Institutional Variation in Credential Completion: Evidence from Washington State Community and Technical Colleges

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Abstract

As community colleges search for models of organizational success, new attention is being paid to technical colleges—institutions that primarily offer terminal programs in specific career-related fields rather than focusing on more general academic credentials and transfer programs as many comprehensive institutions do. Recent research observes that in some states, technical colleges have substantially higher completion rates than do comprehensive community colleges. Yet there is scant research available that systematically compares similar students in similar programs at technical and comprehensive colleges. This study uses administrative data from Washington State to compare the outcomes of young, career-technical students across institutions, with and without extensive controls for student characteristics, educational intent, and area of study. This generates three key findings: first, technical and comprehensive colleges tend to serve quite different populations, so a true apples-to-apples comparison requires limiting the analysis to a relatively small fraction (less than 10%) of students enrolled at either institution. Second, at least for this limited subset of career-technical students, technical schools have significantly higher certificate completion rates after three years, with no apparent deficit in associate degree completion. Our third main finding is that the differences in student outcomes *within* the two types of schools are much larger than differences *between* them. Even within this limited group, institution type alone explains a relatively small fraction of the overall variation in student outcomes across institutions. It would thus be unwise for research and policymakers to fixate on this one dimension of difference.

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1. Introduction

As the United States struggles to recover from the Great Recession, reduce levels of income inequality unseen since the 1920s, and stop its downward slide in international rankings of educational attainment, policymakers have increasingly converged around the goal of substantially increasing the proportion of the population that has earned a postsecondary credential. President Obama has set a goal of having "the highest proportion of students graduating from college in the world by 2020" (White House, 2011), which would require more than a 40% increase in the rate of degree completion (National Center for Public Policy and Higher Education, 2008). Several large foundations and individual states have established similar or even more ambitious goals.[1]

Meanwhile, there is also a growing sense of impatience with discrete interventions that have generally failed to deliver the dramatic improvements that would be required to meet such ambitious goals. Institutions, funders, and researchers have thus begun turning their attention to new efforts to understand the organizational and structural features that promote student success (see, for example, Jenkins [2011], for a review of organizational effectiveness in community colleges). As John Easton, director of the Institute of Education Sciences, argued in a recent speech (2010), "[P]rogrammatic research can only take us so far. We need to ... discover how research can best support colleges as they look to not only improving their remediation programs, but to strengthen the organizational supports needed to sustain and coordinate programs."

As the field searches for models of organizational success, new attention is being paid to technical colleges—institutions that primarily offer terminal programs in specific career-related fields rather than focusing on more general academic credentials and transfer programs. These schools often (but not always) focus on certificates—credentials that are awarded for completion of a program, typically in a specific career-related field, that may be acquired in as little as a few months and generally in less than two years.

[1] For example, the Kentucky Council on Postsecondary Education declared a goal to "double the numbers" of college graduates living in the state by 2020 (n.d.); Lumina Foundation has declared a goal of increasing the college attainment rate to 60% by 2025 (n.d.); and the Bill & Melinda Gates Foundation's Postsecondary Success Strategy aims to "dramatically increase the number of young adults who complete their postsecondary education" (n.d.).

Recent research suggests that, depending upon the field, such certificates, particularly those longer than one year, may have even greater payoffs in the labor market than some academic associate degrees (Jacobson & Mokher, 2009; Complete College America, 2010). Moreover, some evidence from Tennessee suggests that technical schools may achieve significantly higher completion rates than traditional colleges, perhaps because their programs are often pre-packaged (rather than requiring students to assemble courses one by one) and because remedial instruction is often embedded in career-related coursework (Complete College America, n.d.).

Nonetheless, there is relatively little data available to judge whether technical colleges do in fact achieve higher completion rates than do traditional community colleges—when similar students are compared—and if so, why. In this paper, we take advantage of a relatively unique state database that includes administrative data for students in both two-year technical colleges and traditional comprehensive community colleges. We focus our comparisons on workforce students, who are well represented at both types of institutions. We also focus on young students (age 18–26) with no previous postsecondary experience, for whom we might expect educational investments to have the greatest consequences. Utilizing detailed information on students' background characteristics, degree intent, field of study, and academic outcomes, we examine:

- How much overlap is there between the types of students served at technical and community colleges?
- How much variation do we observe in student outcomes (particularly different types of credential completion) between technical and comprehensive colleges?
- How much of this variation remains unexplained after controlling for differences in student background characteristics and program type?
- Are the patterns of variation different when we focus on students of low socioeconomic status (SES)?
- How much variation in student outcomes do we observe across individual institutions (with and without controls for student characteristics), and how important is institution type (technical versus comprehensive) in explaining this variation?

Ultimately, the answers to these questions will only beg further questions about what institutional factors can explain the differences in observed outcomes and what consequences those differences have once students enter the labor market. While some suggestive evidence will be discussed in this paper, the Community College Research Center (CCRC) is continuing to work with Washington State to collect additional quantitative and qualitative data and plans to address these questions more extensively in the near future.

The remainder of this paper proceeds as follows: Section 2 discusses the national policy context and previous research. Section 3 describes the Washington State system and presents basic descriptive statistics for our sample of interest, young workforce students. Section 4 describes the empirical methodology. Section 5 presents the results, and Section 6 provides further discussion and raises questions for future research.

2. Policy Context and Previous Research

Though community colleges may be best known for awarding associate degrees and providing a route to transfer to four-year colleges, fewer than half of all sub-baccalaureate postsecondary credentials conferred between July 2008 and June 2009 were associate degrees. The rest were short-term and long-term certificates (27% and 24% of sub-baccalaureate awards, respectively). Even at public institutions, a full 42% of sub-baccalaureate awards were certificates; of the associate degrees that were awarded, 51% were awarded in fields representing career education rather than the traditional liberal arts.[2]

Institutions vary considerably in the extent to which they offer and encourage such credentials. Public technical schools in states such as Tennessee exclusively offer certificate programs, while some community colleges, such as those in the City University of New York (CUNY) system, offer virtually none. Most community colleges lie somewhere between the two, offering a diverse range of liberal arts, career education, and other programs desired by the community.

[2] Calculated using data on Title-IV institutions in the United States from the Integrated Postsecondary Education Data System (IPEDS). The field distinction between liberal arts and career education is made by using the postsecondary taxonomy of CIP codes (U.S. Department of Education, 2002).

There is an emerging consensus among the higher education policy community that colleges need to focus on helping students meet the demands of the labor market and that promoting completion of career-oriented credentials, including certificates, may be an efficient route to doing so. James Kvaal, Deputy Under Secretary at the Department of Education, said in June 2010 that an important contributor to the administration's goal is "to use this time to help people build their skills and get ahead, so when the job market is back to where we all want it to be, workers have the skills they need" (Washington Monthly/New America, 2010). Corporate Voices for Working Families emphasizes the need for the business community and educational providers to work together to increase college completion: "When working learners see their education as relevant to their job and their prospects for career advancement, they are more likely to stay on a pathway to completion" (Corporate Voices for Working Families, 2011). A recent report by Demos, a non-partisan public policy research and advocacy organization, highlighted the potential to use targeted one- and two-year credentials in high-yield fields to improve economic opportunity (Wheary & Orozco, 2010).

The available empirical evidence, while limited, suggests that completing workforce and technical awards at community colleges may lead to higher earnings than completing academic or liberal arts awards for both recent high school graduates and adult displaced workers. Jacobson and Mokher tracked the 1996 cohort of ninth graders in Florida and found that among those earning a certificate or an associate degree, those with a concentration in a career and technical education (CTE) field had higher earnings in their early-to-mid twenties than those in other concentrations, even after controlling for a rich set of covariates that included high school performance and prior work experience. Moreover, once student characteristics and choice of concentration were taken into account, students who earned certificates had higher post-college earnings than students who earned associate degrees, which is notable because students who earned certificates were much more likely to concentrate in a high-return CTE field rather than in a humanities or social science field (Jacobson & Mokher, 2009).[3] A limitation of this

[3] Jacobson and Mokher did not find a significant difference in earnings between certificate earners who completed a CTE concentration and those who completed an academic concentration, but because certificates in general tend to be career- and technically-oriented, this comparison may not be particularly informative.

analysis is the relative youth of the sample; it is not clear how these differences might evolve over a longer length of follow-up.[4]

In an earlier paper, Jacobson, LaLonde, and Sullivan (2005) looked at earnings over time for displaced workers in Washington State, comparing the trajectories of those that did and did not attend or complete a community college program. This "individual fixed effects" methodology allows the authors to control for an individual's earnings prior to entry in the community college, and thus lends itself to a more causal interpretation. They found that completing technically oriented credits (in such fields as health, professions, technical trades, math, and science) increased students' earnings, but there was no significant effect of completing credits in less technical fields (such as the social sciences, humanities, business, sales, personal health, physical education, or consumer education).

Jepsen, Troske, and Coomes (2009) used a similar methodology to examine returns to community college credentials in Kentucky, also controlling for prior earnings. They find that returns to associate degrees varied by field, with health and non-humanities academic subjects showing the highest returns, and humanities degrees showing the lowest. Long-term certificates (called diplomas in Kentucky) had returns comparable to associate degrees for both men and women. They also find some evidence of smaller, but still positive returns for short-term certificates. However, a limitation of the study is that some students in the sample were quite young and thus did not have prior earnings, so it is not clear whether all of the gains reported can be attributed entirely to the credentials earned.

Given this suggestive evidence regarding the value of career-technical credentials, attention has also turned to whether technical colleges might be more effective at delivering such education, relative to comprehensive colleges with their generally more diverse missions. There is even less evidence on this question. Nonetheless, some intriguing patterns in Tennessee have garnered much enthusiasm among policymakers (Merisotis & Jones, 2010; Auguste, Cota, Jayaram, & Laboissière, 2010). In Tennessee, 27 public Technology Centers fulfill the technical college role in a somewhat unique way. The Technology Centers *only* offer certificates and align themselves closely with

[4] The 1996 cohort of ninth graders was followed up through 2007.

local labor markets. Programs are much more structured than at a typical community college: students enroll in block programs for six hours a day, five days a week, and attendance is mandatory. Remedial coursework ("Tech Foundations") is provided as a co-requisite rather than a pre-requisite and is contextualized into the curriculum of the program. And, according to Carol Puryear, director of the Tennessee Technology Center at Murfreesboro, it gets results—her school sees completion rates of 83% with 75% placed into a job within their field (Washington Monthly/New America, 2010). However, the Tennessee Technology Centers have not yet been subjected to a rigorous evaluation, so it is unclear what these high completion rates represent. It is possible that students who enter programs at these schools have different aspirations, motivations, and abilities than do students who enter comprehensive community colleges or even technical colleges in other states.

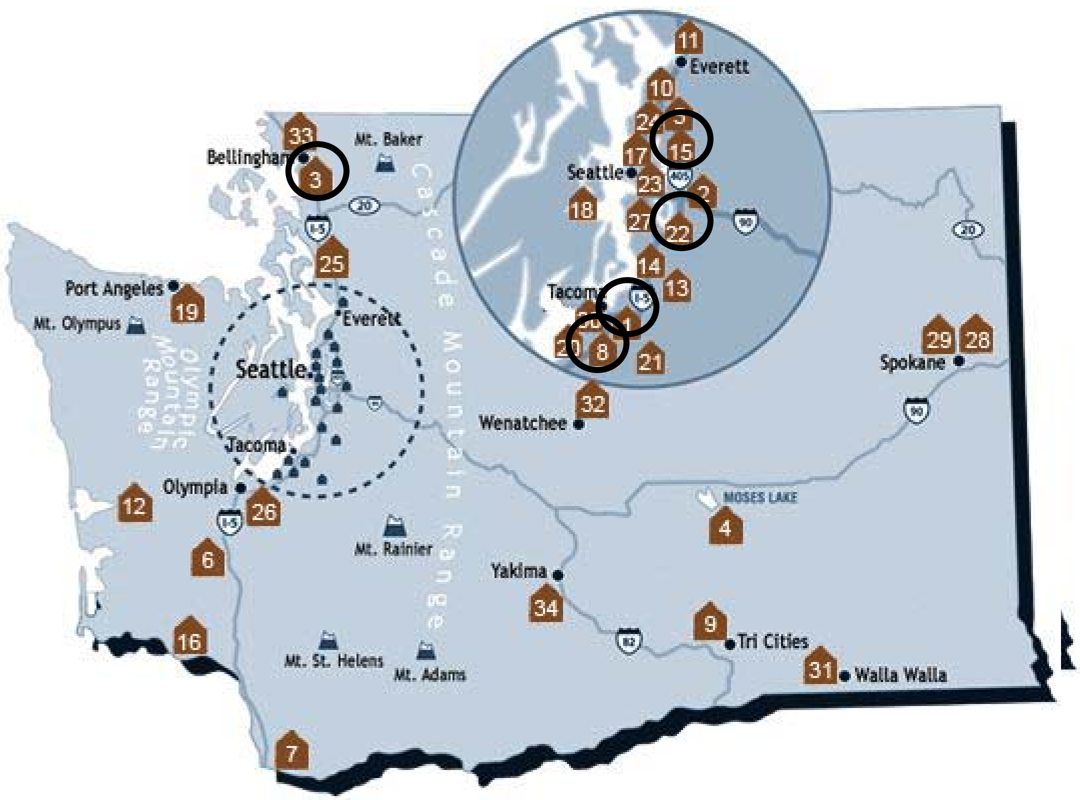
Despite the rising enthusiasm for career-technical credentials, there is also an acknowledged danger in steering students toward a vocational track: some students who may have been successful in transferring to a four-year college, earning a bachelor's degree, and achieving greater upward mobility will be deterred from their aspirations (Clark [1960] famously referred to this as "cooling out"). The available evidence suggests that community colleges have both *diversion* effects (diverting students who might otherwise have attained higher levels of education into shorter programs) and *democratization* effects (encouraging students who would not have otherwise participated in postsecondary education to attend college) (Rouse, 1995; Leigh & Gill, 2003). Previous literature suggests that the democratization effects may be slightly stronger than the diversion effects, especially when student intent is taken into account (Leigh & Gill, 2003). Still, this tension is worth keeping in mind while interpreting the results presented below.

3. The Washington State Community and Technical College System

3.1 Overview

The Washington Community and Technical College (WA CTC) system is comprised of 29 "comprehensive" colleges and five "technical" colleges (see Figure 1). The distinction between institution types is not as distinct as in a state like Tennessee, where technical colleges do not award associate degrees. While such strict distinctions may promote institutional and programmatic focus, there is also concern that it may limit technical students' career pathways and opportunities for educational advancement. In Washington, technical colleges can and do award associate degrees, and comprehensive colleges can and do award certificates.

Figure 1
Locations of WA Community and Technical College



Note. Image was edited to highlight locations of technical colleges, indicated by dark circles. Adapted from Washington State Board for Community and Technical Colleges (n.d.).

Rather, the distinction between technical and community colleges in Washington is grounded in their historical genesis (Washington State Board for Community and Technical Colleges [WSBCTC], n.d.). The oldest community colleges still in operation were founded as “junior colleges” in the 1920s and 1930s, while the technical colleges were founded as “vocational technical institutes” (VTIs) in the 1940s. The two types of institutions pursued different missions: the VTIs focused on “pre-employment training and job upgrading-retraining” and were heavily involved in war production programs during World War II (Renton Technical College, n.d.; Clover Park Technical College, n.d.), while junior colleges generally offered a more traditionally academic, albeit non-residential collegiate experience with coursework that could potentially be transferred to baccalaureate institutions.[5] In the 1960s, junior colleges were re-designated as “community colleges,” and an independent community college system was created, with funding separated from local school district budgets. School districts operating VTIs were offered the option to convert these institutes into community colleges, and several did at that time. The five remaining VTIs continued to fall under the jurisdiction of local school district policies and funding until 1991, when they were re-designated as “technical colleges” and were merged with the existing community college system.

Colleges in the community and technical college system have three broad missions—academic transfer, workforce education, and adult basic education—but until very recently, only the latter two have applied to the technical colleges.[6] After the merge in 1991, the technical colleges began offering non-transfer associate degree programs; more recently, technical colleges have begun to offer a limited number of transfer associate degrees in workforce fields. At the same time some community colleges are moving to offer applied bachelor’s degrees in technical fields. Despite this trend toward convergence in Washington State, technical schools’ stated missions remain notably different from their more comprehensive peers. Four out of the five mission statements at technical colleges center on career, technical, and/or workforce preparation. The comprehensive colleges, too, often reference workforce preparation in their missions, but

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[5] As the student newspaper at Lower Columbia Junior College noted at the time, the school was a place where “drama, athletics, and other collegiate activities are being carried on with meritorious success…. [T]his college is filling a community need” (“*We believe*,” February 1, 1935, p. 2).

[6] Personal phone communication with David Prince, SBCTC Director, Research and Analysis, January 6, 2011.

their statements tend to be longer and encompass additional broader goals such as improving people's lives, lifelong learning, and global awareness.[7]

One important practical difference between the two types of schools is that the technical colleges have traditionally offered courses in a block schedule, using clock (or "contact") hours rather than credit hours (for example, a single course might involve students attending eight hours per day for several days per week, with a mix of instructional modes including lecture/discussion, applied laboratory learning, and work site experience). Regulatory revisions phased in between 2006 and 2010 (largely after the cohorts examined in this analysis) now require all community and technical colleges to use the credit hour system (WSBCTC, 2008, Chapter 4, Appendix B). Because the clock-to-credit hour conversion rates are much more favorable to courses with a single rather than mixed mode of instruction, this has discouraged the offering of explicitly block-scheduled courses.[8] Though many programs at technical colleges still offer groupings of courses that approximate the old block schedules, it has changed the way students think about and move through these programs, as they take distinct, individual classes rather than just enrolling in a single integrated course.[9]

3.2 Data and Sample

The de-identified administrative data used in this analysis were provided to the Community College Research Center (CCRC) under a restricted-use data agreement with the Washington State Board for Community and Technical Colleges (SBCTC). The SBCTC regularly collects student unit record data including demographic characteristics, registrations, course enrollments and outcomes, financial aid disbursements, and certificate and degree completion from each of the 34 institutions under its umbrella. In addition, the SBCTC matches these data with enrollment records from the National

[7] Information gathered from mission statements posted on the websites of all five technical colleges and a sampling of comprehensive colleges (Centralia, Cascadia, Big Bend, and Bellevue). Bates Technical College was the outlier among technical colleges with a mission simply "to inspire, challenge, and educate."

[8] For example, the conversion rate of clock hours to credit hours for lecture/discussion, applied learning/laboratory, supervised work cite activities, and other unsupervised work experiences are 1:1, 2:1, 3:1, and 5:1, respectively, while the conversion rate for a course with mixed or variable modes of instruction is 16.5:1.

[9] Personal phone communication with Tina Bloomer, SBCTC Policy Associate, Workforce Education, January 6, 2011.

Student Clearinghouse (NSC), enabling analysts to identify whether a student has simultaneously enrolled in or transferred to an institution outside the SBCTC's purview (including in-state public four-year institutions, many private two- and four-year institutions, and out-of-state institutions). The data are also matched with administrative employment records gathered via the state's unemployment insurance system, allowing analysts to examine students' quarterly employment, earnings, and hours worked before, during, and after their SBCTC enrollment.[10] One limitation of these data is that they do not include any measure of students' academic ability upon admission (such as high school grade point average or test scores, or college entrance or placement exam scores).

The SBCTC provided CCRC with two cohorts of first-time entrants, from the 2001–02 and 2005–06 school years (students were considered "first-time" entrants if they had not appeared in the SBCTC system prior to the semester of entry unless it was as a high school dual enrollee, had no prior degrees, and no prior college enrollment indicated by the NSC records). This data extract includes 274,168 first-time college enrollees. All students can be tracked for at least three years (12 academic quarters) following initial entry.

Given the differences in their institutional history and missions, it no surprise that technical and comprehensive community colleges tend to attract different types of students. Most strikingly, a full 66% of students at technical colleges have the intent of "upgrading job skills," which often indicates a single, short, work-related class, compared to only 11% at comprehensive colleges. In contrast, students at the comprehensive community colleges are more likely to have an academic transfer intent (15.4% compared to 0%) or general studies intent (26% compared to 5%).[11] Because workforce-oriented students are often required to declare a major (with the exception of some students in developmental coursework or academic non-transfer programs), 84% of students at technical schools had declared a major at entry compared to only 21% at comprehensive

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[10] The employment records also include records from neighboring states, although in practice most records come from within the state. The duration of the employment data varies somewhat by enrollment cohort.

[11] A student's "intent" is coded by the college during registration. The category "vocational preparatory" signals entering a vocational program and is necessary for Perkins funding; the category "upgrading job skills" is more varied and could indicate taking just a few work-related classes.

colleges.[12] Students at technical colleges are also much less likely to be of traditional college age (18 to 22 years old), and more likely to attend part time. Interestingly, the distribution of students by socioeconomic status (SES) is not radically different between institution types, although technical colleges do attract slightly fewer students from the top SES quintile.[13] These and other differences are summarized in Table 1 on the next page.

Because of these differences, a comparison of student outcomes across schools for the entire student population is not likely to be very informative. Fundamentally, the broader mission of the comprehensive schools attracts a broader student population, including those at both the high end academically (students with a transfer intent), those at the low end (students exclusively focused on basic skills development), and those simply seeking recreational education (such as pottery courses). Even within the subgroup of students with a "workforce orientation," the technical colleges attract a much larger number of non-degree seeking students. However, students with a "vocational preparatory" intent, which requires declaration of a major and indicates enrollment in a degree *program* rather than in just a single course, are well represented at both types of schools, making cross-school comparisons feasible. It is worth emphasizing that such students comprise only 9% of the overall population at WA technical colleges and only 6% at comprehensive colleges. The simple fact illustrated in Table 1 is that overall, these two types of institutions do serve quite different populations in terms of educational goals, so true apples-to-apples comparisons of the two types of institutions must be limited to a relatively small subset of students.

[12] This requirement is to ensure that vocational students qualify for relevant assistance such as Perkins funds.

[13] SES quintiles are defined based on the average income in the census tract where the student lived upon application to the SBCTC. For a relatively young sample that includes both independent and dependent students, this type of measure is preferable to an individual-level measure of income.

Table 1
Descriptive Characteristics of First-Time Enrollees
at Washington Community and Technical Colleges

Characteristic	Comprehensive Colleges	Technical Colleges	Overall
Percent female (18/16% missing)	51.7	51.6	51.7
Age			
17 or under	11.3	12.0	11.4
18–22	31.8	21.1	30.2
23–29	15.0	15.6	15.1
30–39	16.0	18.9	16.4
40–49	12.2	17.1	12.9
50–64	10.1	12.9	10.5
65 or over	3.6	2.5	3.4
Race/ethnicity (34/45% missing)			
White, non-Hispanic	60.5	63.8	61.0
Black, non-Hispanic	5.7	7.5	6.0
Hispanic (any race)	17.7	11.7	16.8
Asian/Pacific Islander	7.7	12.8	8.5
International	3.5	0.6	3.1
Other	4.9	3.7	4.7
SES (26/30% missing)			
High (top 20%)	20.0	17.7	19.6
High-middle	20.1	21.5	20.4
Middle	20.0	21.7	20.2
Low-middle	19.2	19.9	19.3
Low (bottom 20%)	20.8	19.1	20.5
Received a Pell Grant (entry quarter)	5.3	1.7	4.7
Part-time student (entry quarter)	76.5	89.3	78.7
Declared student intent at entry			
Academic non-transfer degree	2.8	0.0	2.3
Academic transfer	15.4	0.0	12.7
High school diploma/GED	8.0	1.7	6.9
Developmental	15.5	9.6	14.5
Vocational preparatory[a]	6.1	8.8	6.6
Vocational preparatory applicant	2.1	0.3	1.8
Vocational apprentice	0.8	3.1	1.2
Upgrading job skills	11.0	65.6	20.5
Vocational home/family life	1.3	6.0	2.1
General Studies	25.5	4.6	21.9
Undecided/none of the above	11.5	0.3	9.6
Did not attempt any credits w/in 3 yrs	38.8	11.8	34.1
Did not complete any credits w/in 3 yrs	53.9	65.4	55.9

Characteristic	Comprehensive Colleges	Technical Colleges	Overall
Declared major at entry			
Humanities	0.6	0.6	0.6
Social sciences	0.7	0.8	0.7
Sciences	0.1	0.3	0.2
Engineering and information sci.	3.7	5.1	4.0
Business, marketing, office, and legal	3.1	25.8	7.0
Education and child care	1.9	4.8	2.4
Health	2.5	5.2	3.0
Construction	1.9	4.0	2.3
Mechanics, repair, and maintenance	0.6	3.8	1.2
Precision production	0.6	2.5	1.0
Protective services	0.9	0.9	0.9
Cosmetology	0.2	0.4	0.2
Culinary	0.3	20.5	3.8
Other workforce	0.3	5.0	1.1
Basic skills	0.5	0.5	0.5
Developmental	0.4	0.1	0.3
Personal and continuing ed.	3.0	3.5	3.1
Undeclared	78.7	16.2	67.9
Sample size	226,604 (83%)	47,564 (17%)	274,168

Note. Sample represents all first-time entrants during the 2001–02 and 2005–06 academic years. Adapted from authors' calculations using WA State Board for Community and Technical College (SBCTC) unit record database.
[a]Students with this declared intent will be the focus of the remainder of the paper.

For the remainder of this analysis, we limit the sample to this group of students—those with vocational preparatory intent—and we also focus on students who were between age 17 and 26 at the time of enrollment (who represent approximately 44% of vocational-preparatory students in the Washington system). This younger group is of particular interest to policymakers because they are less likely to have already established themselves in a career, and educational investments for this group can have a particularly high payoff because the bulk of their working years still lie ahead of them. These restrictions reduce the effective sample size to 10,172.

We further exclude international students and "non-state-funded" students.[14] We also exclude students who never complete any credits while at the college (about 8% of the remaining sample). This gives us a final sample of 8,122 first time entrants from the 2001–2 and 2005–6 cohorts who were between age 17 and 26, non-international, at least

[14] The term "state funded" does not imply that the student was necessarily receiving direct financial assistance from the state; rather it is a way of distinguishing between exclusively programs funded by employers or specialized grants and programs that are at least partially supported by the state and open to the public.

partially state-funded, who entered with a vocational intent, and completed at least some credits. Of this sample, approximately 22% enrolled at a tech school.

Descriptive statistics for this young vocational sample are presented in Table 2. Among this group, it is still the case that the technical colleges disproportionately attract slightly older students. In contrast to the full sample, however, young vocational students at technical colleges are *more* likely to enroll full-time than their peers at comprehensives. Perhaps surprisingly, among this group the technical schools also attract students from slightly *higher* SES census tracts and have a different racial/ethnic mix than the comprehensives; the explanation for this is the disproportionately urban concentration of the technical colleges, four out of five of which are located near Seattle-Tacoma.

Table 2
Descriptive Characteristics of First-Time Young Vocational Enrollees at Washington Community and Technical Colleges

Characteristic	Comprehensive Colleges	Technical Colleges	Overall
No credits completed within 3 yrs[a]	*7.9*	*8.5*	*8.1*
Percent female	42.8	43.8	43.1
Age			
17 or under	5.2	4.0	5.0
18	36.7	30.9	35.5
19	22.1	25.4	22.8
20	9.4	9.3	9.4
21	6.2	7.9	6.6
22	4.8	5.4	4.9
23–26	15.6	17.0	15.9
Race/ethnicity (3/9% missing)			
White, non-Hispanic	73.4	74.3	73.5
Black, non-Hispanic	5.3	6.5	5.6
Hispanic (any race)	10.1	5.5	9.1
Asian/Pacific Islander	6.1	11.1	7.1
Other	5.2	2.7	4.7
SES (13/8% missing)			
High (top 20%)	10.6	17.5	12.2
High-middle	19.7	19.5	19.6
Middle	23.3	20.9	22.7
Low-middle	24.3	22.3	23.8
Low (bottom 20%)	22.2	19.8	21.6
Received a Pell Grant (entry quarter)	26.0	23.2	25.4

Characteristic	Comprehensive Colleges	Technical Colleges	Overall
Part-time student (entry quarter)	31.1	23.4	29.4
Declared major at entry			
Humanities	3.8	1.2	3.3
Social sciences	0.5	0.0	0.4
Sciences	0.0	0.4	0.1
Engineering and information sci.	20.4	20.0	20.3
Business, marketing, office, and legal	19.4	7.4	16.8
Education and child care	4.8	2.8	4.3
Health	12.2	20.9	14.1
Construction	1.9	2.5	2.0
Mechanics, repair, and maintenance	10.2	19.2	12.1
Precision production	7.0	9.8	7.6
Protective services	11.0	2.2	9.1
Cosmetology	2.6	7.1	3.6
Culinary	3.7	3.3	3.6
Other workforce	1.7	2.5	1.9
Personal and continuing ed.	0.9	0.9	0.9
Undeclared	0.0	0.0	0.0
Sample size	6,364 (78%)	1,758 (22%)	8,122

Note. Sample is restricted to vocational-preparatory students age 26 or under, and excludes international and non-state-funded, and culinary students. Adapted from authors' calculations using SBCTC data.
[a]After the italicized first line, the sample is further restricted to students who completed at least one transcripted credit in the first three years after entry.

4. Empirical Methodology

To explore the variation across institutions and institution types, we undertake two separate analyses. In the first analysis, we compare average, unadjusted student outcomes between the technical and comprehensive colleges, and then adjust for differences in student characteristics using a simple regression framework:

$$y_{ic} = \alpha + \beta(techschool_c) + X_{ic}\delta + \varepsilon_{ic} \quad (1)$$

where i indexes individuals, c indexes colleges, y_{ic} is an academic outcome, *techschool* is a binary indicator of whether the student attends a technical college, and X_{ic} is a vector of individual background characteristics including gender, race/ethnicity, age, SES, and in some specifications, fixed effects for different categories of students' declared intent and major at entry.

The question of interest is whether and by how much the differences between institution types (measured by the coefficient β) are reduced once one accounts for differences in *which* students enroll where. The results from this regression analysis can be usefully summarized using a Oaxaca decomposition. The Oaxaca decomposition, originally developed to explain differences in labor market outcomes between males and females (Oaxaca, 1973), is a way of disaggregating the mean difference in outcomes between two groups into 1) a portion that can be explained simply by differences in background characteristics or "inputs," and 2) a portion that is unexplained, but is potentially due to differences in how those inputs are utilized in the economy (or in this case, by the institution).

In the second analysis, we turn to comparisons across individual institutions. Again, we first examine average, unadjusted student outcomes at each school. Then, using a regression model similar to the one above which estimates the relationship between various incoming student characteristics and outcomes, we compute *predicted* outcomes for each institution based solely on their student composition. This analysis acknowledges that some institutions will have higher or lower completion rates simply by virtue of the types of students (include degree intent) that they attract. We then compare the predicted outcomes to actual outcomes at each school to compute a measure of institutional "value-added."

The outcomes we consider (all measured three years after initial entry, and not mutually exclusive) include:

- Credits completed in the first quarter of enrollment
- Total number of quarters enrolled (a measure of persistence)
- Total college-level credits earned
- Earned 45 or more college-level credits (whether or not a credential was earned, thus potentially measuring untapped credential completion)
- Earned a certificate of less than one year
- Earned a certificate of one year or more
- Earned an associate degree
- Ever attended a four-year institution within three years (we will refer to this as "transfer")

5. Results

5.1 Differences Across Institution Types

Main results. Table 3 compares the unadjusted mean outcomes of young vocational-preparatory enrollees at the 29 comprehensive and five technical colleges, indicating a number of statistically significant differences beginning in the first quarter of enrollment. Students starting at technical schools complete about 2.0 more college-level credits in their first quarter (though this difference is not statistically significant) despite the fact that more students (20%) enrolled at technical colleges do not complete a single college-level credit in their first quarter (20% compared with 13% at comprehensive colleges). Among those who complete any college-level credits in the first term, students at technical colleges complete significantly more credits on average than those at comprehensive colleges (13.8 versus 10.5 credits).

Table 3
Unadjusted Outcomes of First-Time Young Vocational Enrollees at Washington Community and Technical Colleges

Outcome	Comprehensive Colleges	Technical Colleges	
Outcomes after one quarter			
Average college-level credits completed	9.1	11.1	
Percent completing zero college-level credits	0.132	0.196	
College level credits completed among those completing any college level credits	10.5	13.8	***
Outcomes after three years (12 quarters)			
Cumulative quarters enrolled over three years	4.7	4.6	
Cumulative college-level credits completed	45.2	57.7	***
Completed 45+ credits	0.397	0.506	***
Credential and degree outcomes after three years			
Earned certificate of less than one year	0.062	0.144	**
Earned certificate of one year or more	0.046	0.157	**
Earned associate degree	0.143	0.133	
Transferred to four-year college	0.056	0.026	***
Earned any degree or certificate	0.227	0.397	**
Earned any credential or transferred	0.260	0.411	*
Sample size	6,364	1,758	

Note. Sample is restricted to vocational-preparatory students age 26 or under who completed at least one transcripted credit in the first three years after entry, and excludes international and non-state-funded, and culinary students. Adapted from authors' calculations using SBCTC data.
* 10% statistically significant difference (measured by a t-test) in mean outcomes (with standard errors clustered by institution)
** 5% statistically significant difference
*** 1% statistically significant difference

After three years, there are no substantial differences among vocational students enrolled at the technical colleges and those enrolled at the comprehensive community colleges in the average number of quarters enrolled, nor in the rate at which students earned an associate degree (though it is one percentage point higher at the comprehensive schools). However, students at the technical colleges complete significantly more college-level credits and are significantly more likely to earn both short-term (requiring less than one year) and long-term (requiring one year or more) certificates. They are also significantly less likely to transfer to a four-year institution (the transfer rate at the comprehensives is more than twice the rate at the technicals for this population, but the magnitude of the difference is only 3 percentage points). The technical college advantage in certificate completions is much larger than the deficits in associate degree completion and transfers, such that overall completion rates are significantly higher at the technical colleges. Students at the technical colleges are more than 75% more likely to have earned some type of credential after three years (40% versus 23%). This difference is diminished to a 60% advantage when transfer rates are included as a positive outcome (41% versus 26%).

These observed raw differences, however, could be driven simply by differences in which type of students enroll where. Although our sample is already limited to vocational students, there is still variation within this sample along the dimensions of field of study, age, and other key student characteristics. For example, students at the comprehensives are much more likely to be majoring in business or protective services, and less likely to be majoring in engineering, health, mechanics, or cosmetology. Thus, rather than comparing simple raw differences, it may be more instructive to adjust for these differences in student characteristics and educational intent.

The results of these adjustments are shown in Table 4. The first column shows the raw mean of each outcome for the comprehensive colleges, and the second column provides the unadjusted "technical college effect" (in other words, how much better or worse technical college students perform on a given outcome, equivalent to the unadjusted differences implied in Table 3). The third column shows the adjusted technical college effect under Model 1, which controls for differences in student gender composition, race/ethnicity, SES, age, part-time enrollment status, and Pell Grant status, between the two types of schools. The fourth column, Model 2, additionally controls for the institutional characteristics of percent minority and urbanicity. The final column, Model 3, controls for 18 declared major field of study categories at entry.

Model 1, which controls for student characteristics but not for institutional characteristics nor for student major, has little effect on the estimates. Most estimates shift by less than a percentage point. The adjustments in Models 2 and 3 make more of a difference. Adding the full set of covariates (Model 3) tends to slightly decrease the technical school advantage on the credit completion measures and tends to increase the technical school advantage (or decrease the disadvantage) on the credential completion and transfer measures; still, in most cases the estimates are similar and statistical significance is not dramatically altered. The one exception to this pattern regards certificates of less than one year: controlling for differences in student majors *reduces* the estimated technical school advantage by about 1.5 percentage points (about a 20% reduction), with the remaining 6.7 percentage point difference no longer statistically significant. Under the most complete adjustment model (Model 3), one of the most interesting changes compared with the raw differences are that when similar students are compared, the small technical school disadvantage in associate degree completion now completely disappears. The large technical school advantages in long-term certificate completions and overall completions persist, while their disadvantage in transfer rates also persists regardless of what controls are included.

Table 4
Regression-Adjusted Differences in Outcomes of First-Time Young Workforce Enrollees Between Washington Community and Technical Colleges

Outcome	Compre-hensive College Mean	Regression Estimates of Technical School Effects: Baseline (S.E.)		Model 1[a] (S.E.)		Model 2[b] (S.E.)		Model 3[c] (S.E.)	
Outcomes after one quarter									
Average college-level credits completed	9.1	2.0		1.4		0.7		0.6	
		(1.8)		(1.7)		(2.0)		(2.0)	
Percent completing zero college-level credits	0.132	0.063		0.080		0.109		0.120	
		(0.092)		(0.094)		(0.119)		(0.121)	
Credits completed among those with credits	10.5	3.3	***	2.8	***	2.6	***	2.7	**
		(1.1)		(0.9)		(0.9)		(1.0)	
Outcomes after three years (12 quarters)									
Cumulative quarters enrolled over three years	4.7	-0.1		-0.1		-0.1		-0.1	
		(0.2)		(0.2)		(0.2)		(0.2)	
Cumulative college-level credits completed	45.2	12.6	***	10.4	***	10.4	***	10.5	***
		(3.7)		(2.8)		(3.4)		(3.6)	
Completed 45+ credits	0.397	0.109	***	0.088	**	0.083	**	0.076	**
		(0.036)		(0.032)		(0.035)		(0.035)	
Credential and degree outcomes after three years									
Earned certificate of less than one year	0.062	0.082	**	0.079	**	0.083	*	0.067	
		(0.038)		(0.036)		(0.046)		(0.045)	
Earned certificate of one year or more	0.046	0.111	**	0.107	**	0.139	***	0.125	**
		(0.050)		(0.050)		(0.045)		(0.047)	
Earned associate degree	0.143	-0.011		-0.017		0.000		0.002	
		(0.026)		(0.023)		(0.024)		(0.024)	
Transferred to four year college	0.056	-0.030	***	-0.037	***	-0.027	***	-0.020	**
		(0.006)		(0.008)		(0.008)		(0.008)	
Earned any degree or certificate	0.227	0.170	**	0.161	**	0.212	***	0.184	**
		(0.080)		(0.076)		(0.070)		(0.068)	
Earned any credential or transferred	0.260	0.151	*	0.137	*	0.193	**	0.168	**
		(0.081)		(0.077)		(0.072)		(0.068)	
Sample size	6,364	8,122		8,122		8,122		8,122	

Note. Adapted from authors' calculations using SBCTC data.
[a]Model 1 includes controls for gender, race/ethnicity, SES dummies, age and age-squared, part-time status (at entry) and Pell Grant status (at entry). [b]Model 2 adds institutional characteristics: percent minority and urbanicity. [c]Model 3 adds fixed effects for 18 major field categories.
* 10% statistically significant difference (measured by a t-test) of estimated effect of attending a technical college (with standard errors clustered by institution)
** 5% statistically significant difference
*** 1% statistically significant difference

Oaxaca decompositions. We can use a Oaxaca decomposition, a statistical accounting method, to summarize the extent to which differences between two groups can be explained by differences in preexisting characteristics. For the Oaxaca decompositions, we focus on the certificate and degree outcomes, which are of greatest policy relevance. First, we limit the sample to comprehensive colleges and run regressions of each outcome on the covariates included in Model 3. This generates a set of predicted relationships (or coefficients) between each covariate (race, gender, SES, etc.) and each outcome, within the comprehensive schools. Then, we perform the following thought experiment: what would outcomes look like at the comprehensive colleges if we applied these predicted relationships to the mix of characteristics (including students' declared majors as well as urbanicity and overall percent minority) of a typical technical college? In other words, if comprehensive colleges perform the way they always do with certain types of students, but the particular mix of students changes, what outcomes would we expect to see?

We then compare the raw gaps in outcomes between techs and comprehensives to the predicted gaps if comprehensive schools had the same composition as the technical colleges. If the only difference between schools is the student composition, then the predicted gaps should fall to zero—because all of the gaps could be explained by differences in characteristics. If the predicted gaps look similar to the actual gaps, this implies that a large proportion of the raw gap cannot be explained by differences in student characteristics, but instead must be due to something else.

Results of this analysis are summarized in Table 5. The first three columns show the raw gap and the actual means at each type of school. The next three columns show the predicted mean outcomes at comprehensive schools if they had the same students as technical colleges, calculates the predicted gap that would still remain, and indicates the proportion of the raw gap that remains unexplained.

Table 5
Oaxaca Decompositions of the Gaps Between Technical and Comprehensive College Outcomes

				Hypothetical: If Comprehensives Had Same Students as Technical Colleges		
Outcome	Raw Gap	Tech. Mean	Comp. Mean	Predicted Comp. Mean	Gap Still Remaining	Percent of Raw Gap Unexplained
Credential and degree outcomes after 3 years						
Earned certificate of less than one year	0.082	0.144	0.062	0.081	0.063	78%
Earned certificate of one year or more	0.111	0.157	0.046	0.052	0.105	95%
Earned associate degree	-0.011	0.133	0.143	0.135	-0.003	27%
Transferred to four year college	-0.030	0.026	0.056	0.043	-0.016	54%
Earned any degree or certificate	0.170	0.397	0.227	0.236	0.161	94%
Earned any credential or transferred	0.151	0.411	0.260	0.264	0.146	97%

Note. Decompositions are based on Model 3 from Table 4, which includes controls for gender, race/ethnicity, SES, age, part-time status, Pell Grant status, institution urbanicity and percent minority, and declared major at entry. Adapted from authors' calculations using SBCTC data.

Reinforcing the pattern of results from Table 4, the Oaxaca decompositions indicate that the only outcomes for which student composition can explain more than a trivial fraction of the differences between institution types are the percent earning certificates of less than one year (22% explained), the percent earning associate degrees (73% explained), and the percent transferring to a four year college (46% explained). In contrast, student characteristics explain virtually none of the gaps for overall completion rates or completion of certificates of one year or more—these gaps are suggestive of true differences in institutional performance with the same students.[15]

A critical caveat, of course, is that the Oaxaca decomposition is only as good as the covariates included. If students differ in unobservable ways, this analysis will understate how much of the gaps can be explained by student characteristics.

Differences by socioeconomic status. A question of particular interest to policymakers is whether certain types of institutions do better or worse with low-income

[15] Note that one can also perform the thought experiment in reverse: how would the comprehensive colleges perform if they had the same students as the technical schools? We have run this analysis and the pattern of results across outcomes is the same: only for the associate degree completion and transfer rates can student composition explain more than a trivial fraction of the observed gaps. In fact, under the reverse Oaxaca, several of the predicted gaps are *larger* than the raw gaps (indicating that not only does student composition not explain the differences between institutions, but in fact, if student compositions were equivalent we might actually have expected to see larger gaps than we do).

students. So far, we have focused only on institutional differences controlling for differences in student makeup (including SES), but we have not explicitly examined whether there is an interaction between institution type and SES.

Our measure of SES quintile is defined based on the average income in the Census tract where the student lived upon application to college. We define a student as "low SES" if they live in a tract in the bottom 40% of the average income distribution. Note that while this measure does not vary individually, it may actually be preferable to an individual measure of income (which could in theory be computed from our earnings records). Given students' current participation in schooling and the variation in whether students live independently or with their parents, their Census tract may be a more accurate measure of their "permanent income" or true socioeconomic status than a measure of their current earnings.

In Table 6, we present results of separate regressions of each outcome on the low SES dummy, the technical schools dummy, and an interaction of these two dummy variables. We also include controls for age, gender, student intent, and declared major at entry (we omit race as a control here since it may be highly collinear with SES).

Not surprisingly, we find that low SES students overall (regardless of institution; this is referred to as the "main effect" in Table 6) persist for fewer quarters, are less likely to earn a certificate of more than one year or an associate degree, and are less likely to transfer. The main effect of being low SES is insignificant but still negative for several other outcomes, including total number of credits earned, and earning at least 45 credits. Despite the fact that low SES students have lower outcomes overall, they do not seem to perform differentially better or worse at technical colleges—the interaction coefficients shown in the first line of Table 6 are small and statistically insignificant for all of the outcomes measured (though they do all go in a positive direction).

Table 6
OLS Regression Estimates of Interaction Between Low SES Status and Technical School Enrollment

Variable	Quarters Enrolled	College-Level Credits Earned	Earned 45+ Credits	Earned Certificate of <1 Year	Earned Certificate of 1 Year+	Earned AA Degree	Transferred
LowSES[a] Techschool	0.207	1.379	0.019	0.020	0.001	0.011	0.012
(S.E.)	(0.198)	(3.082)	(0.030)	(0.036)	(0.033)	(0.019)	(0.010)
p-value	0.303	0.658	0.517	0.584	0.980	0.561	0.234
LowSES (main effect)	-0.260	-1.952	-0.023	0.007	-0.015	-0.023	-0.018
(S.E.)	(0.101)	(1.553)	(0.018)	(0.006)	(0.009)	(0.009)	(0.006)
p-value	0.015	0.218	0.199	0.281	0.097	0.017	0.006
Techschool (main effect)	-0.150	9.690	0.073	0.060	0.124	-0.005	-0.021
(S.E.)	(0.166)	(4.049)	(0.038)	(0.056)	(0.049)	(0.021)	(0.009)
p-value	0.374	0.023	0.065	0.293	0.017	0.799	0.030
N	7,123	7,123	7,123	7,123	7,123	7,123	7,123
r2	0.043	0.118	0.094	0.051	0.079	0.058	0.021

Note. Sample based on 8,122 first time college entrants (2001–02 and 2005–06 cohorts) classified as vocational preparatory students based on stated intent at entry. International students, students in exclusively non-state-funded programs, and culinary students are excluded. Sample sizes are smaller in this table because location, and thus SES could not be identified for all students. All outcomes in this table are measured three years after initial entry (12 quarters). All models include additional controls for gender, age and age squared, part-time status, institution urbanicity and percent minority, and declared major at entry, and standard errors are clustered by institution. Student race/ethnicity and Pell Grant status are omitted in these models due to collinearity with the LowSES measure. Adapted from authors' calculations using SBCTC data.
[a]LowSES indicates that a student lives in a county in the bottom 40% of the mean income distribution.

Summary. Overall, our analysis of young vocational-preparatory students in Washington State finds that those beginning at technical colleges have significantly higher rates of credential completion after three years, though this increase is driven by a large advantage in certificate completion combined with a very small, statistically insignificant disadvantage in associate degree completion. After controlling for student composition, including students’ declared major field of study, the 1 percentage point technical school disadvantage in associate degrees shrinks to zero and the 3 percentage point disadvantage in transfer rates is cut by a third—suggesting that any difference on these measures is largely due to differences in the incoming student population. This conclusion is reinforced by our Oaxaca decomposition. In contrast, the technical schools’ advantage in certificate completion—particularly longer certificates of one year or more—cannot be explained away by differences in student characteristics, but rather appears to be an important and real institutional difference.

The analysis of institutional differences by SES suggests that (after controlling for other covariates) while low-income vocational students have somewhat worse outcomes overall, they do not appear to be differentially served by technical versus comprehensive colleges.

An important caveat to this analysis is that there may still be unobservable differences between incoming students at technical and comprehensive colleges—even after accounting for an extensive set of observable control variables—and that these preexisting differences may account for some of the differences in outcomes. For example, although we are controlling for field of study, there may be important differences in the specific programs offered within those fields that attract different types of students. For example, at some technical colleges, private industry councils associated with some schools (e.g., in the allied health field) may help identify particularly strong candidates and steer them to enroll, potentially creating a "creaming" effect for some programs at these schools.[16]

A final caveat is that whether an institution is "comprehensive" or "technical" is only one of many dimensions along which schools may differ. Thus, in the next section we turn to an examination of differences across individual institutions, across and within each broad type.

5.2 Differences Across Individual Institutions

Observed (raw) differences across institutions. Whether or not a college is defined as "technical" or "comprehensive" is just one dimension along which individual institutions might differ. In this section, we examine how much variation there is not only across these two institution types, but also across individual institutions within each type. Table 7 thus presents observed (raw) differences in outcomes for young vocational-preparatory students by institution, sorted by the most comprehensive measure of completion after three years: whether the individual earned any certificate, degree, or transferred to a four year institution (right-most column). Technical colleges are indicated in boldface type.

[16] Conversation with David Prince, March 10, 2011.

A number of interesting points can be drawn from this table. The top three institutions on the "earned any credential or transferred" measure are all technical colleges; four of the five technical colleges rank in the top half on this measure. However, as might be suspected given the analyses of the previous sections, it is not the case that schools doing well on one measure do well on all. Only one of the technical colleges ranks in the top third of schools on associate degree completion rates. If transfer to a four-year institution were considered the most important outcome, all five technical colleges would rank in the bottom half.

Overall, however, the variation across individual institutions swamps the differences between technical and comprehensive school types. Across the 32 schools in the table, the percentage of young vocational students earning a certificate of less than one year after three years ranges from zero to 29% with a standard deviation of 8%—a standard deviation as large as the mean.[17] The rate of "earned any credential or transferred" within three years ranges from 9% to 66%, with a standard deviation of 13%.

This dramatic variation across individual institutions places the results from the previous section into perspective. Despite the differences in average outcomes between technical and comprehensive colleges (as described in the previous section), institution type alone can explain only about 26% of the variation in rates of "earned any credential or transferred" across institutions; the fraction of variation it can explain in associate degree completion rates is trivial (less than 1%). The completion outcome for which institution type is most substantially explanatory is for certificates of one year or more, for which institution type alone can account for 35% of the variation in institutional averages.[18]

[17] Note that two institutions with fewer than 75 students in this young vocational-preparatory sample are omitted from the table due to small sample size.

[18] These calculations are not shown in the table. They are obtained by collapsing the data to the institution level and then regressing institutional average outcomes on an indicator for whether the school is a technical college. The proportion of variation explained by this indicator variable is given by the R-squared from the regression.

Table 7
Average Outcomes Three Years After Entry by Individual College, Sorted by "Earned Any Credential or Transferred"

College	Sample size	Earned certificate of less than one year	Earned certificate of one year or more	Earned associate degree	Transferred to four year college	Earned any degree or certificate	Earned any credential or transferred
Technical College A[a]	**326**	**0.270**	**0.294**	**0.110**	**0.037**	**0.635**	**0.656**
Technical College B	**236**	**0.203**	**0.114**	**0.263**	**0.021**	**0.530**	**0.538**
Technical College C	**242**	**0.107**	**0.339**	**0.116**	**0.029**	**0.525**	**0.537**
Comprehensive College A	273	0.088	0.125	0.341	0.092	0.469	0.509
Comprehensive College B	191	0.110	0.272	0.094	0.021	0.455	0.471
Comprehensive College C	159	0.088	0.000	0.258	0.126	0.340	0.428
Comprehensive College E	271	0.292	0.004	0.129	0.066	0.339	0.380
Comprehensive College F	99	0.162	0.010	0.162	0.071	0.333	0.374
Comprehensive College G	624	0.016	0.075	0.234	0.030	0.316	0.335
Comprehensive College H	85	0.094	0.129	0.106	0.071	0.271	0.318
Comprehensive College I	166	0.054	0.030	0.253	0.054	0.307	0.313
Technical College D	**562**	**0.135**	**0.075**	**0.103**	**0.025**	**0.292**	**0.308**
Comprehensive College J	88	0.216	0.068	0.102	0.011	0.295	0.295
Comprehensive College K	185	0.130	0.027	0.146	0.054	0.254	0.286
Comprehensive College L	182	0.022	0.011	0.198	0.077	0.231	0.264
Comprehensive College M	133	0.045	0.030	0.180	0.060	0.248	0.263
Comprehensive College N	422	0.149	0.019	0.092	0.062	0.220	0.261
Comprehensive College O	217	0.046	0.023	0.157	0.046	0.217	0.258
Comprehensive College P	287	0.003	0.038	0.143	0.108	0.157	0.230
Comprehensive College Q	202	0.089	0.045	0.084	0.035	0.198	0.213
Comprehensive College R	303	0.036	0.003	0.145	0.089	0.165	0.211
Technical College E	**392**	**0.038**	**0.074**	**0.125**	**0.020**	**0.191**	**0.199**
Comprehensive College S	76	0.092	0.013	0.092	0.039	0.158	0.197
Comprehensive College T	266	0.011	0.023	0.120	0.060	0.147	0.195
Comprehensive College U	275	0.029	0.044	0.091	0.058	0.145	0.193
Comprehensive College V	255	0.047	0.063	0.063	0.047	0.157	0.192
Comprehensive College W	201	0.035	0.030	0.109	0.035	0.169	0.184
Comprehensive College X	439	0.000	0.062	0.105	0.062	0.153	0.178
Comprehensive College Y	488	0.033	0.037	0.107	0.035	0.145	0.168
Comprehensive College Z	84	0.060	0.024	0.071	0.036	0.155	0.167
Comprehensive College AA	284	0.000	0.007	0.099	0.035	0.102	0.127
Comprehensive College BB	78	0.000	0.013	0.064	0.051	0.077	0.115
Overall	8,122	0.080	0.070	0.141	0.050	0.263	0.293

Note. Sample is restricted to vocational-preparatory students age 26 or under who completed at least one transcripted credit in the first three years after entry, and excludes international and non-state-funded, and culinary students. Two institutions with fewer than 75 students in this selected sample are omitted from the table. Authors' calculations using SBCTC data.
[a]Boldface rows indicate technical colleges.

Value-added measures. Just as was pointed out in the previous section, however, these raw institutional differences may be confounded by differences in student characteristics, particularly in terms of students' major field of study. It may be the case that some schools have specialties in particular fields for which long-term certificates are more marketable, for example. Thus, in Table 8, we compute a measure of value-added for each institution that accounts for differences in race, gender, age, SES, part-time status, Pell Grant status, school urbanicity and percent minority, *and* students' major field of study (the same characteristics included in Model 3 of Table 4). In other words, this value-added model adjusts not only for the different mix of student background characteristics across schools, but also adjusts for differences in their program choices. For clarity of presentation, we focus only on certificate and degree (and transfer) outcomes.

To describe how this computation works intuitively: we start with the mean outcome for the overall sample of young vocational-preparatory students, pooled across institutions, along with a set of predicted coefficients describing the relationship between student characteristics and that outcome (obtained from regressions using this pooled sample). We then calculate a *predicted average outcome* for each school based on the overall mean, the predicted relationships between characteristics and outcomes, and information about the composition of the student population at each particular institution. Finally, we compute the difference between the actual and predicted outcomes for each school; this is our value-added estimate. Positive differences indicate that the school is doing better than would be predicted given their student composition. The table is sorted according to differences on "earned any credential or transferred" (the final column).

Table 8
Measures of Institutional Value-Added,
Completion Outcomes After Three Years

College	Sample size	Earned certificate of less than one year	Earned certificate of one year or more	Earned associate degree	Transferred to four year college	Earned any degree or certificate	Earned any credential or transferred
Technical College A[a]	**326**	**0.137**	**0.187**	**-0.016**	**-0.004**	**0.301**	**0.300**
Technical College B	**236**	**0.120**	**0.042**	**0.110**	**-0.026**	**0.243**	**0.226**
Technical College C	**242**	**0.039**	**0.263**	**-0.050**	**-0.033**	**0.237**	**0.214**
Comprehensive College A	273	0.016	0.064	0.130	0.022	0.171	0.173
Comprehensive College E	271	0.175	-0.048	0.009	0.024	0.081	0.095
Comprehensive College B	191	-0.012	0.078	-0.006	-0.029	0.068	0.057
Comprehensive College F	99	0.077	-0.033	-0.038	0.006	0.045	0.049
Comprehensive College G	624	-0.026	0.012	0.042	-0.022	0.046	0.037
Comprehensive College C	159	-0.038	-0.068	0.078	0.041	-0.003	0.035
Comprehensive College N	422	0.092	-0.035	-0.016	0.017	0.021	0.030
Comprehensive College H	85	-0.014	0.032	-0.001	0.025	-0.004	0.015
Comprehensive College I	166	-0.017	-0.061	0.113	0.002	0.029	0.014
Comprehensive College J	88	0.127	0.036	-0.064	-0.055	0.046	0.003
Comprehensive College L	182	-0.031	-0.040	0.054	0.017	0.000	0.002
Comprehensive College O	217	-0.041	-0.042	0.036	0.003	-0.023	-0.005
Technical College D	**562**	**0.009**	**-0.023**	**-0.002**	**-0.001**	**-0.008**	**-0.009**
Comprehensive College K	185	0.040	-0.002	-0.033	-0.012	-0.007	-0.014
Comprehensive College P	287	-0.065	-0.032	0.022	0.057	-0.084	-0.042
Comprehensive College M	133	-0.038	0.003	-0.014	-0.007	-0.018	-0.044
Comprehensive College Q	202	0.040	-0.017	-0.064	-0.011	-0.037	-0.048
Comprehensive College T	266	-0.015	-0.016	-0.048	-0.002	-0.071	-0.056
Comprehensive College Z	84	0.013	-0.039	-0.027	-0.033	-0.043	-0.072
Comprehensive College R	303	-0.007	-0.079	0.002	0.031	-0.090	-0.074
Technical College E	**392**	**-0.056**	**0.002**	**-0.014**	**-0.010**	**-0.072**	**-0.085**
Comprehensive College Y	488	-0.044	-0.023	-0.013	-0.007	-0.083	-0.087
Comprehensive College X	439	-0.058	-0.003	-0.024	0.003	-0.081	-0.090
Comprehensive College BB	78	-0.066	-0.011	-0.057	0.011	-0.113	-0.092
Comprehensive College W	201	-0.081	-0.054	0.033	-0.009	-0.084	-0.097
Comprehensive College V	255	-0.058	-0.040	-0.040	0.017	-0.118	-0.103
Comprehensive College AA	284	-0.052	-0.045	-0.037	-0.011	-0.122	-0.125
Comprehensive College S	76	-0.004	-0.033	-0.103	-0.023	-0.142	-0.140
Comprehensive College U	275	-0.070	-0.015	-0.082	-0.011	-0.146	-0.140
Overall	8,122						

Note. Sample is restricted to vocational-preparatory students age 26 or under who completed at least one transcripted credit in the first three years after entry, and excludes international and non-state-funded, and culinary students. See text for details of value-added computation. Authors' calculations using SBCTC data.
[a]Boldface rows indicate technical colleges.

Comparing the rankings between Table 7 and Table 8, it is clear that adjusting for student characteristics switches some individual schools around, but overall, the adjustment for student characteristics has little effect. The correlation between the raw average of the "earned any credential or transferred" from Table 7 and the value-added measures in Table 8 is 0.95. It is worth remembering that part of the reason why student characteristics may matter relatively little in this case is that because of our original sample restrictions, the sample is already relatively homogenous (older students, those pursuing purely recreational studies, and those just taking a class or two to upgrade job skills are among those excluded).

While four of the five technical colleges do slightly worse than predicted on the AA completion measure, it is worth noting that five of the comprehensives do worse than the worst technical school on this value-added measure and several do virtually the same.[19] In contrast (and not surprisingly given previously reported findings) the technical schools generally have high value-added on the measures of long-term certificate completion. Still, there remains significant variation across institutions within each type on this outcome even after controlling for student characteristics. Finally, while the technical colleges generally have positive value-added on the measure of earning a short-term certificate, the top college on this measure is actually a comprehensive community college.

Summary. While the previous section indicated some significant differences between technical and comprehensive institutions, the results from this section put those findings in context. The variation in outcomes across individual institutions is nothing short of dramatic; overall completion or transfer rates range from 9% to 66% across these 32 institutions. Moreover, institution type alone explains only about one-quarter of the variation in this measure across schools. The rest of the variation in outcomes occurs across individual institutions within each type. Institution type matters most for completion of long certificates, but it is worth remembering that the average of each type is calculated using a limited number of institutions (in the case of technical colleges, just five) that are themselves far from homogenous. As in the previous section, we examine both raw differences and differences adjusted for student composition to ensure that we are truly comparing similar students. While adjusting for student composition (via the creation of a value-added measure) makes some difference for individual schools, it has

[19] Note: Two institutions, Cascadia and Bellevue, which are included in the table, will be excluded from the final analysis due to small sample size and thus are not counted in the number stated in this sentence.

little effect on the overall rankings; the adjusted and unadjusted completion or transfer rates have a correlation near one.

6. Discussion and Conclusion

The goal of this paper was to examine differences in student outcomes across individual institutions and institution types, when *similar students* in *similar programs* could be compared. We have attempted to ensure apples-to-apples comparisons both by restricting our sample from the outset to young, vocational-preparatory students, who are well represented across a wide range of institutions, and by controlling further for additional student characteristics (including declared major) in our analyses.

One basic, yet nonetheless important finding from our analysis is that technical and comprehensive colleges tend to serve students with quite different educational goals, at least in Washington State. For example, fully two thirds of students at the technical colleges were coded at registration as having a primary intent of "upgrading job skills," compared with only 11% at the comprehensive colleges. This confirms our original concern that simplistic comparisons of student outcomes across institution types are not likely to be particularly informative. By the same token it is worth emphasizing that more sophisticated apples-to-apples comparisons must necessarily be limited to a relatively small subset of the student population at these schools (less than 10% of the overall student population, in this case).

A second important finding from our analyses is that when we do compare the outcomes of students in similar programs and control for student characteristics, young vocational students in technical colleges do tend to have better completion outcomes. All else equal, these students are 7 percentage points more likely to earn a short-term certificate in a technical college, 13 percentage points more likely to earn a long-term certificates, and no less likely to earn an associate degree after three years. Students at technical schools are, however, 2 percentage points less likely to transfer to a four-year institution, all else equal.

The large advantage of the technical colleges in enabling students to earn longer term certificates is noteworthy, given recent research suggesting such credentials are likely to pay off in the labor market (Complete College America, 2010). However, our analysis of individual institutions suggests that this particular "technical school advantage" may be driven primarily by two of the five technical institutions in Washington State. Many comprehensive institutions matched or exceeded the outcomes of the other three technical institutions on this measure. Thus even this result should be interpreted somewhat cautiously.

Our third main finding is that the differences in student outcomes *within* the two types of schools are much larger than differences *between* them. The degree of variation is truly dramatic: Overall completion/transfer rates at the top school are more than six times the rate at the bottom school. The particular mix of outcomes conferred also varies widely across institutions: No institution is the best on all measures or the worst on all measures, and the rankings strongly depend upon which measure is considered most important.

An important question raised by this variation is whether students are aware of it. It is unproblematic for some schools to specialize in short certificates, others in long certificates, and still others in associate degrees, as long as students are aware of these differences and are choosing where to attend according to their own goals and preferences. For example, within some fields in some regions, there may be explicit relationships between technical and community colleges in which each institution specializes in a degree level (e.g., in nursing, an LPN versus an RN degree) and planned pathways are established for students who want to continue on to the comprehensive college after earning the lower degree.[20] However, if students are simply attending the nearest school, policymakers may be more concerned about why completion profiles vary so dramatically even for apparently similar students.

In conclusion, while the technical colleges appear to have somewhat better performance in enabling students to earn certificates, ultimately the more important issue is what accounts for the larger differences in overall completion rates as well as the mix of credentials conferred across individual institutions regardless of their type. We are currently in the midst of additional research, both quantitative and qualitative, that we hope will help answer the questions raised by this analysis.

[20] Conversation with David Prince, March 10, 2011.

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