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ABSTRACT

In response to concerns of unnecessary duplication in programs offered by Texas community/junior colleges and the four campuses and five centers of Texas State Technical College (TSTC), TSTC undertook a study to examine curricula, enrollments, and outcomes for both systems. A literature review was conducted to determine potential differences between community/junior college and technical college education and data were obtained from published reports and official documents of the Texas Higher Education Coordinating Board for the 1990-91 school year and for the 1990 federal fiscal year. Key findings included the following: (1) in general, the TSTC curriculum reflected "export-related" technologies (e.g., manufacturing, electronics, lasers, computers, and energy) while the community/junior college curriculum reflected "service-related" technologies (e.g., marketing, office skills, health care, and criminal justice); (2) TSTC was found to offer a unique curricula design and instructional delivery system in that students who enrolled knew that they would be required to take more courses, complete more contact hours, and spend more time in laboratory assignments; (3) students attending TSTC were much more likely to complete a technical degree or certificate program than community/junior college students; (4) TSTC also had an outstanding graduation record for minority and special population students from "export-related" technical programs, typically high risk groups for technical programs; (5) TSTC had lower costs per graduate and a higher "graduate percent yield" than the community/junior colleges. (KP)

A COMPARATIVE ANALYSIS OF POSTSECONDARY TECHNICAL EDUCATION IN TEXAS

AN EXECUTIVE SUMMARY

Prepared By

TEXAS STATE TECHNICAL COLLEGE SYSTEM

OFFICE OF THE CHANCELLOR
Cecil L. Groves, Ph.D.
Chancellor

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EXECUTIVE SUMMARY

INTRODUCTION

Global competition, a growing national debt, declining state budgets, dislocated workers, fear of unemployment, and public discontent are causes for national and state concern. In this world of uncertainty, education is the single best hope for a successful economic future and a desirable quality of life. People with knowledge and skills are the most significant asset a state or nation can possess in the worldwide race to create and apply technology. In contrast, inferior education poses the greatest potential threat to our state and nation in the present and throughout the future.

Quality technical education is an economic and social essential for Texas. Business and industry, particularly small- and medium-size firms, need an educated and well-trained work force to help them modernize their workplace and become high performance organizations capable of competing in the world market. High performance organizations need smart people to perform smart jobs which produce smart goods and valued services, creating individual and public wealth and economic strength and stability. Smart workers with advanced skills employed in smart jobs are paid higher wages. To acquire the advanced skills and smart jobs, quality technical education is essential, especially for the increasing number of citizens desiring to escape dependency and achieve self-sufficiency. How do we provide this quality technical education that helps Texans achieve their job goals, and Texas business and industry achieve their productivity goals during a time when state resources are diminished?

Postsecondary technical education, like the rest of higher education and the public schools, is being held accountable for quality and performance. An analysis of performance must begin by identifying the current status of technical education. The primary public institutions in Texas that provide postsecondary technical education and training are the four campuses of Texas State Technical College and the 65 campuses of community/junior colleges. An evaluation of key performance indicators of both these technical education delivery systems is necessary in order to identify comparative benchmarks for assessment of outputs and outcomes.

PURPOSE AND DESIGN OF THE STUDY

Texas State Technical College (TSTC) is undergoing reviews by the Texas Higher Education Coordinating Board and a Subcommittee of the House Committee on Higher Education. These reviews were undertaken due to a concern that unnecessary duplication exists in programs offered by TSTC and the Texas community/junior colleges. Comparatively, TSTC has 4 campuses and 3 active extension centers with 2 additional centers scheduled for implementation in Fall 1992 while the community/junior colleges have 65 campuses and approximately 250 extension centers. Compared to the community/junior colleges, TSTC offers 5 percent of the total number of technical programs, enrolls 6 percent of the technical students, and accounts for 12 percent of the total number of technical program graduates in Texas.

TSTC, supportive of the state mandated studies, undertook a comparative analysis study of the community and technical colleges of Texas in order to provide better insight into some of the more probing questions mentioned previously. The Comparative Analysis of Postsecondary Technical Education in Texas is a study comprised of two volumes. Volume I is the report of findings (71 pages) and Volume II contains the supporting appendices (147 pages).

Review of Literature

A review of the literature was conducted by TSTC to provide background information, context, and understanding of potential differences between community/junior college and technical college education. The National Assessment of Vocational Education (NAVE) study, published in 1989, served as the primary resource document for this comparative analysis study. The outcomes of the NAVE study and other studies revealed that while most students have access to higher education through two-year colleges, they do not stay in school long enough preferring to "mill around" rather than complete a "coherent program of study." Without a degree or certificate, the economic benefits of higher education to students is marginal at best. This problem was found to be particularly acute for special population students.

Methodology

The data utilized by the Occupational and Institutional Research Division of TSTC for the study were obtained from published reports and official documents of the Texas Higher Education Coordinating Board (Coordinating Board) for the 1990-91 school year and for the

1990 Federal fiscal year. All enrollment data were based on "declared majors" in technical programs. Also, a list of the active Coordinating Board-approved vocational/technical programs was compiled according to the Texas HEGIS Code designation for each program. A data base of the information was compiled and an institutional curricula profile was built for each two-year college.

Technical Program Clusters

To facilitate data comparisons and to improve data integrity, Coordinating Board-approved technical programs were assigned to one of twelve primary program clusters which were identified based on the Texas Innovation Network System (TINS) list of emerging and advanced technologies, and on generally understood and accepted program clusters or families of occupations. The primary technical program clusters identified are listed below:

Medical/Health Care
Biotechnologies
Automotive/Heavy Mechanics
Building Systems & Construction
Applied Service & Business
Related Studies
Information
Energy & Environmental
Laser/Electronics
Manufacturing, Design & Engineering
Aerospace
Agribusiness

In addition, the terms "export-related" and "service-related" were used to classify the technical program clusters for comparative analysis.

"Export-Related" - This term or classification refers to those technical program clusters that most directly support the needs of businesses and industries which export goods and services for sale to those outside the state of Texas. These businesses and industries, and those programs which support them, have a multiplier effect in helping create wealth, thus improving the economy of the state. The technical programs assigned to the "export-related" classification are as follows:

Information
Energy & Environmental
Laser/Electronics
Manufacturing, Design & Engineering

Aerospace
Agribusiness

"Service-Related" - This term or classification refers to those technical program clusters which most directly impact businesses, industries, and public agencies and institutions which provide services primarily within the state of Texas. While important to the quality of life, service-related firms generally do little to directly improve the overall creation of wealth for a region or state. The technical programs assigned to the "service-related" classification are as follows:

Biotechnologies
Medical/Health Care
Automotive/Heavy Mechanics
Building Systems & Construction
Applied Service & Business
Related Instruction

Definitions

The following definitions apply to the study and were used when analyzing the findings.

Declared major - a student who has enrolled in a Texas Higher Education Coordinating Board-approved technical program and has stated the intent to complete courses that lead to an associate degree or certificate.

Key descriptive data - for the community/junior colleges and TSTC include the number of programs offered, enrollment and the number of graduates.

Performance indicators - for the purposes of the comparative analysis study, performance indicators for the community/junior colleges and TSTC are the "Graduate Percent Yield" and cost per graduate.

Institutional curricula profiles - for the community/junior colleges and TSTC contain the key descriptive data as distributed among the technical program clusters.

"Graduate Percent Yield" - for the community/junior colleges and TSTC is computed by dividing the annualized number of technical program cluster graduates (degree and certificate) by the technical program cluster enrollment of the previous fall term figure and multiplying by 100.

Cost per graduate - the state appropriated funding for fiscal year 1990-91 as determined by the Texas Higher Education Coordinating Board formula divided by the total number of graduates. The cost per graduate is determined separately for the community/junior colleges and TSTC, and for each technical program cluster.

Special populations - is based on the federal statute and includes individuals with handicaps, educationally and economically disadvantaged individuals, individuals with limited English proficiency, individuals who participate in programs designed to eliminate sex bias, and individuals in correctional facilities.

Major metropolitan area institutions - for the purpose of this comparative analysis, major metropolitan area institutions include those community/junior colleges located in Dallas/Fort Worth, Houston, San Antonio, Austin, El Paso, Beaumont-Port Arthur, and appropriate contiguous counties.

Balance of state institutions - for the purpose of this comparative analysis, the balance of state institutions include all those community/junior colleges not located in the major metropolitan areas.

CONCLUSIONS

After reviewing the comparative information on community/junior colleges and Texas State Technical College, the following conclusions were drawn from the findings:

1 **The Texas Higher Education Coordinating Board, to comply with federal and state reporting requirements, has collected a wealth of data on public two-year colleges. This data can and should be used for implementation of a performance-based budgeting system, and to provide comparative reports for prospective students, taxpayers, governing boards, state agencies, and business and industry.** Use of the available Coordinating Board data would permit Texas to establish comparative performance benchmarks and assume a national leadership role for postsecondary technical education.

2. **Texas State Technical College has a significantly different curricula profile reflective of "export-related" technologies (e.g., manufacturing, electronics, lasers, computers, energy)**, while the curricula profile of the community/junior colleges emphasizes the "service-related" technologies (e.g., marketing, office skills, health care, criminal justice). The "export-related" technologies represent those technical programs most directly supportive of businesses and industries which sell Texas-produced goods and services to others outside the state. These "export-related" technologies are critical to the economy of Texas and its ability to effectively compete in the world marketplace. Most "export-related" technologies teach the productive application of scientific principles based on the physical sciences (e.g., physics, chemistry). As a result, these programs are expensive and typically require a significant investment in equipment and facilities.

3. **TSTC offers students a unique curricula design and instructional delivery system different from that of the community/junior colleges.** Students choosing to enroll at TSTC do so knowing they will be required to **take more courses** with **more contact**

hours to complete a degree, **spend more time** in completing laboratory assignments and projects, and be encouraged to graduate on-time with their class. **While some technical programs and courses may have similar titles, there is no unwarranted duplication of courses or programs.**

4. **The unnecessary duplication of technical programs is an issue of legitimate concern. The rising cost of technology, especially for those technologies requiring expensive capital equipment for laboratories and highly specialized faculty, should be approved only after careful study. Program submission to the Coordinating Board, as a positioning exercise by institutions to prevent other institutions from securing similar program approval, should be discouraged.** The present system of individual program approval is rapidly becoming dysfunctional given the changed workplace demands for new technicians cross-trained in different technology applications. These changes require two-year colleges to stress the clustering of technologies into supportive families of technical programs facilitating the exchange of ideas, information, and resources. The clustering of technologies will permit the colleges and the state to benefit from economies-of-scale.

5. **Community/junior colleges have a curricula profile skewed toward "service-related" technologies, especially those programs in the Medical/Health Care technologies and in the Applied Service & Business technologies.** A preliminary analysis of trend data found a continued skewing of technical programs, enrollments, and graduates toward "service-related" technologies. The reason is that the Coordinating Board funding formula, which is enrollment-driven, favors those programs with the largest enrollments, lowest capital costs, best students who require fewer support services, opportunity to utilize part-time faculty to reduce salary costs, and programs which have the least risk of failure. The "service-related" jobs, despite the education level of the employee, pay low wages and require minimal skills.

6. **Texas State Technical College offers the majority of its technical programs in the "export-related" technologies, most of which require higher skill levels for employment and pay higher wages.** The "export-related" technologies directly support the economic diversification of Texas by providing business and industry with quality technical graduates capable of being productive on the work floor or in the workplace with minimal internal training. This is especially important for the small- and medium-size businesses and industries which are financially unable to provide the time and financial support needed for new employees to become productive through expensive and extensive internal training. The larger corporations are better able to cope with the problem.

7. **Students attending Texas State Technical College are much more likely to complete a technical degree or certificate program than students who attend a community/junior college.** Graduation or completion of a "coherent program of study" from a quality technical program was identified by the National Assessment of Vocational

Education study in 1989 to be the greatest problem facing technical education in the United States. The problem was most acute for minority students and special population students who were the least likely to graduate.

8. **The outstanding graduation record of Texas State Technical College for minority and special population students from "export-related" technical programs, which require a working knowledge of math and science, represents a significant educational achievement for TSTC and supports its instructional methodology and curricula design.** The successful graduation of those students considered most "at risk" in technical programs critical to the economic diversification of Texas not only benefits the economy of the state, but helps to reduce the present and potential social and welfare costs to the state. Much more needs to be accomplished by postsecondary institutions to address the educational and training needs of minority and special population students.

9. **Community/junior colleges (29 campuses) located in the "major metropolitan" areas were not as successful in having students graduate as those community/junior colleges (36 campuses) located in the "balance of state." None were as successful as Texas State Technical College.** The lower graduation rate for the "major metropolitan" area community/junior colleges may have resulted from the primary focus of their technical programs on retraining or continuing education rather than on graduation which is the basis for most pre-employment training. Another reason for the lower graduation rate might be a technical program focus for transfer to a four-year college which does not necessitate completion of a degree. The graduation comparisons for this study were predicated on students who declared a technical education major. For the purpose of this study, "declared majors" were students who professed the intention of completing a technical degree.

10. **The lower cost per graduate and the higher "Graduate Percent Yield" along with the demonstrated success in meeting the educational needs of minority and special population students make Texas State Technical College the most cost-effective, educationally sound, and economically vital two-year public college in Texas.** These accomplishments were achieved despite the fact that:

    (1) TSTC has no tax base and, as a result, an income differential approximately 20 percent less than the community/junior colleges; and

    (2) TSTC has no dedicated source of facility or equipment funds which is available to all other institutions of higher education through either the Permanent University Fund (PUF), the Higher Education Assistance Fund (HEAF), or the ability to levy property taxes.

11. **The present funding formula which rewards only inputs (enrollment) and not outputs or outcomes (graduates) has had a perverse effect upon the type and quality of technical programs offered, and upon graduates, "Graduate Percent Yield," and**

the graduation rates of minorities and special population students. A formula which is totally enrollment-driven rewards institutional behavior contrary to those factors known to be essential for quality technical education:

(1) more time spent by the student in the laboratory and on projects which are relevant to the modern workplace;

(2) more direct teacher involvement with the student on a regular basis;

(3) greater integration of classroom and laboratory learning activities which integrate academic and application skills; and

(4) more involvement by business and industry in curricula development and instructional delivery to assure relevancy.

The preceding quality factors associated with student learning place emphasis upon student graduation. **The present enrollment-driven funding formula does not reward such desired institutional behavior. Instead, by emphasizing only enrollments, there is a disincentive to spend the time, energy, and funds necessary to help students graduate.** Under the current system, what really matters is that they enroll and stay in class through the 12th class day which is the critical deadline for two-year colleges to receive their funding.

12. **Medical/Health Care technologies, assessed in terms of programs offered, students served, graduates, and cost, represent an exemplary associate degree and certificate model which other technical program clusters should consider adopting. TSTC uses a similar curricula and instructional model for all its programs.** Key factors in the Medical/Health Care and TSTC models are:

(1) the establishment of acknowledged standards which must be met before program approval is given;

(2) a highly structured curriculum requiring full-time faculty, essential course prerequisites, and the schedule blocking of students by class;

(3) significant participation by the employer community at all levels (e.g., curricula design, laboratory experience, instructional demonstrations) of student education;

(4) required demonstration of student competencies by written test and observed performance;

(5) extensive student laboratory time, either college-based or employer-based, given to workplace relevant projects and activities; and

(6) the active support of employers in securing state, federal and private support.

The preceding conclusions were reached after a careful analysis of the detailed findings from the study. A summary of key findings from the study follows.

SUMMARY OF KEY FINDINGS

Findings from the TSTC study are shown in issue-specific, disaggregated data tables for various segments of state and institutional groupings. The tables contain institutional descriptors and performance indicators supported by detailed data compiled for each public two-year college. The data bases were compiled using dBase IV and subsequently queried using the same software program. Lotus 123 was also used to create selected tables. Each comparison was described in a separate section. A list of the comparisons made between TSTC and the community/junior colleges follows:

(1) institutional curricula profiles - compared by technical program clusters, "service-related" and "export-related" program clusters;

(2) "Graduate Percent Yield" - compared by technical program clusters, "service-related" and "export-related" program clusters;

(3) graduates - compared by gender, ethnicity and special populations in total. Also compared by gender, ethnicity and special populations within technical program clusters, "service-related" and "export-related" program clusters;

(4) "major metropolitan" area institutions, "balance of state" institutions and TSTC compared in terms of institutional curricula profiles, "Graduate Percent Yield," and graduates;

(5) cost per graduate - compared by "major metropolitan" area institutions, "balance of state" institutions, all community/junior colleges and TSTC in terms of "service-related" and "export-related" program cluster

Institutional Curricula Profiles

A comparison of the institutional curricula profiles for TSTC and the community/junior colleges illustrated that TSTC has a significantly different institutional profile from the community/junior colleges (Table 1, page 11). The most visible difference was that the majority (59%) of all technical programs offered by the community/junior colleges are in only two of the

twelve technical program clusters--Medical/Health Care and Applied Service & Business. The concentration in these clusters was also found in the enrollments (69% for Fall 1990) and graduates (72% for fiscal year 1990-1991). When combined with the other four technical program clusters under the rubric "service-related" technical program clusters, "service-related" programs accounted for 71 percent of the programs offered, 74 percent of the enrollments, and 78 percent of the graduates for the community/junior colleges.

For TSTC, there were no two or three dominant technical program clusters. The concentration of technical program clusters for TSTC was in "export-related" technical programs. "Export-related" technical programs accounted for 57 percent of the programs offered, 65 percent of the enrollment and 54 percent of the graduates for TSTC.

In summary, the institutional curricula profile for the community/junior colleges was found to be strongly biased toward those technical programs supportive of "service-related" businesses and industries. In contrast, TSTC had the greater percentage of its efforts in support of the "export-related" businesses and industries. These curricula and program findings affirm that TSTC, with its unique curricula profile, substantially met the mandated role and mission as established by the Legislature.

Table 1

Institutional Curricula Profile for the Community/Junior Colleges and TSTC

	Community/Junior Colleges (65 Campuses)			TSTC (4 Campuses)		
Technical Program Clusters	No. of Programs	Fall 1990 Enrollment	1990-91 Total Graduates	No. of Programs	Fall 1990 Enrollment	1990-91 Total Graduates
Service-Related Clusters						
Medical/Healthcare	406	30,370	6,939	7	481	283
Biotechnologies	1	2	0	0	0	0
Automotive/Heavy Mechanics	104	2,175	665	13	827	340
Building Systems & Construction	92	2,428	371	8	470	161
Applied Service & Business	867	46,725	5,656	14	1,074	432
Related Instruction	49	0	2	4	0	0
****Subtotals****	1,519	81,700	13,633	46	2,852	1,216
Export-Related Clusters						
Information	162	13,727	1,457	13	1,207	287
Energy & Environmental	37	544	53	5	274	84
Laser/Electronics	106	6,205	1,014	14	1,541	402
Manufacturing, Design & Engineering	221	6,494	925	20	1,316	435
Aerospace	40	1,270	227	4	627	114
Agribusiness	57	875	250	5	253	107
****Subtotals****	623	29,115	3,926	61	5,218	1,429
******Grand Totals******	2,142	110,815	17,559	107	8,070	2,645

"Graduate Percent Yield"

A comparison of the "Graduate Percent Yield" or student completion rate of those students enrolled as declared majors in Texas Higher Education Coordinating Board-approved technical programs at TSTC and the community/junior colleges revealed that the "Graduate Percent Yield" for TSTC was 33 percent, twice that of the community/junior colleges at 16 percent (Table 2, page 13). For every applicable technical program cluster (there were 10), TSTC had a higher percent "Graduate Percent Yield" than the community/junior colleges.

TSTC had a 43 percent "Graduate Percent Yield" for the "service-related" technical program clusters and a 27 percent "Graduate Percent Yield" for the "export-related" technical program clusters as compared to a 17 percent and 13 percent respectively for the community/junior colleges.

TSTC had a significantly better success rate than the community/junior colleges in having students complete a "coherent program of study." The higher graduation success rate can largely be attributed to the following TSTC characteristics:

(1) the intensity of instruction requiring students to be in class and laboratory 25 to 30 hours a week;

(2) the integration of the theoretical and academic with applied and laboratory-based learning;

(3) the involvement of the faculty with each student in the classroom and the laboratory;

(4) the residential nature of the campuses permitting students to attend full-time; and

(5) a highly structured curriculum with few options encouraging students to keep on-track.

From an overall assessment by the number of programs offered, students enrolled, students graduated annually, and "Graduate Percent Yield," the Medical/Health Care technical program cluster offers the most effective and most efficient model for emulation by two-year public colleges. TSTC curricula design, instructional strategies and student-required extensive laboratory experience utilized for all technical programs for over 20 years, closely parallels the medical/health care model.

Table 2

"Graduate Percent Yield" for TSTC and the Community/Junior Colleges

	Community/Junior Colleges (65 Campuses)			TSTC (4 Campuses)		
Technical Program Clusters	Fall 1990 Enrollment	1990-91 Total Graduates	Graduate Percent Yield (%)	Fall 1990 Enrollment	1990-91 Total Graduates	Graduate Percent Yield (%)
Service-Related Clusters						
Medical/Healthcare	30,370	6,939	22.85	481	283	58.84
Biotechnologies	2	0	0.00	0	0	0.00
Automotive/Heavy Mechanics	2,175	665	30.57	827	340	41.11
Building Systems & Construction	2,428	371	15.28	470	161	34.26
Applied Service & Business	46,725	5,656	12.10	1,074	432	40.22
Related Instruction	0	2	N/A	0	0	N/A
****Subtotals****	81,700	13,633	16.69	2,852	1,216	42.64
Export-Related Clusters						
Information	13,727	1,457	10.61	1,207	287	23.78
Energy & Environmental	544	53	9.74	274	84	30.66
Laser/Electronics	6,205	1,014	16.34	1,541	402	26.09
Manufacturing, Design & Engineering	6,494	925	14.24	1,316	435	33.05
Aerospace	1,270	227	17.87	627	114	18.18
Agribusiness	875	250	28.57	253	107	42.29
****Subtotals****	29,115	3,926	13.48	5,218	1,429	27.39
******Grand Totals******	110,815	17,559	15.85	8,070	2,645	32.78

Graduates

Four analyses were performed to determine the success or graduation rate of the various ethnic and special population students completing a "coherent program of study:"

(1) graduates statewide,
(2) graduates by institution,
(3) graduates by "service-related" and "export-related" program clusters, and
(4) graduates by specific technical program cluster.

It was found that for the ethnic minorities and special population students attending Texas two-year colleges, TSTC had an extraordinary success rate in having students complete a "coherent program of study" and graduate. The student completion rate was especially pronounced for special population students enrolled in the "export-related" technical programs (Table 3). Particularly important to note is that the "export-related" technical programs are generally considered the most difficult requiring more math and science.

Table 3

*Total Graduates by Special Population Category During the Period July 1989 Through June 1990 for TSTC and the Community/Junior Colleges in the "Service-Related" and "Export-Related" Technical Program Clusters**

	Statewide Graduates by Cluster		Community/Junior College Graduates (65 Campuses)		TSTC Graduates (4 Campuses)	
Special Population Category	Service-Related Clusters	Export-Related Clusters	Service-Related Clusters	Export-Related Clusters	Service-Related Clusters	Export-Related Clusters
Handicapped	664	557	512	220	152	337
Percent (%) Handicapped	100.00	100.00	77.11	39.50	22.89	60.50
Limited English Proficiency	830	357	647	262	183	95
Percent (%) Limited English Proficiency	100.00	100.00	77.95	73.39	22.05	26.61
Disadvantaged	6,079	2,698	5,145	1,575	934	1,123
Percent (%) Disadvantaged	100.00	100.00	84.64	58.38	15.36	41.62
Single Parent	1,309	343	1,228	222	81	121
Percent (%) Single Parent	100.00	100.00	93.81	64.72	6.19	35.28
Sex Bias	964	503	812	311	152	192
Percent (%) Sex Bias	100.00	100.00	84.23	61.83	15.77	38.17

* "Special population" is a subset of the total number of graduates. A graduate can be classified in more than one category.

Given the importance of math and science, the comparatively higher graduation rate of TSTC becomes even more impressive when one considers the fact that each of the four TSTC campuses ranked in the bottom six institutions among all public two-year colleges based on the tested ability of entering students to pass all or part of the TASP test. TSTC's graduation success rate appears to be attributable to the five characteristics of TSTC listed on page 12.

Many ethnic minorities and special population students require special services and assistance in order to enable them to succeed in technical programs. A supportive learning environment is needed to provide each student a reasonable expectation of success and instructional alternatives to the traditional classroom. Historically, TSTC has exemplified such a positive learning environment and has provided a laboratory or "hands-on" learning alternative to the traditional classroom.

"Major Metropolitan" Area and "Balance of State" Community/Junior Colleges and TSTC

A comparative analysis of the technical programs offered, enrollments, graduates, and "Graduate Percent Yield" for TSTC as compared with the community/junior colleges located in the "major metropolitan areas" and the "balance of state" provided some interesting findings:

Special population students. The number of special population students (e.g., handicapped, single parent, disadvantaged) who graduated from TSTC as compared to the number who graduated from community/junior colleges in Texas, showed the critical importance of TSTC to Texas as a desired and proven higher education alternative, particularly for those persons most "at risk" (Table 4, page 16). "Handicapped" students were particularly advantaged (TSTC graduated 40 percent of the statewide total) by attending TSTC. These findings were unexpected since the TSTC campuses are located outside the "major metropolitan" areas where the vast majority of special population students live.

Table 4

*Total Graduates by Special Population Category During the Period July 1989 Through June 1990 for TSTC and the Community/Junior Colleges**

	Statewide	Community/Junior Colleges (65 Campuses)		TSTC (4 Campuses)
		"Balance of State" (36 Campuses)	"Major Metropolitan" Areas (29 Campuses)	
Special Population Category	Total Graduates	Total Graduates	Total Graduates	Total Graduates
Handicapped	1,221	318	414	489
Percent (%) Handicapped	100.00	26.04	33.91	40.05
Limited English Proficiency	1.187	360	549	278
Percent (%) Limited English Proficiency	100.00	30.33	46.25	23.42
Disadvantaged	8,777	3,920	2,800	2,057
Percent (%) Disadvantaged	100.00	44.66	31.90	23.44
Single Parent	1,652	914	536	202
Percent (%) Single Parent	100.00	55.33	32.45	12.23
Sex Bias	1,467	391	732	344
Percent (%) Sex Bias	100.00	26.65	49.90	23.45

* "Special population" is a subset of the total number of graduates. A graduate can be classified in more than one category.

Technical program clusters. The magnitude of the skewing of the number and percentage of graduates from the technical program clusters in the "balance of state" community/junior colleges toward "service-related" program clusters was unanticipated (Tables 5 and 6, page 17).

Table 5

Institutional Curricula Profile for the "Balance of State" Community/Junior Colleges and TSTC by Percentage

	"Balance of State" (36 Campuses)			TSTC (4 Campuses)		
Technical Program Clusters	No. of Programs (%)	Fall 1990 Enrollment (%)	1990-91 Total Graduates (%)	No. of Programs (%)	Fall 1990 Enrollment (%)	1990-91 Total Graduates (%)
Service-Related Clusters	72.52	78.87	82.46	42.99	35.34	45.97
Export-Related Clusters	27.48	21.13	17.54	57.01	64.66	54.03
******Grand Totals******	100.00	100.00	100.00	100.00	100.00	100.00

Table 6

Institutional Curricula Profile for the "Major Metropolitan" Area Community/Junior Colleges and TSTC by Percentage

	"Major Metropolitan" Areas (29 Campuses)			TSTC (4 Campuses)		
Technical Program Clusters	No. of Programs (%)	Fall 1990 Enrollment (%)	1990-91 Total Graduates (%)	No. of Programs (%)	Fall 1990 Enrollment (%)	1990-91 Total Graduates (%)
Service-Related Clusters	69.71	70.43	73.43	42.99	35.34	45.97
Export-Related Clusters	30.29	29.57	26.57	57.01	64.66	54.03
******Grand Totals******	100.00	100.00	100.00	100.00	100.00	100.00

The percentage of "balance of state" graduates in the "service-related" program clusters was 82 percent as compared to 17 percent in the "export-related" program clusters. The percentages for the community/junior colleges located in the "major metropolitan" areas were similar, with 73 percent of the graduates in the "service-related" program clusters and 27 percent in the "export-related" program clusters. TSTC had a more balanced profile with 54 percent of its graduates in the "export-related" program clusters and 46 percent in the "service-related" program clusters.

"Graduate Percent Yield." The "Graduate Percent Yield" advantage for students attending TSTC as compared to the community/junior colleges located in the "major

metropolitan" areas and the "balance of state" was much greater than expected (Tables 7 and 8, page 18).

Table 7

"Graduate Percent Yield" for the "Balance of State" Community/Junior Colleges and TSTC

	"Balance of State" (36 Campuses)			TSTC (4 Campuses)		
Technical Program Clusters	Fall 1990 Enrollment	1990-91 Total Graduates	Graduate Percent Yield (%)	Fall 1990 Enrollment	1990-91 Total Graduates	Graduate Percent Yield (%)
Service-Related Clusters	34,119	6,756	19.80	2,852	1,216	42.64
Export-Related Clusters	9,141	1,437	15.72	5,218	1,429	27.39
******Grand Totals******	43,260	8,193	18.94	8,070	2,645	32.78

Table 8

"Graduate Percent Yield" for "Major Metropolitan" Area Community/Junior Colleges and TSTC

	"Major Metropolitan" Areas (29 Campuses)			TSTC (4 Campuses)		
Technical Program Clusters	Fall 1990 Enrollment	1990-91 Total Graduates	Graduate Percent Yield (%)	Fall 1990 Enrollment	1990-91 Total Graduates	Graduate Percent Yield (%)
Service-Related Clusters	47,581	6,877	14.45	2,852	1,216	42.64
Export-Related Clusters	19,974	2,489	12.46	5,218	1,429	27.39
******Grand Totals******	67,555	9,366	13.86	8,070	2,645	32.78

TSTC students were much more successful in completing a "coherent program of study" and securing a degree or certificate than students from the community/junior colleges regardless of their location. In 19 out of 20 technical program cluster comparisons, the "Graduate Percent Yield" for TSTC exceeded that of the community/junior colleges in either the "major metropolitan" areas or the "balance of state." The margin of advantage for TSTC students was greatest in the "export-related" program clusters, where in 4 out of 6 technical program cluster comparisons, TSTC had a "Graduate Percent Yield" twice that of the community/junior colleges located in the "major metropolitan" areas.

Institutional size - technical program clusters and "Graduate Percent Yield." Institutional size, when considered as a factor associated with "major metropolitan" area (larger) community/junior colleges and the "balance of state" (smaller) community/junior colleges, did not appear to be significant in differentiating between the program offerings, enrollments, graduates, and "Graduate Percent Yield" for the community/junior colleges. It might reasonably have been expected that the "major metropolitan" area community/junior colleges would have had a greater percentage of their programs, enrollments, and graduates in the "export-related" program clusters. Instead, their institutional curricula profile looked much like that of the smaller community/junior colleges located in the "balance of state." Compared in terms of "Graduate Percent Yield," the "balance of state" community/junior colleges had a higher percentage in all six of the "export-related" technical program clusters, which was unexpected since the largest number of exporting businesses and industries are located in urban or surrounding areas. The same pattern of "Graduate Percent Yield" dominance of the "balance of state" community/junior colleges over the "major metropolitan" area community/junior colleges was also found in the "service-related" program clusters where the "balance of state" community/junior colleges had higher percentages in three of the four technical program clusters.

Cost Per Graduate

While a comparison of cost per graduate did not directly address the issue of unnecessary program duplication, it is vitally important to know and understand how much it costs the taxpayers of Texas in appropriated state dollars to produce a technical graduate. Given such information, a more informed decision can be made concerning which institutions offer the students and taxpayers the most effective and efficient postsecondary technical education. Clearly, based on the findings from this study, TSTC provides **all** Texans access to quality technical education; a greater probability of completing a "coherent program of study" and graduating; and, TSTC provides the Texas taxpayers a lower reasonable cost per graduate, especially for the "export-related" technical programs (Table 9, page 20).

Table 9

"State Funding Per Graduate" for All Two-Year Public Colleges

	State Funding Per Graduate ($)		
Technical Program Clusters	All Two-Year Public Colleges	Community/Junior Colleges (65 Campuses)	TSTC (4 Campuses)
Service-Related Clusters	9,132	9,175	8,649
Export-Related Clusters	14,596	15,613	11,801
******Grand Tctals******	10,580	10,615	10,352

The comparatively lower cost per graduate for technical programs for TSTC is given additional significance since TSTC graduates are required to take from 30 percent to 50 percent more contact hours of instruction before graduating in most technical programs.

CLOSING REMARKS

Texas is at a critical juncture in its history. Decisions made today will affect technical education well into the future. Texas citizens must have access to technical education that enables them to use and apply technology to create higher paying jobs and wealth for themselves and for Texas. This study was designed to identify key descriptive and performance indicators and to provide useful comparative benchmarks for postsecondary technical education in Texas. It is intended that the findings from this study serve as a catalyst for subsequent studies of postsecondary technical education toward the purpose of improving student learning and the accomplishment of student educational and career goals.