developed by COSMOS Corporation for the Southern Maryland Educational Consortium.
Some items were adapted from the following sources:
Local Tech Prep Implementation Survey (National Center for Research in Vocational Education)
Inventory of Local Tech-Prep Planning and Implementation (Mathematica Policy Research, Inc.)
Maryland Tech Prep Evaluation Project Counselor Survey (University of Maryland at College Park)

APPENDIX C

Response Rates

STAFF SURVEY RESPONSE RATES FOR TEACHERS AND COUNSELORS BY COUNTY

SURVEY RESPONSES	CALVERT COUNTY	CHARLES COUNTY	ST. MARY'S COUNTY	TOTALS
Teachers[1]				
Distributed	158	164	161	483
Completed	106	66	90	262
Response Rate	67%	40%	56%	54%
Counselors[2]				
Distributed	16	19	11	46
Completed	9	7	11	27
Response Rate	56%	37%	100%	59%
Total Staff				
Distributed	174	183	172	529
Completed	115	73	101	289
Response Rate	66%	40%	59%	55%

[1]Teacher surveys were distributed to all teachers in each of the six sample high schools and three career and technical centers.

[2]Counselor surveys were distributed to all counselors in the six sample high schools, their feeder middle schools, and the three career and technical centers.

APPENDIX D

Observation Form

SMEC TECH PREP
Classroom Observation Form

Date_____ Observer: SM SR

School_____ District_____

Teacher_____ Grade level: 09 10 11 12

Course Title_____

Cluster Area (if applies): Health & Human Services Engineering Business

1. Describe the class you observed today. What was the objective? (Was it stated to the students or did you infer it)? What methods did the teacher use in presenting the material? How did the students respond? (What were the students expected to do?)

_____

_____

_____

_____

_____

_____

2. During the class, did you see application of the following Tech Prep teaching/learning strategies? If so, please check and elaborate below.

____ a. Integration of academic and vocational course content (e.g., incorporation of math concepts in career/technical course).

____ b. Attempts to tie instruction to student's everyday life (e.g., use of real world examples)

____ c. Instruction relevant or applicable to world of work (e.g., use of work-based learning examples)

____ d. Integration of career development activities into instruction

____ e. Hands-on learning opportunities (e.g., use of simulations)

____ f. Competency-based learning (e.g., statement of competencies, applied assessment methods)

____ g. Instruction in advanced technical skills

____ h. Other applied instructional methods

Elaborate by letter:_____

_____

_____

_____

_____

_____

APPENDIX E

Survey Data Tables

Involvement in
Planning and Implementation of Tech Prep

Exhibit E-1

PERCENTAGE OF TEACHERS INVOLVED IN TECH PREP PLANNING AND IMPLEMENTATION ACTIVITIES BY SCHOOL DISTRICT

PLANNING AND IMPLEMENTATION ACTIVITIES	CALVERT (N=106)	CHARLES (N=66)	ST. MARY'S (N=90)	TOTAL (N=262)
Served on Tech Prep planning or steering committee	5	5	7	5
Helped develop Tech Prep curriculum or course	15	11	23	17
Helped develop content articulation between secondary and community college courses	9	9	6	8
Taught Tech Prep (applied, integrated) course(s)	20	6	29	20*
Advised students on Tech Prep requirements and options	70	18	56	52*
Spoke to parents or students about Tech Prep	37	11	38	31*
Participated in Tech Prep meetings with business or community leaders	14	5	18	13*
Attended local in-service workshop(s)/training on Tech Prep	54	17	46	42*
Attended state/regional workshop(s)/training on Tech Prep	7	8	13	9
Attended national conference on Tech Prep	9	5	10	8
Conducted workshop(s)/training on Tech Prep	7	2	3	4
Presented material at national Tech Prep conference	4	2	4	3
Visited Tech Prep programs in other school districts	8	3	7	6
Have not been involved in Tech Prep planning or implementation	16	62	22	30*

*Significant variation among school districts

Exhibit E-2

PERCENTAGE OF ACADEMIC AND TECHNICAL/VOCATIONAL TEACHERS INVOLVED IN TECH PREP PLANNING AND IMPLEMENTATION ACTIVITIES

PLANNING AND IMPLEMENTATION ACTIVITIES	ACADEMIC (N=173)	TECH/VOC (N=62)	TOTAL (N=262)
Served on Tech Prep planning or steering committee	4	8	5
Helped develop Tech Prep curriculum or course	9	36	17*
Helped develop content articulation between secondary and community college courses	1	26	8*
Taught Tech Prep (applied, integrated) course(s)	17	29	20
Advised students on Tech Prep requirements and options	48	58	52
Spoke to parents or students about Tech Prep	23	48	31*
Participated in Tech Prep meetings with business or community leaders	9	21	13*
Attended local in-service workshop(s)/training on Tech Prep	34	63	42*
Attended state/regional workshop(s)/training on Tech Prep	6	18	9*
Attended national conference on Tech Prep	4	13	8*
Conducted workshop(s)/training on Tech Prep	2	7	4
Presented material at national Tech Prep conference	2	3	3
Visited Tech Prep programs in other school districts	4	11	6*
Have not been involved in Tech Prep planning or implementation	34	19	30

*Significant difference between academic and technical/vocational teachers

Exhibit E-3

PERCENTAGE OF COUNSELORS AND TEACHERS INVOLVED IN TECH PREP PLANNING AND IMPLEMENTATION ACTIVITIES

PLANNING AND IMPLEMENTATION ACTIVITIES	COUNSELORS (N=27)	TEACHERS (N=262)
Served on Tech Prep planning or steering committee	33	5
Helped develop Tech Prep curriculum (pathways, clusters, course)	30	17
Helped develop content articulation between secondary and community college courses	7	8
Spoke to parents or students about Tech Prep	85	31
Participated in Tech Prep meetings with business or community leaders	41	13
Attended local in-service workshop(s)/training on Tech Prep	89	42
Attended state/regional workshop(s)/training on Tech Prep	59	9
Attended national conference on Tech Prep	33	8
Conducted workshop(s)/training on Tech Prep	19	4
Presented material at national Tech Prep conference	19	3
Visited Tech Prep programs in other school districts	7	6
Have not been involved in Tech Prep planning or implementation	0	30

Participation in Staff Development Activities

Exhibit E-4

PERCENTAGE OF TEACHERS WHO HAVE PARTICIPATED IN STAFF DEVELOPMENT ACTIVITIES ON TECH PREP-RELATED TOPICS BY SCHOOL DISTRICT

STAFF DEVELOPMENT TOPICS	CALVERT (N=106)	CHARLES (N=66)	ST. MARY'S (N=90)	TOTAL (N=262)
General information about Tech Prep	84	41	64	66*
Integrating vocational and academic content	43	17	31	32*
Developing curricula and instruction to promote hands-on learning	18	11	28	20*
Recognizing and accommodating different learning styles	30	32	27	29
Methods for teaching diverse populations	17	20	16	17
Using multiple teaching strategies	25	23	21	23
Effective ways to raise and achieve higher expectations	13	9	17	13
Promoting cooperation between secondary and post-secondary staff	9	6	9	8
How mathematics, science, and/or communications competencies are applied in the work setting	20	9	13	15
Have not participated in any staff development activities on Tech Prep-related topics	9	42	12	19*

*Significant variation among school districts

Exhibit E-5

PERCENTAGE OF ACADEMIC AND TECHNICAL/VOCATIONAL TEACHERS WHO HAVE PARTICIPATED IN STAFF DEVELOPMENT ACTIVITES OF TECH PREP-RELATED TOPICS

STAFF DEVELOPMENT TOPICS	ACADEMIC (N=173)	TECH/VOC (N=62)	TOTAL (N=262)
General information about Tech Prep	62	77	66*
Integrating vocational and academic content	23	55	32*
Developing curricula and instruction to promote hands-on learning	10	45	20*
Recognizing and accommodating different learning styles	19	53	29*
Methods for teaching diverse populations	10	39	17*
Using multiple teaching strategies	17	37	23*
Effective ways to raise and achieve higher expectations	12	18	13
Promoting cooperation between secondary and post-secondary staff	3	19	8*
How math, science, and/or communications competencies are applied in the work setting	13	21	15*
Have not participated in any staff development activities on Tech Prep-related topics	23	10	19

*Significant difference between academic and technical/vocational teachers

Exhibit E-6

PERCENTAGE OF COUNSELORS AND TEACHERS WHO HAVE PARTICIPATED IN STAFF DEVELOPMENT ACTIVITIES ON TECH PREP-RELATED TOPICS

STAFF DEVELOPMENT TOPICS	COUNSELORS (N=27)	TEACHERS (N=262)
General information about Tech Prep	62	66
Integrating vocational and academic content	30	32
Recognizing and accommodating different learning styles	19	29
Effective ways to raise and achieve higher expectations	12	13
Promoting cooperation between secondary and post-secondary staff	26	8
How math, science, and/or communications competencies are applied in the work setting	15	15
Have not participated in any staff development activities on Tech Prep-related topics	4	19

Changes in
Staff Development and Curriculum

Exhibit E-7

PERCENTAGE OF TEACHERS WHO HAVE SEEN CHANGES IN STAFF DEVELOPMENT ACTIVITIES OR CURRICULUM BY SCHOOL DISTRICT

CHANGES	CALVERT (N=106)	CHARLES (N=66)	ST. MARY'S (N=90)	TOTAL (N=262)
Changes in Staff Development Activities in the Last 3 Years				
Staff development activities are held more frequently	26	24	10	20*
Topics covered are more relevant to instruction	21	27	18	21
There have been more opportunities to attend conferences or training institutes	25	9	23	20*
Have not seen any changes in staff development activities in the last three years	41	41	43	42
Changes in Curriculum in (Your Subject Area)				
Curriculum (i.e., course selection and sequencing) restructured around career pathways and/or clusters	43	27	54	43*
Technical and academic content integrated	26	20	34	27
Academic content integrated across disciplines	21	32	16	22*
Secondary curriculum articulated with community college curriculum	18	21	17	18
Have not seen any of the above changes in my subject's curriculum	38	27	22	30

*Significant variation among school districts

Exhibit E-8

PERCENTAGE OF ACADEMIC AND TECHNICAL/VOCATIONAL TEACHERS WHO HAVE SEEN CHANGES IN STAFF DEVELOPMENT ACTIVITIES OR CURRICULUM

CHANGES	ACADEMIC (N=173)	TECH/VOC (N=62)	TOTAL (N=262)
Changes in Staff Development Activities in Last 3 Years			
Staff development activities are held more frequently	19	27	20
Topics covered are more relevant to instruction	16	31	21*
There have been more opportunities to attend conferences or training institutes	15	36	20*
Have not seen any changes in staff development activities in the last three years	51	21	42*
Changes in Curriculum (in Your Subject Area)			
Curriculum restructured around career pathways and/or clusters	36	61	43*
Technical and academic content integrated	18	52	27*
Academic content integrated across disciplines	21	24	22
Secondary curriculum articulated with community college curriculum	8	53	18*
Have not seen any of the above changes in my subject's curriculum	38	10	30*

*Significant difference between academic and technical/vocational teachers

Exhibit E-9

PERCENTAGE OF COUNSELORS AND TEACHERS WHO HAVE SEEN CHANGES IN STAFF DEVELOPMENT ACTIVITIES OR CURRICULUM

CHANGES	COUNSELORS (N=27)	TEACHERS (N=262)
Changes in Staff Development Activities in the Last 3 Years		
Staff development activities are held more frequently	30	20
Topics covered are more relevant to instruction	41	21
There have been more opportunities to attend conferences or training institutes	37	20
Have not seen any changes in staff development activities in the last three years	26	42
Changes in Curriculum (in Your Subject Area)		
Curriculum restructured around career pathways and/or clusters	82	43
Technical and academic content integrated	74	27
Academic content integrated across disciplines	56	22
Secondary curriculum articulated with community college curriculum	74	18
Have not seen any of the above changes in my subject's curriculum	7	30

Teaching Strategies and Methods

Exhibit E-10

PERCENTAGE OF TEACHERS WHO HAVE USED TECH PREP-RELATED TEACHING STRATEGIES OR METHODS BY SCHOOL DISTRICT

TEACHING STRATEGIES/METHODS	CALVERT (N=106)	CHARLES (N=66)	ST. MARY'S (N=90)	TOTAL (N=262)
Integration of academic and vocational/technical course content	29	35	43	36
Interdisciplinary integration of academic content	39	42	40	40
Instruction relevant to world of work (e.g., use of work-based learning examples)	54	56	63	58
Integration of career development activities into instruction	35	47	37	39
Scheduling a representative from business/industry to visit any of my classes	35	42	21	32*
Use of applied academic curricula	16	27	29	23
Use of course objectives consistent with post-secondary pre-requisites	33	32	36	34
Instruction in advanced technical skills	14	20	20	18
Hands-on learning opportunities	69	73	68	70
Competency-based learning	30	49	44	40*
Cooperative learning techniques	70	77	63	70
Alternative assessments (e.g., portfolios, performance assessment)	30	36	46	37
Variation in teaching to meet diverse learning styles	67	76	70	70

*Significant variation among school districts

Exhibit E-11

PERCENTAGE OF ACADEMIC AND TECHNICAL/VOCATIONAL TEACHERS WHO HAVE USED TECH PREP-RELATED TEACHING STRATEGIES OR METHODS

TEACHING STRATEGIES/METHODS	ACADEMIC (N=173)	TECH/VOC (N=62)	TOTAL (N=262)
Integration of academic and vocational/technical course content	23	66	36*
Interdisciplinary integration of academic content	41	40	40
Instruction relevant to world of work (e.g., use of work-based learning examples)	49	81	58*
Integration of career development activities into instruction	29	60	39*
Scheduling a representative from business/industry to visit any of my classes	20	61	32*
Use of applied academic curricula	23	24	23
Use of course objectives consistent with post-secondary pre-requisites	34	42	34
Instruction in advanced technical skills	9	42	18*
Hands-on learning opportunities	60	97	70*
Competency-based learning	24	82	40*
Cooperative learning techniques	71	69	70
Alternative assessments (e.g., portfolios, performance assessment)	35	47	37
Variation in teaching to meet diverse learning styles	68	76	70

*Significant difference between academic and technical/vocational teachers

Collaborative Instructional Activities

Exhibit E-12

PERCENTAGE OF TEACHERS WHO HAVE PARTICIPATED IN COLLABORATIVE INSTRUCTIONAL ACTIVITIES BY SCHOOL DISTRICT

COLLABORATIVE INSTRUCTIONAL ACTIVITIES	CALVERT (N=106)	CHARLES (N=66)	ST. MARY'S (N=90)	TOTAL (N=262)
Collaboration of academic and vocational teachers to develop course content	19	14	16	16
Joint planning time for academic and vocational teachers	7	8	6	7
Team teaching with academic and vocational teachers	5	11	8	7
Involvement in interdisciplinary planning and teaching	20	27	16	20
Contact with community college	8	29	12	15*
Contact with a business/industry representative in a field related to a class I teach	26	39	28	30
Have not participated in any of the above instructional activities this year	54	33	51	48*

*Significant variation among school districts

Exhibit E-13

PERCENTAGE OF ACADEMIC AND TECHNICAL/VOCATIONAL TEACHERS WHO HAVE PARTICIPATED IN COLLABORATIVE INSTRUCTIONAL ACTIVITIES

COLLABORATIVE INSTRUCTIONAL ACTIVITIES	ACADEMIC (N=173)	TECH/VOC (N=62)	TOTAL (N=262)
Collaboration of academic and vocational teachers to develop course content	8	37	16*
Joint planning time for academic and vocational teachers	2	16	7*
Team teaching with academic and vocational teachers	2	18	7*
Involvement in interdisciplinary planning and teaching	19	23	20*
Contact with community college	8	34	15*
Contact with a business/industry representative in a field related to a class I teach	18	60	30*
Have not participated in any of the above instructional activities this year	61	18	48

*Significant difference between academic and technical/vocational teachers

Support to Implement Tech Prep

Exhibit E-14

PERCENTAGE OF TEACHERS WHO REPORTED RECEIVING SUFFICIENT SUPPORT TO IMPLEMENT TECH PREP BY SCHOOL DISTRICT[1]

AREAS OF SUPPORT	CALVERT (N=106)	CHARLES (N=66)	ST. MARY'S (N=90)	TOTAL (N=262)
Materials	65	41	49	53*
Staff development	70	41	49	55*
Planning time	38	33	25	32
Support from other teachers	65	50	61	60
Support from counselors	66	38	47	53*
Support from school principal	78	50	70	68*
Support from central administration	70	45	48	56*

*Significant variation among school districts

[1]Approximately 50 teachers did not respond to these survey items.

277

Exhibit E-15

PERCENTAGE OF ACADEMIC AND TECHNICAL/VOCATIONAL TEACHERS WHO REPORTED RECEIVING SUFFICIENT SUPPORT TO IMPLEMENT TECH PREP[1]

AREAS OF SUPPORT	ACADEMIC (N=173)	TECH/VOC (N=62)	TOTAL (N=262)
Materials	41	77	53*
Staff development	45	76	55*
Planning time	20	54	32*
Support from other teachers	45	85	60*
Support from counselors	42	69	53*
Support from school principal	56	92	68*
Support from central administration	44	75	56*

*Significant difference between academic and technical/vocational teachers

[1]Approximately 70 teachers either did not respond to these survey items or could not be classified as a technical or academic teacher.

Exhibit E-16

PERCENTAGE OF COUNSELORS AND TEACHERS WHO REPORTED RECEIVING SUFFICIENT SUPPORT TO IMPLEMENT TECH PREP[1]

AREAS OF SUPPORT	COUNSELORS (N=27)	TEACHERS (N=262)
Materials	92	53
Staff development	85	55
Planning time	na	32
Professional development time	74	na
Support from (other) teachers	79	60
Support from (other) counselors	88	53
Support from school principal	92	68
Support from central administration	89	56

na - Not applicable

[1]Approximately 50 teachers did not respond to these survey items.

Staff Attitudes toward Tech Prep

Exhibit E-17

TEACHER ATTITUDES TOWARD TECH PREP BY SCHOOL DISTRICT
PERCENTAGE OF TEACHERS IN AGREEMENT[1]

ATTITUDE ITEM	CALVERT (N=106)	CHARLES (N=66)	ST.MARY'S (N=90)	TOTAL (N=262)
Tech Prep is beneficial for all students	61	67	57	61
Tech Prep is beneficial for the former general "track" students	84	75	88	83
Tech Prep has increased the academic rigor of courses for the former general "track" students	53	48	53	52
Integrating academic and vocational skills is crucial to Tech Prep success	84	88	88	86
Tech Prep is just another short-lived educational innovation[1]	52	43	38	45
Tech Prep helps to orient students to current workplace requirements	83	85	74	80
Tech Prep has not changed vocational education[1]	55	29	60	50*
Tech Prep will effectively prepare students for post-secondary education and/or future employment	62	68	58	62
Tech Prep is not appropriate for college-bound students[1]	52	69	56	58
Students are more focused on career goals since the implementation of Tech Prep	46	34	54	46*
Students exhibit a more business-like, purposeful attitude in my classes since the implementation of Tech Prep	18	9	14	14
I support the continuation of the Tech Prep program	75	75	82	77

*Significant variation among school districts

[1]For items indicated, percentage of disagreement has been reported.

Exhibit E-18

ATTITUDES TOWARD TECH PREP AMONG ACADEMIC AND TECHNICAL/VOCATIONAL TEACHERS PERCENTAGE OF TEACHERS IN AGREEMENT[1]

ATTITUDE ITEM	ACADEMIC (N=173)	TECH/VOC (N=62)	TOTAL (N=262)
Tech Prep is beneficial for all students	52	82	61*
Tech Prep is beneficial for the former general "track" students	83	82	83
Tech Prep has increased the academic rigor of courses for the former general "track" students	47	55	52
Integrating academic and vocational skills is crucial to Tech Prep success	83	92	86
Tech Prep is just another short-lived educational innovation[1]	39	53	45
Tech Prep helps to orient students to current workplace requirements	77	88	80
Tech Prep has not changed vocational education[1]	46	60	50
Tech Prep will effectively prepare students for post-secondary education and/or future employment	53	80	62*
Tech Prep is not appropriate for college-bound students[1]	47	82	58*
Students are more focused on career goals since the implementation of Tech Prep	41	55	46
Students exhibit a more business-like, purposeful attitude in my classes since the implementation of Tech Prep	6	29	14*
I support the continuation of the Tech Prep program	70	91	77*

*Significant difference between academic and technical/vocational teachers

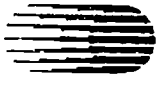
[1]For items indicated, percentage of disagreement has been reported.

Exhibit E-19

ATTITUDES TOWARD TECH PREP AMONG COUNSELORS AND TEACHERS PERCENTAGE OF COUNSELORS AND TEACHERS IN AGREEMENT[1]

ATTITUDE ITEM	COUNSELORS (N=27)	TEACHERS (N=262)
Tech Prep is beneficial for all students	59	61
Tech Prep is beneficial for the former general "track" students	93	83
Tech Prep has increased the academic rigor of courses for the former general "track" students	76	52
Integrating academic and vocational skills is crucial to Tech Prep success	93	86
Tech Prep is just another short-lived educational innovation[1]	69	45
Tech Prep helps to orient students to current workplace requirements	81	80
Tech Prep has not changed vocational education[1]	88	50
Tech Prep will effectively prepare students for post-secondary education and/or future employment	82	62
Tech Prep is not appropriate for college-bound students[1]	81	58
Students are more focused on career goals since the implementation of Tech Prep	76	46
Students exhibit a more business-like, purposeful attitude in my classes since the implementation of Tech Prep	48	14
I support the continuation of the Tech Prep program	89	77

[1]For items indicated, percentage of disagreement has been reported.



COSMOS
CORPORATION

7475 Wisconsin Avenue • Suite 900 • Bethesda, MD 20814 • (301) 215-9100