A COMPARISON OF POST-SECONDARY OUTCOMES FOR TECH PREP AND NON-TECH PREP STUDENTS AT SINCLAIR COMMUNITY COLLEGE

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A Comparison of Post-Secondary Outcomes for Tech Prep and Non-Tech Prep Students at Sinclair Community College

The goal of the Tech Prep program is to create seamless pathways that begin in the junior year of high school and continue through an associate degree in college and beyond. Tech Prep programs stress mathematics, science, communication and technology while emphasizing teamwork, hands-on learning, work site experiences, critical thinking, and problem solving. Academic content is integrated with technical or vocational content in order to provide career direction and develop workplace skills.

There is still relatively little research about postsecondary outcomes of Tech Prep students. Brown-Lerner & Brand note that "Although national research findings on the effectiveness of Tech Prep programs are inconclusive, …a number of evaluations… have found evidence of improved GPA's, lowered dropout rates, reduced absences, increased high school completions, and improved postsecondary enrollment. However… findings were mixed on whether Tech Prep improved students' postsecondary achievement" (2006, p. 41). The studies that have been done are promising. Results from one study of eight strong Tech Prep consortia showed that 65% of the Tech Prep students had enrolled in postsecondary education within three years of high school graduation (Bragg, 2001). But this study did not address postsecondary outcomes. One study that looked at secondary and postsecondary measures of success of Tech Prep students found that the Tech Prep participants were more likely to be college ready than their peers, and earned more college level credits than their peers (Bragg & Ruud, 2007). Limitations of this study include the limited number of postsecondary outcomes presented. Another study that looked at postsecondary outcomes showed that Tech Prep students in one consortium had higher college placement test scores and therefore required less remediation than their counterparts. These Tech Prep students also performed better in introductory math and English courses, had higher cumulative GPAs, and were more likely to be retained than their non-Tech Prep counterparts (Krile & Parmer, 2002). Limitations of this study included imprecise matching of the Tech Prep students and the comparison group and not following the cohorts through to graduation or transfer.

The Miami Valley Tech Prep consortium works with Sinclair Community College and 58 area high schools to offer twelve different Tech Prep programs in the fields of health sciences, business,

engineering, and others. The current study looks at all students who participated in a Tech Prep program and graduated from high school in 2002 through 2006 and who attended Sinclair Community College, a large urban community college, between Summer 2002 and Spring 2007. College performance of those who participated in a high school Tech Prep program is contrasted with a carefully matched comparison group of students who did not participate in such a program.

The Tech Prep office provided a list of 5,314 graduates from local area high schools who had graduated as a Tech Prep program participant between 2002 and 2007. This list was limited to students who had graduated from high school between 2002 and 2005 so enough time would have passed to do meaningful tracking at the college. It was then limited to students who had attended Sinclair after their high school graduation and who were at least 18 years old. The final set of Tech Prep students for this study numbered 1,412.

METHODOLOGY

Graduates from Tech Prep programs in local high schools were matched with other students at the college using the factors of age, gender, ethnicity, high school attended, division of major at the college, educational intent (associate' degree, transfer, etc), and term of first enrollment at the college after high school graduation. This matching was done using a program that allows the researcher to match members from one group with members from another, larger group based on relevant factors. These factors can be weighted, and the program returns the pairs and an indication of how good the match was. In this case, high school attended, term of first enrollment at Sinclair (after high school graduation), and major division were weighted the most heavily.

The following table shows the distributions of the Tech Prep group and the comparison group on some of these demographic and academic characteristics.

Comparison of Demographic and Academic Characteristics		
	Tech Prep Group N = 1,412	Comparison Group N = 1,412
Gender*		
Female:	39.8%	43.3%
Male:	60.2%	56.7%
Minority Status		
Caucasian:	82.6%	84.1%
Minority:	12.3%	11.3%
Unknown:	5.1%	4.6%
Age		
Mean *	18.7	18.9
Median	19.0	19.0
Academic Division of Major*		
Allied Health Technologies	22.0%	21.4%
Business Technologies	29.7%	32.1%
Engineering Technologies	24.5%	25.4%
Extended Learning	2.1%	4.9%
Fine & Performing Arts	9.1%	8.6%
Liberal Arts & Sciences	5.1%	3.7%
No Division	7.5%	3.9%
Primary Academic Intent*		
Associate's Degree for Job Market	30.6%	34.8%
Associate's Degree for Transfer	52.5%	45.5%
Transfer without an Associate's Degree	12.5%	12.4%
Other	4.4%	7.3%

* Statistically significant difference between Tech Prep and non-Tech Prep students.

Statistically speaking, these groups did differ significantly[1] in terms of their gender, age, and division, but as the table above shows these differences were actually quite small. Tech Prep students were more likely to say they planned to transfer after earning their associate's degree while their peers were more likely to intend to earn a degree for the job market or to have other intentions (a certificate, upgrade job skills…). It should be noted that the students in this study are not representative of the

[1] The statistical significance of a result is the probability that the observed relationship or a difference in a sample occurred by pure chance. The statistical significance of a result tells us something about the degree to which the result is "true" (in the sense of being "representative of the population"). For example, a p-value of .05 indicates that there is a 5% probability that the relationship between the variables found in our sample is a "fluke." The p-value of .05 is generally considered to be the threshold of statistical significance, thus for our purposes results that yield values of $p < .05$ are considered to be "statistically significant" (non-chance) differences.

overall enrollment at Sinclair Community College since the Tech Prep students in general are not representative of the overall student body, and the comparison group was specifically selected to match the Tech Prep group.

Performance measures include scores on the college's placement tests and placement into developmental education (DEV). Each new incoming student who has no previous successful college experience is required to take a computer assisted placement test divided into three areas: reading skills, writing skills, and mathematical skills. The scores on these tests determine which levels of English and Math the student is advised to take.

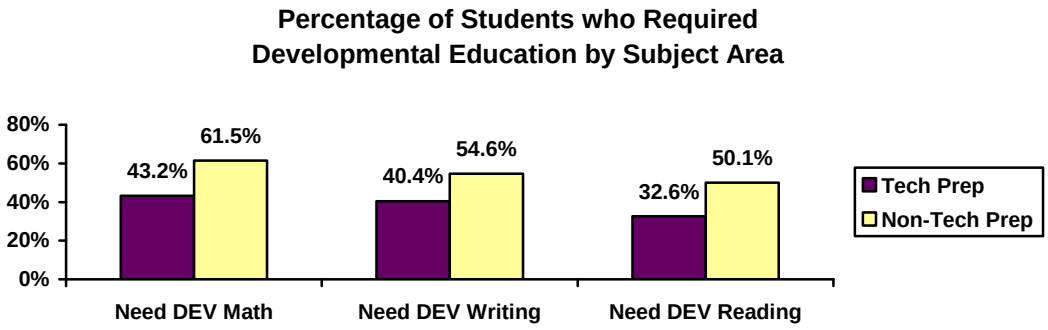
Success in entry-level math and English classes, as well as progression into and success in upper level math courses are examined. Students are considered successful in a course if they earn an A, B, or C. The credit completion ratio or percentage of credits attempted that were completed is also analyzed. Another measure of performance is students' cumulative GPA which is calculated using quality points earned in all courses.

Finally, rates of transfer to a 4-year school and graduation for each group are examined. The transfer information was obtained through the National Student Clearinghouse and so includes information on all students who and transferred to another participating institution (as long as there were no privacy flags for that student). Graduation with an associate's degree is discussed as is time to graduation.

FINDINGS

Preparation: Need for Remediation and Proficiency Credits

The students who graduated from high school Tech Prep programs were less likely to test into developmental education and more likely to test directly into entry-level math and English courses than their peers. The following chart shows this distribution.



As this chart shows, Tech Prep students were significantly less likely to need Developmental or remedial education in math, writing, or reading than their peers. In fact, while only 22.1% of the comparison required no remediation, 38.1% of Tech Prep students tested out of all developmental courses. And while 31.4% of the comparison group required remediation in all three subject areas, only 16.9% of the Tech Prep students did. Tech Prep students needed, on average 1.6 DEV courses in all compared to 2.5 for the comparison group. These are all statistically significant differences.

One way students can get a head start on their college career is by earning proficiency credits before coming to college. Students can get credit for courses in subjects they've already studied, usually by taking a proficiency test for that course. The Tech Prep program encourages its participants to do just that. In fact, 47.8% of the Tech Prep participants had accumulated proficiency credits compared to only 3.4% of the non Tech Prep participants. Interestingly, the few non-participants who earned any proficiency credits earned quite a few, so there was no statistically significant difference between the two groups in the average number of proficiency credits earned (11 for each group).

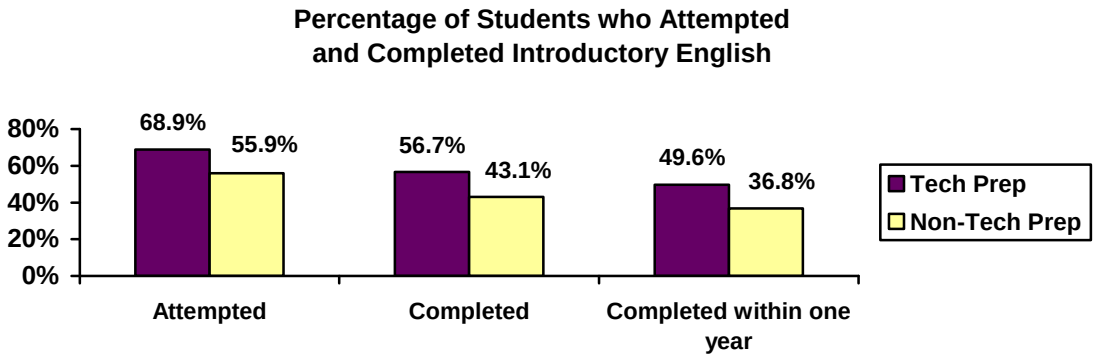
Success in Developmental Courses

When Tech Prep students do require developmental or remedial education, are they more successful in completing these requirements than their peers? The answer appears to be yes. Among those who required DEV reading, 82% of Tech Prep students and 73% of the comparison group had successfully completed the exit level course in that sequence (i.e. had fulfilled their DEV requirements in that subject area). Similarly, in DEV writing, 86% of the Tech Prep group who required remediation in this

subject had completed the final DEV writing course compared to 77% for the comparison group. And for those who needed remedial math, 74% of the Tech Prep group had completed those requirements, compared to 66% of the comparison group. These are all statistically significant differences.

Success in Introductory English Courses

Tech Prep students were more likely to have attempted and to have successfully completed introductory English than their peers. The following chart shows these results.



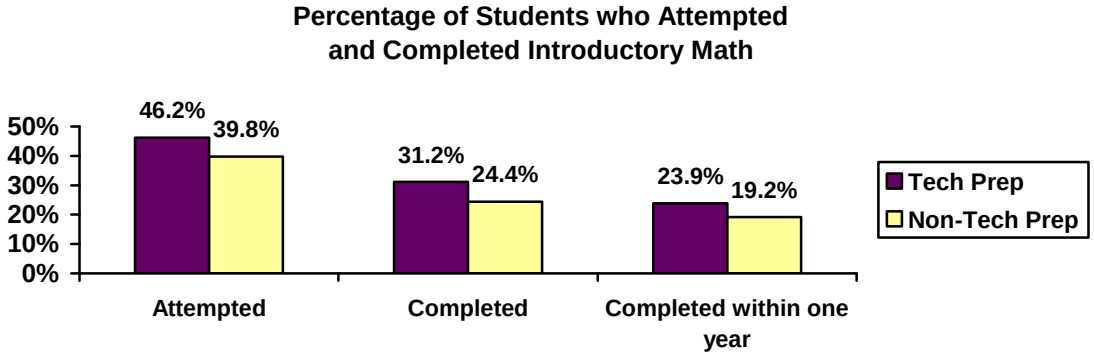
The chart above shows the percentage of students who attempted an introductory English course, the percentage of the total who successfully completed, and the percentage who successfully completed introductory English within one year. Tech Prep students were more likely to attempt and complete English. When only those who attempted English are considered, the pattern is the same with 82.7% of Tech Prep students who attempted English completing it compared to 77.5% of their peers. These are all statistically significant differences.

Tech Prep students who required remedial English were also more likely than their peers who required remedial English to attempt and complete introductory English. Of those who required DEV English, 54% of the Tech Prep students had attempted an introductory English course and 42% had successfully completed an introductory English course. Among non-Tech Prep students who required DEV English, 43% had attempted and 34% had successfully completed an introductory English course. These are statistically significant differences. Interestingly, even though the Tech Prep group required fewer DEV courses overall and in each subject area, they were not statistically significantly more likely to

successfully complete introductory English in their first year compared to their peers (34% of Tech Prep students vs. 27% of the comparison group).

Success in Introductory Math Courses

Tech Prep students performed better in entry-level Math courses than their non-Tech Prep classmates. These results are shown in the following chart.



Again, Tech Prep students were significantly more likely to attempt and to complete introductory math than were their peers. They were also more likely to complete an introductory math course within their first year. When only those who attempted math are considered, 67.4% of Tech Prep math attempters completed compared to 61.4% of non-Tech Prep attempters. These are all statistically significant differences.

Tech Prep students who required remedial math were also more likely than their peers who required remedial math to attempt and complete an introductory math course. Of those who required DEV math, 42% of the Tech Prep students had attempted an introductory math course and 24% had successfully completed at least one introductory math course. Among non-Tech Prep students who required DEV math, 32% had attempted and 18% had successfully completed an introductory math course. These are statistically significant differences. Again, even though the Tech Prep group required fewer DEV math courses, they were not statistically significantly more likely to successfully complete introductory math in their first year compared to their peers.

Upper Level Math Course Experience

Introductory math is not sufficient for most of the degree programs that Tech Prep students are pursuing. So, the next analyses looked at the experience of the Tech Prep students and the non-Tech Prep students in upper level math courses. These courses are defined as 200 level courses or other courses that are included in the college's transfer module, a list of courses that is guaranteed to transfer to other state institutions. Among the Tech Prep students, 22.5% had attempted at least one upper level math course compared to only 13.3% of the non-Tech Prep students. Similarly, 17.1% of Tech Prep students had successfully completed one or more of these courses, compared to 9.7% of the comparison group. These are statistically significant differences.

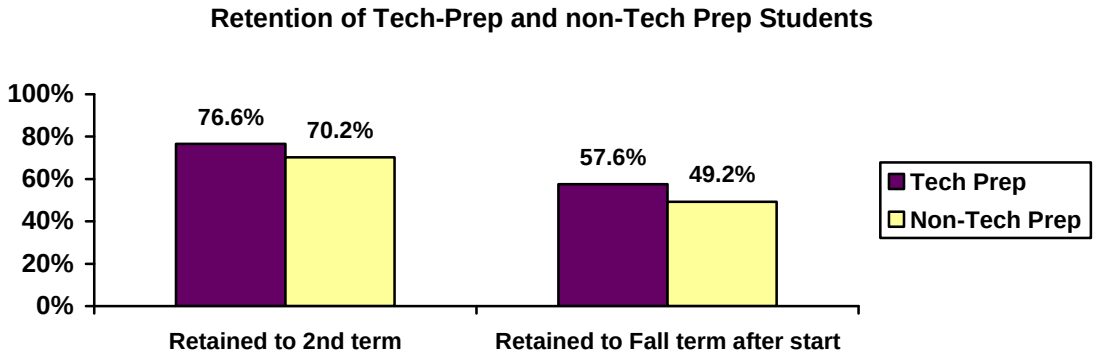
Cumulative GPA and Credit Completion Ratio

Tech Prep students had significantly higher average cumulative GPA's than their peers. The average cumulative GPA (as of summer 2007 or their last term here) was 2.26 for Tech Prep students compared to 1.88 for the non-Tech Prep students. Similarly, Tech Prep students completed a significantly higher percentage of the credits they attempted. On average, Tech Prep students completed 70% of the credits they attempted, compared to 56% in the other group.

Retention

Students in the Tech-Prep program were more likely to be retained to their second quarter than their peers. The difference between the two groups for second year retention (tracking a student from their start term to the same term exactly one year later) was not statistically significant. Interestingly, a previous study (Krile & Parmer, 2002) showed that Tech Prep students were more likely to be retained to the second year but not to the second quarter, which is somewhat different than the current results. The previous study had looked only at students who began in the fall and tracked them to the following winter and then the following fall. In this study all students were included, regardless of the term they started. So, these students were tracked to the fall term following their start term (unless they started in summer, then the fall one year later was used) to see if retention from start term to the following fall differed. The

Tech Prep students were in fact significantly more likely to enroll in the fall term following their start term than were their peers. The following chart shows these statistically significant differences.

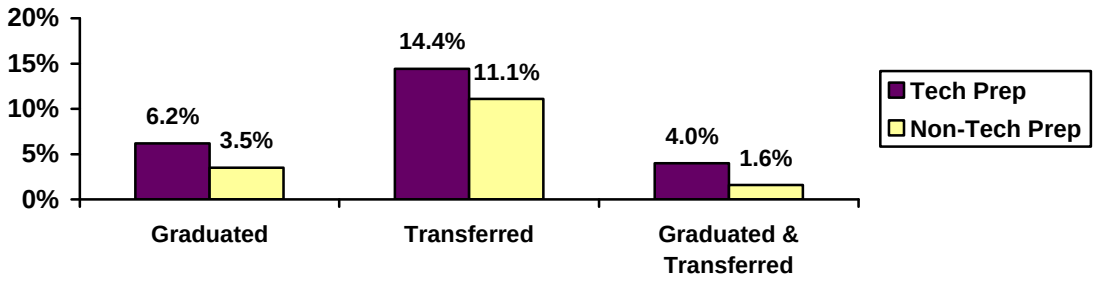


The Tech Prep students also attended Sinclair for more terms than their peers. On average, as of spring 2007, Tech Prep students had attended Sinclair 5.4 terms compared to 4.9 terms for their non-Tech Prep counterparts. When retention is considered more broadly, and enrollment in a four-year college is counted, the pattern is the same. Of the Tech Prep students, 62.5% were enrolled at Sinclair or at a 4-year college or university the fall term following their start term compared to 52.7% of their non-Tech Prep peers. These are statistically significant differences.

Outcomes: Graduation and Transfer

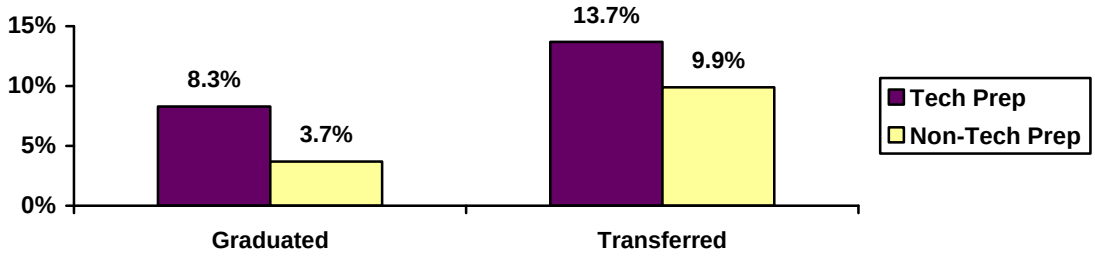
Students in the Tech Prep program were more likely to have earned a degree and were more likely to have transferred to a four-year college. Just over 10% of the Tech Prep group had earned associate's degrees as of spring 2007 compared to only 5.2% of the comparison group. Overall, 18.4% of the Tech Prep group transferred to a 4-year college or university before summer 2007 compared to 12.7% of the comparison group. The following chart shows the distribution of students who graduated, transferred, or both.

Graduation and Transfer of Tech-Prep and non-Tech Prep Students



So, Tech Prep students were more likely to graduate, to transfer to a 4-year college or university, or to graduate then transfer. Because the federal government tracks graduation and transfer rates at three years (150% of the 'normal' time to complete an associate's degree), these figures were also calculated. Again, Tech Prep students outperformed their peers.

3-Year Graduation and Transfer Rates of Tech-Prep and non-Tech Prep Students



* Does NOT include students who graduated.

Overall, the 3-year combined graduation and transfer rate for Tech Prep students was 22% compared to only 13.6% for the comparison group.

Discussion

This study set out to answer several questions about the postsecondary performance of Tech Prep students:

- Are they more prepared for college than their peers?
- If they do require remediation, are they more successful in completing it?
- Are they more successful in introductory English courses?
- Are they more successful in introductory math courses?
- Are they more likely to attempt and succeed in upper level math courses?
- Are they more likely to persist or be retained in college?
- Are they more likely to graduate and/or transfer to a 4-year school?

The answers to these questions provide a great deal of support for the Tech Prep program. Participants in this program were significantly less likely than their peers to require remediation in any of the three subjects tested. When they did require remediation, they required less than their peers and were more likely to successfully complete it. Tech Prep students were more likely to have successfully completed introductory math and English courses than their peers. They were also more likely to have attempted and successfully completed upper level math courses. Compared to their non-Tech Prep counterparts, these students had higher average cumulative GPA's and completed a higher percentage of the credits they attempted. Tech Prep students were more likely to be retained to their second term and to re-enroll in the fall term following their start term. Finally, Tech Prep students were more likely to graduate from Sinclair and to transfer to a four-year college or university.

While these results are very positive for Tech Prep students and Tech Prep program, it should be noted that the Tech Prep program requires that entering students have a GPA of at least 2.0 (equivalent to a C average). One major limitation of this study is that information on the high school performance of the comparison group was not available so the students' GPA at the end of their sophomore year of high school could not be included as one of the matching variables. Therefore it is possible that some of the effects seen above are partially due to the types of students who can participate in Tech Prep.

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