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ABSTRACT

The Seattle (Washington) Tech Prep Demonstration Project involves the following consortium partners: North Seattle, Seattle Central, and South Seattle community colleges; 13 secondary schools of the Seattle School District; 8 businesses; an industrial association; and a labor union. The demonstration project was subjected to a comprehensive evaluation using the following methodologies: surveys of 1,897 tech prep students, interviews with key individuals, content and context analyses, focus group with tech prep students from two schools, observation of applied academic and professional technical education classes, and conduct of a local inventory. It was discovered that the tech prep program draws significantly larger percentages of minority students and students with lower grade point averages into community colleges. Because tech prep program graduates enrolled at four-year colleges at the same rate as non-tech prep graduates, the tech prep program was also concluded to be a good option for higher ability students. The evaluation team issued recommendations calling for the following: development of a clear vision of tech prep and its future; more intensive work to increase student, staff, parent, and employer awareness of tech prep; and improvement of methods to identify, monitor, and assess tech prep students' experiences and outcomes. (Nineteen tables/figures are included.) (MN)

THE Northwest Regional Educational Laboratory

FINAL REPORT

Seattle Tech Prep Demonstration Project
Final Evaluation Report

December 30, 1994

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Seattle Tech Prep Demonstration Project

Final Evaluation Report

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December 30, 1994

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ACKNOWLEDGMENTS

The Northwest Regional Educational Laboratory (NWREL) evaluation staff wish to thank a number of people for their assistance in this evaluation.

Marie Coon of Seattle Community College and Malver Haynes of Seattle Public Schools served as codirectors of the project and provided generous assistance in describing the activities of the project and reviewing the overall evaluation plan.

Tom Phillips, an administrator at South Seattle Community College, served as internal evaluation coordinator and liaison with George Neff and his students in developing the Student Tech Prep Management Information System, and with district staff in providing data about Tech Prep students.

Carolyn Cohen, a part-time NWREL staff member located in Seattle, attended a number of the evaluation meetings and conducted some of the interviews with key persons in the district and community regarding Tech Prep. Shirley Bjornsson of the Seattle Public Schools Student Information System provided useful information on the courses and demographic data of professional technical education students in the district who were eligible to be Tech Prep students.

The evaluation advisory committee—the codirectors, Tom Phillips, and district vocational education representatives Dale Brown, Joanna Farris, and Sandee Nyberg—met five times to help define Tech Prep students and contribute to the direction of the evaluation.

Finally, we extend appreciation to Steve Funk-Tracy for word processing, data analysis, and creation of tables and graphs, and to Barbara Warren-Sams for her editing skills.

INTRODUCTION

This report summarizes data that were collected from June 1992 to December 1994 on the Seattle Tech Prep Demonstration Project by the Northwest Regional Educational Laboratory (NWREL) which is serving as the external evaluation contractor. The report is divided into seven sections: (1) summary of the 1993-94 evaluation design; (2) summary of the evaluation activities for this period; (3) comprehensive description of the project based on the Mathematica Policy Research, Inc. (MPR) local Tech Prep inventory completed in October 1993 and December 1994; (4) findings from a survey of 11th- and 12th-grade students in the Seattle School District; (5) findings from interviews of key persons; (6) description of the student management information system; (7) program effectiveness claims; and 8) evaluation recommendations.

OVERVIEW OF THE EVALUATION

Summary of the 1993-94 Evaluation Design

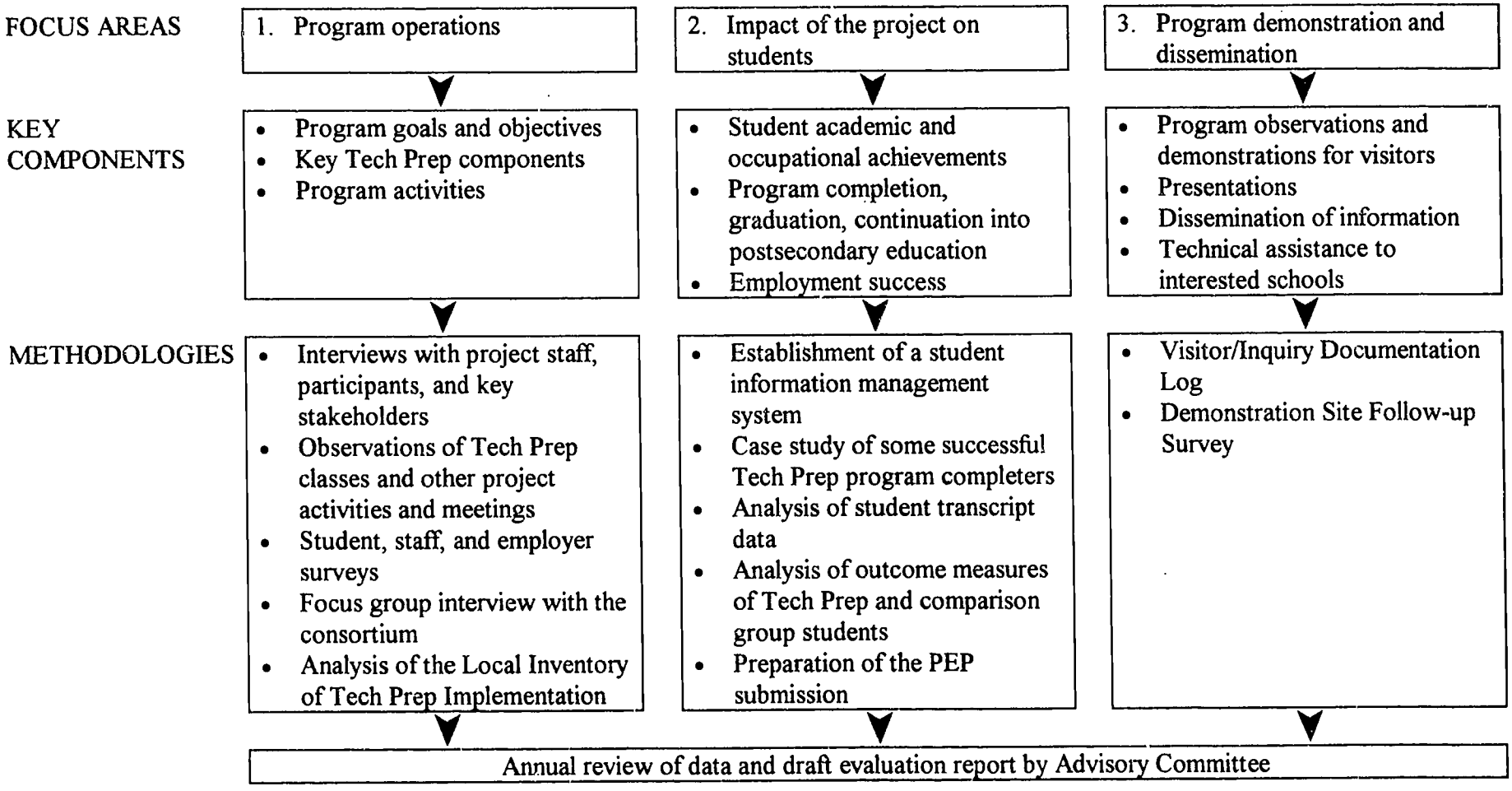
The original evaluation design, prepared in March 1993, was revised in February 1994. It was intended to describe the purposes and framework for the evaluation; define Tech Prep students; and identify key evaluation questions, methodologies, timelines, and reporting procedures. This section will describe the framework, define Tech Prep students, and identify methodologies.

Framework

The overall framework for the two-year evaluation of this Tech Prep Demonstration Project is depicted in Figure 1. The framework consists of three focus areas (program operations, student outcomes, and demonstration), key components of each area, and the major methodologies proposed.

To assist in the formation and review of the final evaluation design, a Tech Prep evaluation advisory committee composed of secondary and postsecondary educators was formed. This committee, chaired by Tom Phillips of South Seattle Community College, met six times. It has helped refine the evaluation design, identify specific evaluation procedures, develop a definition of Tech Prep students, and collect data on courses taken by secondary students.

Figure 1
Overall Evaluation Framework



Methodologies

A variety of methodologies was used to evaluate the project. These include:

- Student and staff surveys to assess outcomes identified
- Content analysis of Tech Prep student transcripts to address student outcomes
- Focus group interview with a sample of Tech Prep students to determine their reasons for entering Tech Prep and their assessment of their program experiences
- Observations of a sample of Tech Prep classes
- Analysis of information provided by the staff on the MPR Inventory of Local Tech Prep Implementation
- Analysis of project records for visitors and persons receiving a mail survey about the project's dissemination efforts

Below is a more detailed description of these methodologies.

Surveys. Design and conduct three written surveys for 1993-94. The first was a survey of a sample of 11th- and 12th-grade vocational education students in the Seattle School District to determine their educational and occupational plans, understanding of Tech Prep, and intent to enter a postsecondary program. The second was a survey of a sample of Tech Prep students to determine their reasons for taking professional technical education and Tech Prep courses, their assessment of program features, and the extent to which they see their secondary education related to their lives outside of school. The third survey was of secondary and postsecondary instructors in Tech Prep courses to determine the instructional methodologies used, the extent to which vocational and academic concepts are integrated, and their assessment of Tech Prep program features. All three draft surveys were reviewed by the evaluation advisory committee.

Context analysis. Continue to work with the community college and district staff to identify: 1. all students who have transcribed high school Tech Prep credits into the community college system over the last four years, and; 2. a comparison group of similarly aged community college students in vocational education who have not transcribed credit and were not in Tech Prep classes in high school.

Focus group with students. Conduct focus groups with a sample of eight to 10 Tech Prep students in the 12th grade in each of two schools in the consortium.

Observation of Tech Prep classes. Observe two applied academic classes and two professional technical education classes at two schools enrolling the highest percent of Tech Prep students as a percent of their total school enrollment in the fall of 1993.

Local inventory. Requested project codirectors to complete the MPR Inventory of Tech Prep Implementation in October 1993 and December 1994 and compare results with those from other Tech Prep programs in Washington.

Additional Evaluation Activities

Since July 1992, a number of additional evaluation activities have been conducted by NWREL as the independent evaluator of the Seattle Tech Prep national demonstration project. These activities included:

- Forming an evaluation advisory committee composed of secondary and postsecondary personnel who review draft documents and advise on the implementation of the evaluation

- Preparing and revising a Year One and Year Two evaluation design specifying the purposes for the evaluation, framework, key evaluation questions, data collection processes, timelines, and reporting procedures

- Attending the United States Office of Education meeting in Washington, D.C., in 1993 for project directors and project evaluators to discuss evaluation requirements and approaches and the procedures for the Program Effectiveness Review Panel

- Working with the project director in completing a comprehensive MPR local Tech Prep inventory documenting the structure and activities of the project

- Designing data collection survey forms for collecting feedback information from site visitors about the dissemination process

- Working with the project staff and the evaluation advisory committee to define what the project means by "Tech Prep students"

- Working with George Neff and students at South Seattle Community College to refine the design, identify elements for a student Tech Prep tracking system, and critique a draft copy of the MIS document

- Working with staff at the community college and district in identifying Tech Prep students and obtaining computer record data about them

- Conducting telephone or personal interviews with key project staff and other influential people regarding their view of the project, its fit with other educational reform efforts, and its future

- Discussing her site visit notes with Dr. Carilyn Norris, Washington Tech Prep program supervisor, and her project staff

- Analyzing data from student transcript files for Seattle Public School Tech Prep and non-Tech Prep students

- Preparing a Program Effectiveness Review Panel submission that includes documentation to support three basic claims for this project

- Preparing a final evaluation report

PROGRAM DESCRIPTION

The Consortium

The Seattle Tech Prep Consortium is composed of representatives from North Seattle, Seattle Central, and South Seattle community colleges; 13 secondary schools that are part of the Seattle School District; eight businesses; an industrial association; and a labor union. The Seattle Community College District has a total enrollment of 12,975 students; the Seattle School District, 41,200 students.

The Seattle Tech Prep Consortium formed July 1992. The governing board consists of two local school district administrators and four community college administrators who meet quarterly. The consortium has 13 working committees which deal with various aspects of Tech Prep and two professional staff.

The purpose of the Seattle Tech Prep Consortium is to link the Seattle Community College District/Seattle Public School Tech Prep program with business, industry, and labor communities to assure that Seattle students are prepared for rewarding and challenging careers that support the economic health of the community.

Funding

The consortium received a Title III E implementation grant of $350,000 in 1992 and $412,144 in 1993. The consortium spent approximately 16 percent of its budget on curriculum development, 9 percent on guidance and counseling, 10 percent on staff development, 5 percent on equipment or materials, 33 percent on general administration of the consortium, 6 percent on evaluation activities, and 20 percent on marketing and promotion.

Business/Industry Support

Business and industry have been active partners, working with students and staff and providing material resources. They have made career awareness opportunities, mentor programs, tours of their facilities, and other work-based learning opportunities available for students. They have assisted staff in developing curriculum, defining program

outcomes, marketing Tech Prep, supporting staff development for counselors and instructors, releasing employees to teach classes in schools, and providing speakers for career education days. In addition, they have provided equipment or materials and attended consortium meetings.

Student Population

The project serves students in grades nine through 14. The consortium has adopted the state definition of a secondary Tech Prep student which states that:

> Tech Prep students in Washington state are those students in grades 9 through 12 who have completed an individual student plan and are enrolled in a planned and approved sequence of competency-based studies articulated between institutions that:
>
> - Leads to direct employment through an associate degree, certificate, apprenticeship, or four-year college degree
> - Provides technical preparation in at least one field, and
> - Builds students' competence in the applications of mathematics, science, communication, and workplace skills.

As a way to identify specific students, the district used a self-selection process. Special efforts have been made to attract economically and educationally disadvantaged students as well as pregnant and parenting students into Tech Prep.

At the postsecondary level there are three definitions of postsecondary Tech Prep students:

TP1. Community college students enrolled in a Tech Prep sequence of courses who had entered from a high school Tech Prep program in the same articulated program area

TP2. Community college students enrolled in a Tech Prep sequence of courses different from their high school Tech Prep program

TP3. Community college students enrolled in a Tech Prep sequence of courses who did not participate in a high school Tech Prep program

Although the most restricted postsecondary definition was TP1above, there are times when the second or third definitions also apply. For example, it may be useful in obtaining all TP3 students' assessment of the technical courses they were taking at Seattle Community College.

Table 1 shows the number of secondary students in the Seattle School District and the number taking one or more vocational/technical courses. Across the grades, 59 percent of students are enrolled in vocational classes for 1994-95.

Table 1
Number and Percent of Secondary Students Taking Vocational Education Classes

Grade Level	Total Number of Students	Number Enrolled in Voc. Ed.	Percent Enrolled in Voc. Ed.
9	4,081	1,844	45
10	3,184	1,902	60
11	2,565	1,654	64
12	2,293	1,735	76
Total	12,123	7,135	59

Table 2 shows the number of students enrolled in vocational education classes over the past three years based on data supplied by the district's consultants. Three program areas account for most of the students: business education, commercial home economics, and trade and industry.

Table 2
Vocational Education Enrollments in the Seattle Public Schools

	October		
	1992	1993	1994
Business Education	3,473	3,552	3,273
Marketing/Distribution Education	74	143	274
Home Economics (Commercial)	1,792	1,747	1,742
Agriculture (Horticulture)	130	109	102
Trade and Industry	970	1,214	1,217
Vocational Industrial Arts*	679	680	575
Totals	7,118	7,445	7,183

*The VIA figures exclude Principles of Technology, which is reported separately. All figures shown are a duplicated count based on district enrollment information.

Student Tech Prep Survey

In December 1993 and early 1994 a survey was distributed to 1,897 students in the district enrolled in articulated vocational education classes, including applied academics classes. The one-page survey described Tech Prep, asked students whether they considered themselves Tech Prep students, and then asked questions about courses taken and their experiences in the program. Table 3 shows the number of students who consider themselves Tech Prep students after reading the following definition:

> A Tech Prep student is a student who plans to pursue a career which requires specific training. This training begins in high school and is completed at the community college level and beyond. Work experience related to the career area is part of the training program. Community college credit may be earned for courses completed (skills gained) in high school.

Table 3
Number of Self-Identified Tech Prep and Non-Tech Prep Students by Grade Level

	Number of Articulated Vocational Education (VE) Students	
Grade Level	Tech Prep	Non-Tech Prep
9	188	289
10	280	233
11	261	183
12	256	207
Total	985	912

Table 4 shows the percent of self-identified Tech Prep students in the overall student population.

Overall, 40 percent of the Tech Prep students are female. Table 5 shows the gender distribution by grade.

Table 4
Distribution of Self-Identified Tech Prep Students by Category and Grade Level

	Percent Self-Identified Tech Prep Students		
Grade Level	Of Articulated VE Students	Of All VE Students	Of All High School Students
9	39	10	5
10	55	15	8
11	59	16	10
12	55	15	11

Table 5
Gender Distribution of Self-Identified Tech Prep Students by Grade Level

	Males		Females	
Grade Level	Number	Percent	Number	Percent
9	126	67	62	33
10	168	60	112	40
11	151	57	110	43
12	150	58	106	42

Figure 2 shows the number of Tech Prep students by school. The data indicate that Nathan Hale (183) and Franklin (170) have the largest number of Tech Prep students.

Figure 3 shows Tech Prep students as a percentage of the total high school population. Nathan Hale and Cleveland have the greatest percentage of Tech Prep students.

Students completing the survey were asked whether they wanted more information about Tech Prep, had taken a career interest survey, had completed a plan for high school and beyond, had started a portfolio, and had taken Applied Mathematics, Principles of Technology, or Business/Applied Communication. Table 6 shows the comparative percent of Tech Prep and non-Tech Prep students responding. More than twice the number of those indicating they were Tech Prep students wanted more information about Tech Prep. Other comparisons showed much less difference between the two groups. Discussions with the Seattle Tech Prep staff indicate that many of the students have not yet received or absorbed much information about Tech Prep and that the four-year high school and beyond plans were just starting to be used in some schools beyond the ninth-grade level. Staff feel that the above information will provide baseline data for comparisons a year from now.

Figure 2
Number of Self-Identified Tech Prep Students by High School

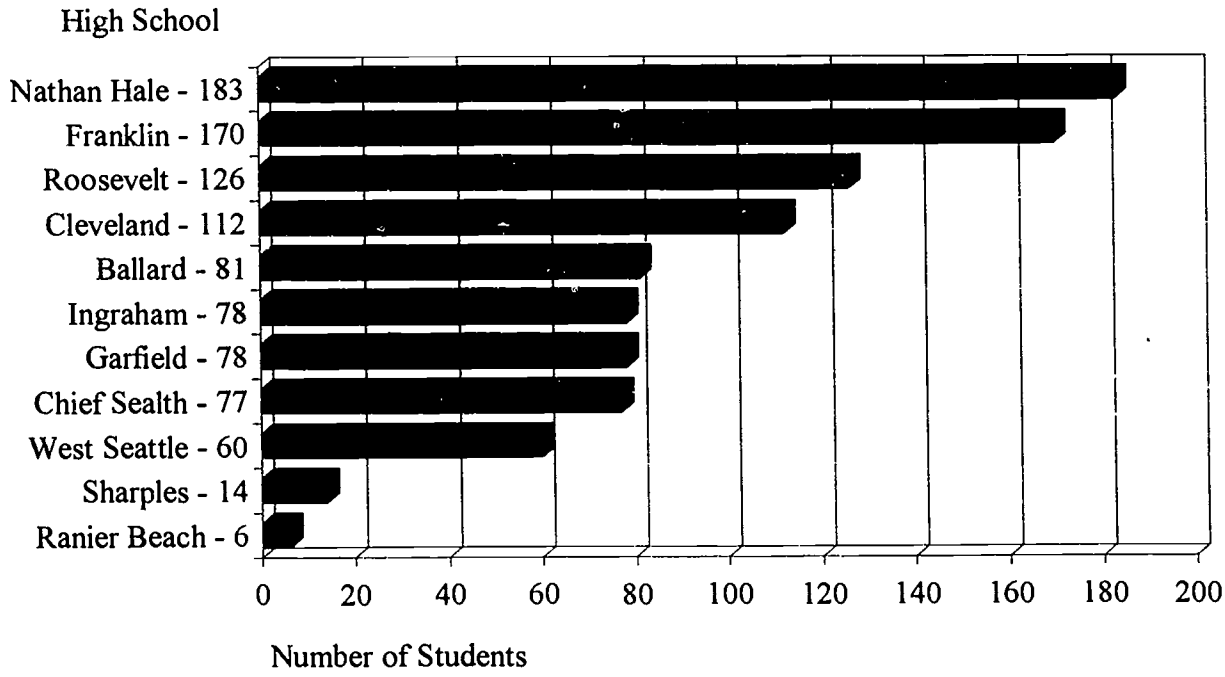


Figure 3
Percentage of Self-Identified Tech Prep Students by High School

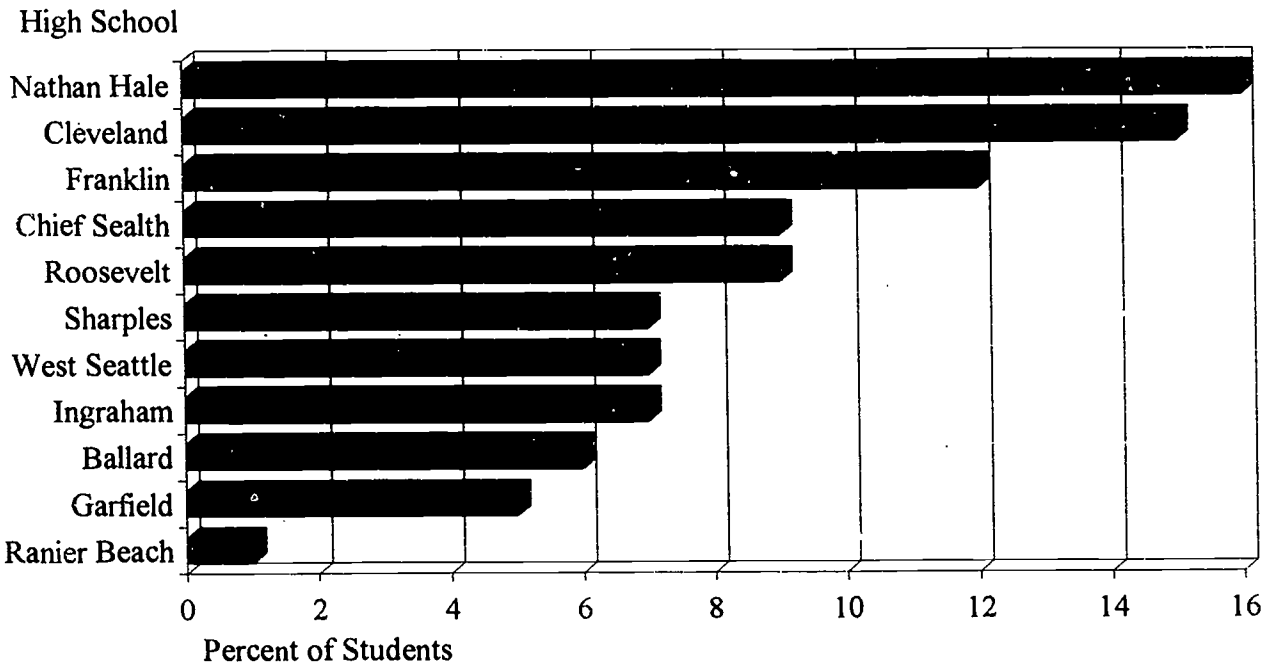


Table 6
Comparison of the Percentage of Self-Identified Tech Prep and Non-Tech Prep Student Responses to Survey Questions

Statement	Percent Tech Prep Students (N=985)	Percent Non-Tech Prep Students (N=912)
Want more information on Tech Prep	85	39
Took a career interest survey/assessment	47	37
Completed a four-year high school and beyond plan	29	19
Started a student portfolio (collection of information about his or her skills and abilities)	29	22
Took an Applied Mathematics course	40	28
Took a Principles of Technology course	25	16
Took a Business/Applied Communications course	37	28

Students identifying themselves as Tech Prep were also analyzed by the occupational courses they had taken. Table 7 below indicates the number and percentage of Tech Prep students in each occupational course/area. The percentages range from 70 percent to 50 percent, with business education having the largest percentage, and keyboarding, the

lowest. The areas with the lowest percentage are not associated with a community college training program or bring in students who are taking the course as general preparation for college or other areas (e.g., keyboarding).

In Seattle, special efforts are made to facilitate participation of special needs populations in Tech Prep. Special services include: inclusion of special populations coordinators in curriculum/staff development, use of interpreters, provision of child care, and coordination with JTPA youth programs.

Table 7
Comparison of Self-Identified Tech Prep and Non-Tech Prep Students by Occupational Course/Area

Occupational Course/Area	Number of Tech Prep Students	Number of Non-Tech Prep Students	Total	Percent of Tech Prep Students in Occupational Course/Area
Accounting	212	142	354	60
Auto/Diesel	105	55	160	66
Business Education	121	52	173	70
Child Development	131	68	199	66
Children/Parenting	73	53	126	58
Clothing Management	76	62	138	55
Computer Applications	281	172	453	62
Drafting	241	128	369	65
Desktop Publishing	29	15	44	66
FEAST	27	20	47	57
Horticulture	67	49	116	58
Information Processing	64	35	99	65
Keyboarding	533	541	1,074	50
Radio Production	99	49	148	67
TV Production	81	47	128	63
Woodworking	280	177	457	61
Word Processing	235	161	396	59

Curriculum Development

New or substantially revised courses have been implemented in six subject areas. Table 8 shows the areas and the number of secondary and postsecondary schools involved.

Commercially developed, applied academics curricula are being used in some participating high schools and community colleges. Table 9 shows the number of schools using each applied curriculum in 1994-95. Principles of Technology is the most commonly used curriculum. Tables 10 through 12 show changes in enrollments in Principles of

Technology, Applied Communications, and Applied Mathematics for each of the past three years.

Table 8
Number of High Schools and Community Colleges Engaged in New or Substantially Revised Academic Courses

Courses	Number of High Schools	Number of Community Colleges
Physics	9	2
Mathematics	5	2
English	2	3
Biology	1	1
Chemistry	1	1
Humanities		1

Table 9
Number of High Schools and Community Colleges Using Each Applied Academics Curriculum

Area	Number of High Schools	Number of Community Colleges
Principles of Technology	8	2
Applied Mathematics	4	2
Applied Communication	2	2
Applied Biology/Chemistry	1	1

Table 10
Number of Schools and Students Participating in Principles of Technology

Year	Number of Schools	Number of Students
1989	2	61
1990	7	206
1991	7	194
1992	8	217
1993	8	322
1994	8	295

Table 11
Number of Schools and Students Participating in Applied Communications

Year	Number of Schools	Number of Students
1992	5	176
1993	4	270
1994	2	67

Table 12
Number of Schools and Students Participating in Applied Mathematics

Year	Number of Schools	Number of Students
1992	2	99
1993	3	117
1994	4	172

Substantial changes also have occurred in occupational/technical courses. High schools made changes to applied science, business, and mechanical/industrial courses that involved both new instructional methods and more advanced skills. Applied mathematics and science, including physics, chemistry and biology, were revised at the community college level.

Although few new Tech Prep courses have been developed at the community college level throughout the United States, Seattle has been the exception. Under sponsorship of this grant and of The Boeing Corporation, the South Seattle Community College Advanced Technology Center has developed and taught four courses as part of its series in Applied Humanities. These courses are: Critical Thinking and Workplace Ethic, Responsibilities and Rights in a Free Society, History of Technology, and Applied Esthetics. All these courses are taught in the context of real world settings including the workplace, home, and community.

Articulation

Written articulation agreements were first signed between the school district and the Seattle Community College District in 1991. A general articulation agreement exists along with specific agreements in the following areas:

Apparel Design
Applied Communications
Applied Mathematicsematics
Automotive Technology
Business Education
CAD/Drafting
Early Childhood
Horticulture
Principles of Technology
Welding
Wood Construction

Community college articulation agreements involve identifying secondary courses or competencies for which postsecondary credits will be granted toward a certificate or degree, and defining/changing the content or competencies in secondary courses that are part of an occupational sequence.

Staff Development

Staff development was one of the most active parts of the Seattle Tech Prep program this year. It involved many people, including consortium staff, secondary and postsecondary administrators, teachers and counselors, and representatives of local business and industry. Heavy emphasis was placed on identifying general Tech Prep concepts and strategies for program leaders, improving integration of vocational and academic instruction, and promoting cooperation among secondary and postsecondary staff. Attention was also given to improving career development and counseling, identifying methods to promote Tech Prep, evaluating Tech Prep, and improving relationships among business, industry, and labor.

Guidance Activities

Seattle staff recognize the importance of guidance and career development as an essential element of an effective Tech Prep program. They took a number of significant steps in 1992-93 to expand this component of Tech Prep. Among those steps were:

- Hiring of a full-time Tech Prep counselor to provide leadership and coordination across the high schools
- Developing a Tech Prep handbook and brochures that were distributed to counselors and career specialists
- Developing a student portfolio
- Establishing a district career guidance focus and objectives
- Developing career guidance plans for each high school
- Conducting training workshops for all high school counselors and career center specialists
- Encouraging counselors to attend relevant state and national conferences

Marketing

A number of activities occurred to promote interest and acceptance of Tech Prep. Those considered by the staff as very effective were: the one-hour Tech Prep documentary shown during prime time on Channel 5, the Tech Prep hotline, public service announcements, development of a Tech Prep video, Tech Prep products such as student folders, and presentations to employer groups. Those considered somewhat effective were press releases, advertising, and presentations at high schools and community colleges.

Evaluation Monitoring

Since Seattle received special funding in 1992 from the U.S. Department of Education as one of nine Tech Prep national demonstration sites, the evaluation of the project has received special attention. The external evaluators from NWREL are working with George Neff and his students at Seattle Community College, who were funded to develop a computerized database containing information on past, current, and future Tech Prep students. When the database is fully implemented, it will include information on academic and vocational courses taken and completed; technical competencies attained; grades earned; diploma, degree, or certificate attained; workplace experiences gained; and job placements made. The community college data will include the following:

- Total number of students enrolled after graduating or leaving high school
- Total number of students by high school, gender, and ethnicity
- Range of ASSET or equivalent test scores
- Student program intent (college transfer program, vocational/technical, basic education)
- Average number of credits below college level and key courses at that level
- Key college transfer courses taken and when (English 101, Mathematics 101)
- Key applied academics courses taken and when (English 105, Mathematics 111)
- Average number and program areas of vocational/technical courses taken
- Length of stay in the community college

Data collection included interviews with key people within and outside the consortium and a written marketing survey of high school students to determine their level of awareness of Tech Prep. Findings from these activities are described in other sections of this report.

Areas of Success and Obstacles

The areas of the MPR survey in which the project codirectors perceived the most success were: collaboration between secondary and postsecondary educators; collaboration of some of the vocational and academic educators; development of articulation agreements; a high degree of involvement at the state level; building networks with other Tech Prep programs; developing increased awareness of Tech Prep in the educational community and the public; and integrating Tech Prep into larger reform efforts.

Obstacles to Tech Prep implementation included: negative attitudes toward vocational education and/or Tech Prep; resistance of secondary schools to replacing the general track; competing reform efforts; difficulty of revising postsecondary curricula; lack of truly integrated curricula; lack of collaboration between vocational and academic educators in some schools; need to expand involvement of business and industry (other than The Boeing Company) and to include a wider variety of activities including internship opportunities; and a shortage of staff, time, and money dedicated to Tech Prep.

In January 1994, Dr. Carilyn Norris, Washington Tech Prep program supervisor, made a two-day site visit to the project. She used an implementation assessment instrument completed by the project codirectors, reviewed project documents, and interviewed 11 secondary and postsecondary educators. Based on her site visit, she identified 10 program strengths and made 11 recommendations as listed below.

Strengths:

1. Competencies were identified for Principles of Technology, Applied Communications, Wood Construction, and CAD.

2. Secondary and postsecondary faculty participated in summer Boeing internships.

3. Competencies for CAD were identified by faculty teams from secondary and postsecondary programs and validated by industry.

4. Linda Reidt, Tech Prep counselor, was hired March 1993 to work with all high schools in Seattle.

5. Gloria Baldwin, Ingraham High School principal, made a strong commitment to implementing the Tech Prep Bridge Program. During fall 1993, four career paths were made available for the 240 ninth-graders at Ingraham, and each student identified a career path preference. Results: Kids are motivated to be in school; supervision is down.

6. Ballard High School has Career Options in place; Rainier Beach plans to implement Career Options in spring 1994.

7. Ingraham High School student interns continued with Boeing summer 1994.

8. Currently, CAD is offered in 10 high schools articulated with North Seattle Community College. The plan is to articulate with South Seattle and Central.

9. During the week of January 3, 1994, the steering committee had representation from Boeing, Fluke, SeaFirst, and CAD businesses to discuss work-based opportunities.

10. Applied academics was implemented at the postsecondary level.

Recommendations:

1. Encourage the steering committee to provide stronger leadership to move Tech Prep forward in the Seattle district. Involve committed individuals to assist with goals to stimulate action for progress. Hold monthly steering committee meetings to provide leadership for the project.

2. Provide stronger collaboration between secondary and postsecondary administrators.

3. Encourage development of a scope and sequence of courses for each cluster area to include applied academics to eliminate duplication and ensure the transfer of secondary credits to postsecondary schools.

4. Improve recordkeeping of committee meetings, minutes, and those in attendance.

5. Implement system for identifying Tech Prep students and tracking competency attainment.

6. Strengthen involvement of business and labor in consortium activities. Greater involvement could increase work-based opportunities for students (job shadowing, mentoring, cooperative work experience, etc.).

7. Collaborate with secondary and postsecondary faculty to integrate academic and technical competency-based curriculum.

8. Continue to update counselor handbook.

9. Based on Aviation Technology limitations and resources, implement a Manufacturing Technology cluster to include aviation.

10. Provide career paths and options for students in more than three of the 10 high schools in the district.

11. Encourage development of articulation agreements for Wood Technology (competencies for this area have been identified).

Student Survey Findings

In May 1993, students in grades nine through 12 in the Seattle Public Schools were surveyed regarding whether and how they had heard about Tech Prep, and what they thought it meant. A total of 1,581 students from all 12 high schools in Seattle completed the survey. Half the students were female. Students were fairly evenly distributed across grade levels (27 percent in grade nine; 26 percent in grade 10; 23 percent in grade 11; and 19 percent in grade 12).

Across the grade levels, only 28 percent said they had heard of Tech Prep. The percentages ranged from 22 percent of the ninth graders to 34 percent of the 12th graders. Fifty-seven percent of the students indicated they wanted to know more about Tech Prep. Students were given five options to describe what they considered Tech Prep to be. Table 13 indicates their responses. A similar study of high school students in the Portland area conducted in the same month found that 25 percent of students surveyed had heard of Tech Prep.

Table 13
Percentage of High School Students Identifying Each Description of Tech Prep

Description	Percent
Certain courses to prepare you for careers in technical fields	45
Preparation for community college or a four-year college	19
A new name for vocational education	11
Preparation for a job immediately after high school	8
I'm not sure	32

The fact that a third of the students were unsure what Tech Prep is and 11 percent believed it a new name for vocational education suggests the need for a continued effort each year to communicate the purposes of Tech Prep.

Students were also asked about their plans after high school. Table 14 displays their responses. The largest percent of students felt they would be going to a four-year college with another 31 percent indicating plans to attend a community college. An interesting breakout of this question by grade level indicates a decrease over time of those planning to attend a four-year college and an increase in those planning to attend a community college.

Table 14
Percentage of High School Students Identifying Various Post High School Plans

Plan	Percent
Four-year university/college	43
Community college	31
Technical college	6
Straight to work	5
Don't know	19

The fact that 19 percent of the students, including 12 percent of the seniors, did not know what they plan to do after high school graduation suggests the need for continued work on career development with high school students.

Interviews with Key People

Secondary

In the spring of 1993, NWREL evaluators conducted personal or telephone interviews with key leaders in the district and community regarding Tech Prep. The intent of the interviews in this first year was to get a baseline of perceptions regarding: (1) what Tech Prep is; (2) how Tech Prep fits with other educational reform efforts in Seattle; and (3) the ideal future of Tech Prep in Seattle.

Interviewees included senior administrators in the district, board members, project co-directors, vocational education staff from the district, and several vocational education advisory committee members.

Interviewees reported they view Tech Prep as a way of meeting the needs of business and industry as well as preparing students for technical jobs while maintaining their interest in school. They also see Tech Prep as a school-to-work transition strategy and a way of linking with community colleges and avoiding duplication of programs and equipment.

Interviewees expressed mixed feelings about how Tech Prep fits with other educational reform efforts. On one hand, they see Tech Prep supporting business linkages, strengthening the three Rs, and reinforcing the district's move toward competency-based outcomes. On the other hand, they are concerned that Tech Prep might be shortchanged by site-based management councils that allow every school to make its own decisions regarding how to serve students. They are also concerned that it may conflict with the district's efforts to upgrade curriculum for every subject and grade.

The third question addressed the future of Tech Prep. There is hope but concern about whether local funds will be available to continue Tech Prep after the federal funds disappear. The future should include more occupational areas for Tech Prep; the project

should continue to develop ways of working with community colleges; and the project should continue to meet the needs of business and industry.

Postsecondary

In the fall of 1994, evaluators conducted interviews with the chancellor and chair of the Board of Trustees of the Seattle Community College District, the president of South Seattle Community College, the director of the Seattle Vocational Institute, and the associate dean of professional and technical education at Seattle Central Community College. Interview questions focused on their perceptions of Tech Prep in the Seattle School District; their perceptions of how widely Tech Prep is applied in the Seattle Community College District; their ideas regarding the future of Tech Prep; and what issues or challenges need to be addressed to meet the future.

Perception of Tech Prep. Perceptions include: progress has been made in developing 18 courses and having up to 40 college/high school teams working together; there is need for a clear direction, purpose and goals for Tech Prep; business, industry, and K-12 staff are beginning to work together in new ways; there is commitment by the district for Tech Prep; and Tech Prep is congruent with other national priorities in unemployment and welfare reform.

Breadth of Tech Prep in the community college district. South Seattle Community College leads the college district in programs that affect high schools; Central and North are interested in beginning an Allied Health area; and one of the board members, Carver Gayton, is a national leader and spokesperson for Tech Prep.

Ideas for the future. The community college district is engaged in a six-year plan that is looking at new and emerging occupations and training voids. Interviewees suggest there is a need for better linkages with industry and a closer look at which programs are articulated into career paths. Applied academics is viewed as very valuable but costly. Interviewees recognize the increasing need for job-directed training and retraining and are working to better provide business and industry with the kinds of employees that can meet their needs.

Issues or challenges. Responses include: a need for a strong role by business; more in-service for teachers and instructors; better equipment and space for conducting onsite training; a cluster in which students can follow a career path and receive a liberal arts education; and finding areas of job growth that provide living wages.

Student Management Information System

During 1993 and 1994, George Neff, a faculty member at South Seattle Community College, and some of his computer technology students developed and pilot tested the Seattle Tech Prep Management System. The system is impressive but some

implementation concerns need attention. Key policy questions identified by the NWREL evaluation team for the school district include:

1. Who is responsible for preparing a consortium-wide implementation plan to include beta testing?

2. What commitment exists (or needs to be made and shared widely) regarding the expectations for each school to participate, or is Tech Prep intended as a local school option rather than a districtwide system?

3. Who will be responsible for managing the system at the district and school levels?

4. Who are the primary users of the system? Are students included?

5. How will confidentiality of data be maintained? What district policies need to be consulted and observed?

6. Who will be required to enter student competency data? Will it be all vocational education teachers as well as any applied academics teachers? If yes, computers will need to be readily accessible to these teachers.

7. Where will the computers for input and use of the system be located? For example, if students are to enter their worksite records and generate resumes, they will need ready access to computers with the system on them.

In addition to the above policy questions, some broad recommendations were made regarding the planning guide.

The Student Management System can be a very useful resource for Tech Prep administrators throughout the nation even if they use a different database system. However, it is important to identify the primary users of the system and then review the contents in relation to the intended audiences. For example, if the primary audience is Tech Prep administrators, then issues related to the pros and cons of where the computers are located and how teachers are approached, motivated, and trained to input competencies need to be addressed. Some existing content such as "grounding the computers" is too detailed and could be omitted or put into an appendix.

PROGRAM EFFECTIVENESS CLAIMS

Description of the Program Effectiveness Panel (PEP)

In essence, the PEP is responsible for reviewing the evaluation data used to demonstrate the effectiveness of projects. The PEP examines the educational significance of the claims, the quality of evidence to support each claim, the extent to which each proven outcome is attributable to the program treatment, and the degree to which the project components are replicable in other sites.

Student Claims

In making the case for the success of this Tech Prep initiative it needs to be remembered that the external evaluation by NWREL has occurred for less than two full years and that some elements of the program have not yet been fully implemented with students throughout all years of high school. The contract for these funded national demonstration projects, however, required a Program Effectiveness Panel submission this year. Therefore, we are identifying claims for which we currently have valid and convincing data. We are also providing a baseline from which future claims can be made in areas such as the graduates' success in employment and postsecondary education.

Business leaders and the general public are starting to recognize the importance of continued education beyond high school for youth who are to become successful in today's competitive workplace. While not necessarily needing a four year degree, young people today do need some preparation beyond high school. Tech Prep has been set up as a 2+2 program (with possibilities for students to continue beyond the community college level) to provide incentive for students to progress beyond a high school program to obtain at least a two year associate degree. Because the link between high school and postsecondary education is a key element of Tech Prep, it is critical to consider the extent to which Tech Prep contributes to students' entering postsecondary education. Thus our final claim shows how Tech Prep is resulting in students' continuation at a higher rate into postsecondary education. The two prior claims are instrumental to students' entering into technical training beyond high school. Claim 1 shows how Tech Prep students are more likely to engage in significant career development practices that set the stage for more intelligent course selection in high school and beyond. Claim 2 shows that Tech Prep students are more likely to enroll in applied academics classes that integrate academic and vocational learning and relate Mathematics, science, and communications to the real world.

1. Claim Type 3: Improvement in Students' Attitudes and Behaviors

Seattle's Tech Prep students are more likely than non-Tech Prep students to have taken a career interest inventory and to have completed a four year high school and beyond plan.

2. Claim Type 3: Improvement in Students' Attitudes and Behaviors

Seattle's Tech Prep students are more likely than non-Tech Prep students to take applied academics classes in Mathematics, science, and communications that help prepare them for the technological workplace.
Claims 1 and 2 are presented together since the methodology and instrumentation are the same.

Description of Methodology

Design. The behaviors of 985 self-identified Tech Prep students in Seattle were compared with those of 912 non-Tech Prep students in the same vocational classes on a written survey administered in December 1993. After spending months discussing with the staff a definition of a high school Tech Prep student, we finally agreed on a definition by having students identify whether they considered themselves to be Tech Prep students. The definition given to students reads:

> A Tech Prep student is a student who plans to pursue a career which requires specific training. This training begins in high school and is completed at the community college and beyond. Work experience related to the career area is part of the training program. Community college credit may be earned for courses completed (skills gained) in high school.

Surveys were distributed by the district vocational education coordinators to vocational teachers in each of the high schools who administered them during a class period and returned completed surveys to the coordinators. The survey was designed and analyzed by the NWREL evaluation team using the Statistical Package for Social Sciences (SPSS).

To determine that the Tech Prep and non-Tech Prep groups were similar in background characteristics, we collected transcript data and compared the two groups' gender, ethnicity, and grade point average (GPA). The Tech Prep group had a somewhat greater proportion of males (62 percent versus 50 percent) but the GPA and ethnic distribution were approximately the same for both groups.

Sample. The population consisted of all 9th-12th grade students enrolled in vocational education courses in the Seattle Public Schools in December 1993. Table 15 shows the distribution of students by occupational course/area. Overall, 40 percent of the students identifying themselves as Tech Prep students were female.

Table 15
Comparison of Self-Identified Tech Prep and Non-Tech Prep Students by Occupational Course/Area

Occupational Course/Area	Number of Tech Prep Students	Number of Non-Tech Prep Students	Total	Percent of Tech Prep Students in Occupational Course/Area
Accounting	212	142	354	60
Auto/Diesel	105	55	160	66
Business Education	121	52	173	70
Child Development	131	68	199	66
Children/Parenting	73	53	126	58
Clothing Management	76	62	138	55
Computer Applications	281	172	453	62
Drafting	241	128	369	65
Desktop Publishing	29	15	44	66
FEAST	27	20	47	57
Horticulture	67	49	116	58
Information Processing	64	35	99	65
Keyboarding	533	541	1074	50
Radio Production	99	49	148	67
TV Production	81	47	128	63
Woodworking	280	177	457	61
Word Processing	235	161	396	59

Instruments and Procedures. The instrument used was a one page survey developed by NWREL containing the student name, social security number, school, class, gender, grade, and ten questions including whether they considered themselves Tech Prep students and what occupational courses they had taken. In addition, students were asked to respond yes or no to behaviors statements such as "I have completed a four year high school and beyond plan."

Description of Results. Essential elements of Tech Prep involve students in learning more about their career interests, planning course sequences that reflect these interests, and integrating academic and vocational learning. To assess these components, the Seattle Tech Prep survey included questions designed to obtain information about these activities. Table 16 shows the comparisons between the two groups on these items. In each case (where the three applied academics classes are combined), there was at least a nine percent difference in favor of the Tech Prep students. A chi square statistic was run comparing the proportion of students in each

group having done the behavior, and the proportion was statistically significant at the .001 level for all six variables. As Tech Prep is more fully implemented in future years, there should be an even higher percentage of Tech Prep students stating yes to these questions.

Table16
Comparison of the Percentage of Self-Identified Tech Prep and Non-Tech Prep Student Responses to Survey Questions

	Percent		
Behavioral Statement	Tech Prep Students (N=985)	Non-Tech Prep Students (N=912)	Chi Square
Took a career interest survey/assessment	47	37	.001
Completed a four year high school and beyond plan	29	19	.001
Took an Applied Mathematics course	40	28	.001
Took a Principles of Technology course	25	16	.001
Took a Business/Applied Communications course	37	28	.001
Named a career of interest	70	61	.001

3. Claim Type 3: Improvements in Students' Attitudes and Behaviors.

The Seattle Tech Prep students have a higher rate of transition into postsecondary education than non-Tech Prep students and a higher rate than the national average.

Description of Methodology

Design. This study of graduates of the class of 1991 was conducted by Dr. Mary Beth Celio of Northwest Decision Resources and reported in April, 1993. A telephone interview with graduates was conducted using a specific questionnaire guide. The interviews were conducted by a team of multilingual interviewers. The study addressed the question of what graduates were doing one year after graduation.

Sample. A random sample of 734 students was drawn from the 1,984 students in the Class of 1991. Of the graduates sampled, 74 percent responded (24 percent could not be located after six calls, and three percent refused). This is a high return rate since similar local and state follow up students often result in only in a 20 to 30 percent response rate.

Instruments and Procedures. A seven item questionnaire was used as the basis for the telephone interviews. Fixed responses were read to the graduates from which they selected the ones appropriate. Data were analyzed and reported by various categories including age, gender, ethnicity, vocational or non-vocational status in high school, high or low GPA, whether respondents were working or not at the time of the interview, and postsecondary status (including whether full or part-time and whether in a two or four year school).

Description of Results. Findings from the Celio study demonstrate that Tech Prep students in the Seattle Public Schools who have taken vocational training are more

likely to have entered postsecondary education one year after graduation than those not having had such training. For the Tech Prep graduates 79 percent were enrolled in postsecondary education compared to 66 percent for other high school graduates. Since Tech Prep is particularly focused on the connection with community colleges, it is important to note that 47 percent of the Tech Prep students went on to the community college, while only 33 percent of the non-Tech Prep students did so. The fact that nearly identical percentages of each group went on to a four year school (32 percent for Tech Prep and 33 percent for non-tech Prep) demonstrates that Tech Prep does not limit options for attending four year programs. Equally impressive is that the Seattle high school graduates going on to the community colleges include a higher percentage of students who formerly did not progress beyond secondary education (those with a high school GPA of 2.8 or less, Black and Asian populations, and high school graduates ages 19 or older) according to the Celio study (pg. 8).

The percentage of Seattle Tech Prep students going on to further education was not only higher than for the non-Tech Prep students, it was also higher than for the nation as a whole. According to the U.S. Dept. of Commerce Bureau of the Census, Current Population Survey of October 1992, 62 percent of high school graduates continue on to a postsecondary program (39 percent to a four year institution and 23 percent to a less than four year institution).

Interpretation and Discussion of Results

1. Relationship Between Effect and Treatment

The data presented in Claims 1 and 2 above demonstrate that students in Tech Prep learn more about their career interests, complete planners that help them link course choices to their career interests, and take academic courses that employ hands-on learning and demonstrate career relevancy at a rate higher than for non-Tech Prep students. Claim 3 shows that Tech Prep students are more likely to enroll in postsecondary education than other students and that they are especially more likely to enroll in community colleges. Clearly these two outcomes are important and are linked. Career guidance in identifying occupational areas of interest is a key factor in helping students see relevance in their education and understand how Tech Prep courses taken in high school can garner credit at the community college. Thus, they are more likely to enroll in community colleges.

2. Control of Rival Hypotheses

The fact that students in Tech Prep are likely to engage in career and course planning, take applied academics courses, and go on to postsecondary education might prove true for all high school students. To rule out these rival hypotheses we established meaningful comparison groups and showed that the Tech Prep students outperformed the comparison group students. A comparison with national data was also used to compare postsecondary attendance.

Educational Significance of Results

1. Relationship of Results to Needs

The Seattle Tech Prep Program is meeting the needs of similar students throughout the United States who need to see relevance in their learning, and to select courses planfully, based on career interests rather than arbitrary factors such as perceived "easiness" or friends' choices. Although the Seattle Tech Prep Program is open to all students, it is designed especially for the "neglected majority" who might otherwise coast through high school never seriously considering entering the postsecondary technical training needed to get and maintain a family wage job in today's advancing technological society. The fact that Tech Prep graduates enroll at four year colleges at the same rate as non-Tech Prep graduates shows that Tech Prep is a good option as well for the higher ability student. The fact that Tech Prep draws a significantly larger percent of minority and lower GPA students into community colleges demonstrates that it is successful for the "neglected majority" for whom the need is greatest.

2. Comparison of Results to Results from Other Programs

The increased enrollment of Seattle Tech Prep students into postsecondary schools, especially community colleges, is similar to findings from the Richmond County, North Carolina Tech Prep program which passed the Program Effectiveness Panel review in 1994.
(James, 1994). Since both Tech Prep programs are based on the same principles, it is reasonable to expect they would achieve similar outcomes. In the case of the Richmond County program, their 55 percent postsecondary placement rate was only three percent higher than the state average (which they used for comparison), while our findings show a 79 percent postsecondary placement - significantly higher than the national average of 62 percent.

RECOMMENDATIONS

The Seattle Tech Prep Project has produced some important outcomes, including the formation of an evaluation advisory committee; an evaluation design reviewed by the advisory committee, revised, and implemented; a set of definitions of high school and community college Tech Prep students; a comprehensive description of the project and its operations; start-up work designing an effective student management information system; and a Tech Prep marketing survey completed by more than 1,500 high school students. In addition, the NWREL Evaluation Team makes the following recommendations for the future to help guide the stabilization of Tech Prep:

A clear vision of Tech Prep and its future is critical to set the direction for the school district, the community college district, and the business community.

Perhaps an annual meeting of a small steering committee including the superintendent, college president, and one or two major corporate executive officers would show top-level commitment to Tech Prep as a comprehensive reform movement. Establishing the fit with other school-to-work and education reform efforts in Seattle is also key.

More intensive work is needed to increase the awareness and understanding of Tech Prep for students, staff, parents, and employers.

Data from the high school survey administered in May 1993 indicate that of the students surveyed, only 28 percent had ever heard the term "Tech Prep," and 11 percent thought it was just a new name for vocational education. While it is not useful to make a major distinction between Tech Prep and college prep, since some students will qualify for both, it is important that students know about Tech Prep and be encouraged through individual student plans and student portfolios to think about how they can continue their professional technical education beyond high school. Since extensive television coverage of Tech Prep occurred in late 1994, it would be useful to repeat the student survey in early 1995 to determine the impact of the additional marketing efforts.

The experiences and outcomes of Tech Prep students should be identified, monitored and assessed next year to determine achievement of project claims.

Seattle Tech Prep has attempted to organize a solid program for students. In the future, it needs to carefully identify the project claims to be made and continue collecting reliable related data. This will involve a careful distinction between which students are considered Tech Prep students and which can be considered a meaningful comparison group. It will also be necessary to document the actual classes and other experiences that are considered core components of the program for all Tech Prep students as part of a comprehensive evaluation. This evaluation effort may be effectively combined with an evaluation of the Seattle Public Schools' work efforts. NWREL would be interested in working with the Seattle Public Schools and Seattle Community College in a comprehensive assessment of their total workforce preparation efforts.