



Growing Wisconsin's Economy

The Economic Impact of Wisconsin's Technical Colleges



Prepared for The Wisconsin Technical Colleges by the Wisconsin Taxpayers Alliance

EXECUTIVE SUMMARY

Wisconsin's 16 technical colleges impact the state economy by educating approximately one in ten state residents, and spending more than \$1 billion annually. These direct effects cycle through the economy, creating additional output, jobs, and earnings. This study estimates the total economic impact of the 16 colleges, the tax revenues generated by that activity, and the return taxpayers receive on the public investment.

Two estimation approaches are used here. First, an input-output model is used to estimate the impact of technical college spending on the Wisconsin economy. This is a commonly used approach to measuring economic impacts.

In the second part of the study, Census figures on earnings by age and education were used to estimate the 2006 earnings gains of current and past technical college graduates. These gains were then translated into output measures consistent with the technical college spending impacts.

In addition to the estimated economic effects, this study reports on state tax revenues generated as a result of the gains and two measures of "return on investment."

Some of the major findings include:

- Technical colleges impact the state economy through the educational services they provide. Although there are likely income gains from both graduates and nongraduates, only data to estimate the gains for the former are available. In 2006, the additional earnings from technical college graduates ages 62 and younger are estimated to be \$1.73 billion. The spending from those additional earnings translated into \$4.09 billion in state output and 24,151 jobs. This is a lower bound on the annual earnings' impact because we cannot estimate the gains for nongraduates.

- An estimated \$360.6 million of state-local taxes were invested in the 2005-06 graduates during their course of study. That money was leveraged with student tuition and fees, federal dollars, and other revenues. Over their lifetimes, these graduates are estimated to earn (in 2006 dollars) an additional \$2.11 billion over what they would have earned as high school graduates. These additional earnings represent a return on state and local tax investment of nearly six.

- In 2005-06, \$778 million in state and local taxes helped fund Wisconsin's technical colleges. Those dollars were leveraged with federal monies, institutional investment, and student tuition to generate \$1.38 billion of spending.

- In addition to its educational services, technical colleges impact the state economy through their spending. The estimated \$1.03 billion of 2005-06 in-state spending created an additional \$1.79 billion of output. Taken together, this one year of technical college spending created an estimated \$2.82 billion of total state output, or 1.3% of the 2005 state total. The total output created from this one year of spending represented a return on state-local tax investment of nearly four.

- In terms of employment, a total of 25,461 jobs, including approximately 10,000 within the system, resulted from the \$1.03 billion of spending.

- The combined impact of 2005-06 institutional spending and the 2006 earnings gains from current and past graduates was estimated to be \$6.91 billion, or 3.2% of total state output. The total impact in terms of jobs for that year was 49,612.

- The economic activity generated from these earnings gains and from the economic impact from the colleges' spending generated a total of \$280.5 million in 2006 state income and sales tax revenues. □

INTRODUCTION

Institutions of higher education can significantly impact local and regional economies. Through education, colleges and universities increase the skills of citizens and raise the value of these potential employees to employers. Colleges and universities also purchase goods and services, many from local suppliers, that bolster local economic activity.

In addition to these direct impacts, employee wages and purchases of goods and services create additional economic activity. As sellers of the goods and services (that the technical colleges or employees purchase) buy inputs for production and use profits to purchase other goods and services, additional economic activity is created.

These transactions cycle through the economy, multiplying economic activity. Thus, the total economic impact of a college or university is more than what it spends.

Wisconsin's 16 technical colleges generate many benefits, both educational and institutional, to the state. Students increase their earning potential, businesses get a more-skilled workforce, and society benefits from less unemployment and crime, and a more aware and engaged citizenry. In addition, the nearly \$1.4 billion Wisconsin's technical colleges spend each year spawns additional economic activity that has a multiplied impact on the state's economy.

Goals

Understanding these contributions, Wisconsin Technical College System (WTCS) officials asked the Wisconsin Taxpayers Alliance (WISTAX) to quantify the impact of the technical colleges on the state economy.

An economic impact study of this nature can be useful in several ways. First, it can demonstrate to business and civic leaders, public officials, and citizens the value of the technical colleges to Wisconsin's economy. Second, it can

help taxpayers understand the economic return realized for each tax dollar of support.

WISTAX researchers met with WTCS representatives in September 2006 to discuss a study of the economic impact of technical colleges. The result was a WISTAX proposal that was approved by WTCS officials in early October 2006.

As outlined in that proposal, the study aims to estimate the:

- economic impact of technical college spending on the state's economy;
- increased earnings realized by individuals who graduated from the system and the economic impact of those gains;
- return taxpayers receive on the public investment in the technical colleges.

Impact Studies

There is a large body of research on the impact of higher-learning institutions on local, regional, and state economies. Some approaches are fairly narrow, focusing only on institutional spending or on the impact of education on earnings. Others use a broad approach that includes the effects of reduced crime, lesser demands on social services, and other societal benefits. Some also add the effect of student and visitor spending to their models.

The magnitude of any economic impact is directly related to the size of the region studied. Economic effects generally increase as the region analyzed grows. The main reason is that many purchases and other economic activities occur outside a single community. To the extent these dollars "leak out" of the immediate area, the local economic impact of the institution lessens. When the area of

This study seeks to estimate the economic impact of the WTCS on the state's economy.

The magnitude of the estimated effect depends on the size of the region studied, as well as the economic activities included.

interest is expanded, there is less “leakage,” and the estimated impact is larger.

A second factor that plays a role in determining the magnitude of the effects is the nature of the economic activity studied. Research that includes student spending, visitor purchases, and other ancillary economic activities will show a larger economic impact than those that include only direct institutional activity.

The analysis here looks at the combined impact of the 16 technical colleges on the state economy. Because the region studied is fairly large, the estimated economic impact should be commensurately large.

However, the impacts identified will be tempered by the degree to which ancillary economic activities are included. Student and visitor spending is not included here. Also, the impact of the colleges on the reduced need for social services is not estimated in this study. There were not sufficient data to estimate the impact of the educational gains for non-program students, basic education students, and non-graduates. Thus, our estimates should be viewed as a lower bound on the colleges’ economic impacts.

Finally, the impacts estimated in this study are for approximately one year. The colleges’ spending is from fiscal 2005-06 and the earnings of technical college graduates

is for calendar 2006. The economic impacts estimated by our model are short term, likely less than two years. However, since the spending occurs each year, the impacts can be considered annual.

Format

The report is divided into sections. Following this introduction is an overview of the technical college system, including governance, students, programs, revenues, and expenditures.

We then examine the institutional impact of technical colleges on the state economy. This section presents the results of input-output modelling and the total economic impact of technical college spending. The effect on total state output, earnings, and employment is reported. State tax revenues generated from the estimated economic activity is also reported.

The final section examines the economic impact of the additional student education. The improved skills that technical colleges help create for students should result in higher pay for graduates and non-graduates. The economic activity generated from the additional income for graduates is estimated, along with the associated tax revenues. These estimates represent a lower bound on the income gains as they did not include non-program students, non-graduates, and basic education students.

WTCS OVERVIEW

The Wisconsin Technical College System is comprised of 16 technical college districts with 52 campuses throughout the state (see Figure 1 below). In addition to campuses, most of the colleges have several community or regional learning centers throughout their districts.

Governance

Each district is governed by a board that is responsible for the direct operation of the school and its programs. Districts have the power to levy property taxes, provide

for facilities and equipment, employ staff, and contract for services.

WTCS is the coordinating agency for the 16 technical colleges. The WTCS board establishes statewide policies and standards, and approves the educational programs and services provided by the colleges. It also supervises district operations through reporting and audit requirements, and consultation, coordination and support services. The board also sets standards and approves new construction and remodeling of current facilities.

Technical colleges are self-governed, with WTCS serving as coordinating agency.

Students and Programs

Wisconsin's technical colleges provide an array of services to a significant portion of Wisconsin's population. In 2005-06, they provided educational services to 409,380 citizens. Approximately one in 11 residents age 16 or older took advantage of the technical colleges' programs.

The colleges provide educational opportunities in many areas, including basic education, technical diplomas, applied associate degrees, collegiate transfer degrees, and adult education. The latter category includes continuing adult education and community services.

In terms of individuals served, the continuing adult education program was the largest with more than 219,000 persons enrolled (see Table 1 on page six). This program offers non-credit courses in areas ranging from gardening to welding. The community services area was the smallest with fewer than 11,000 individuals enrolled.

When examined on a full-time equivalency (FTE) basis, the applied associate degree program is predominate with more than 60% of FTE enrollment. The technical colleges provide applied associate degrees in nearly 200 disciplines. The collegiate transfer program is much smaller, avail-

In 2005-06, approximately one in 11 residents age 16 or older took advantage of technical college programs.

Figure 1:
The Wisconsin Technical College System



Continuing adult education served the most individuals in 2005-06, but the applied associate degree program was the largest based on full-time equivalency.

**Table 1:
Technical College Student Counts**

	Number	Pct.	FTE	Pct.
Collegiate Transfer	20,242	4.2%	6,020.5	8.8%
Applied Associate Deg.	117,408	24.4%	41,988.6	61.5%
Technical Diplomas	38,305	8.0%	8,631.3	12.6%
Basic Education	74,556	15.5%	7,559.4	11.1%
Continuing Adult Educ.	219,574	45.7%	3,856.3	5.6%
Community Services	10,631	2.2%	211.0	0.3%
Total	480,716		68,267.0	
Unduplicated Total	409,380		68,267.0	

able on only three campuses: Madison, Milwaukee, and Nicolet. The program provides students the opportunity to earn associate degrees that satisfy the first two years of a bachelor degree.

The basic education programs, which account for about one in nine FTE's, provide instruction on a continuum, beginning with elementary levels and allow students to complete their General Educational Development (GED or high school equivalency) certificate.

Revenues

While this report examines the economic impact of technical college spending, it is useful to understand how the colleges are funded. This will be particularly important in the next section when returns on public investment are discussed.

In 2005-06, the technical colleges collected \$1.38 billion in revenue. Nearly half (45.2%) was from "local" sources, primarily property taxes (see Figure 2 at right). Other tax dollars from state (\$155 million, 11.3% of the total) and federal (\$141 million, 10.2%) governments brought total public investment to 66.7% of total revenues. State

Public dollars from local, state, and federal taxpayers accounted for two-thirds of technical college revenues.

and local tax support of the technical colleges totalled \$778 million, or 56.4% of the total.

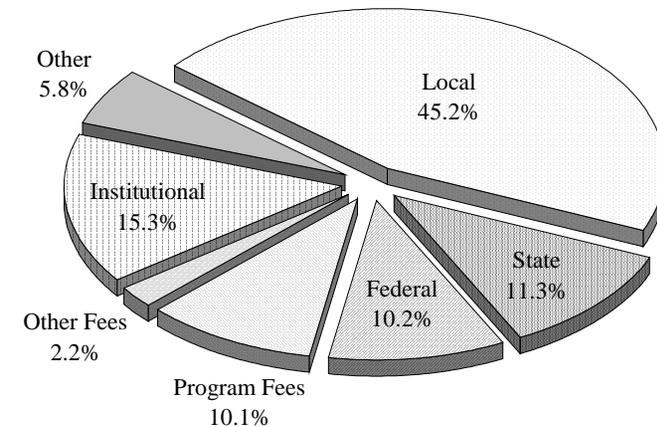
Institutional dollars, or revenues generated from the sale of goods and services and from investment income, were 15.3% of the 2005-06 total. Program fees (generally tuition and academic fees) accounted for 10.1% of revenues.

Spending

Technical college expenditures totalled \$1.38 billion in 2005-06. Spending varied by district and by category.

By District. The impact of the technical colleges statewide is varied. Although many factors affect an individual district's spending, the most significant is the number of students it serves. As Table 2 on page seven shows, Milwaukee Area Technical College, the state's most populous district, spent the most at \$286 million. Madison, Fox Valley, and Northeast were the other three districts spending more than \$100 million each. These three, along with Mil-

**Figure 2:
Wisconsin Technical College Revenue Sources
2005-06, Total = \$1.38 billion**



**Table 2:
WTCS Spending
2005-06, \$ Millions**

District	Exp.
Blackhawk	\$37.61
Chippewa Valley	\$68.09
Fox Valley	\$132.50
Gateway	\$92.96
Lakeshore	\$39.09
Madison	\$169.77
Mid-State	\$35.21
Milwaukee	\$285.72
Moraine Park	\$67.08
Nicolet	\$26.59
Northcentral	\$61.77
Northeast	\$105.72
Southwest	\$29.23
Waukesha	\$96.36
Western	\$72.25
Wisc. Indianhead	\$60.39
Total	\$1,380.33

waukee, are the state's largest both in terms of headcounts and FTE's.

By Expenditure Category. More important for the analysis here is an understanding of the kinds of expenditures made by the technical colleges. The expenditure data used for this study are 2005-06 figures reported by each of the colleges to the WTCS. Districts are required to report spending according to the WTCS Uniform Financial Fund Accounting System (UFFAS).

Table 3 at right provides a summary of 2005-06 district-wide spending

by UFFAS category. Compensation, which includes both salaries and fringe benefits, accounted for almost 55% of total spending. The next largest expenditure, accounting for 16.3% of the total, was for capital (such as buildings and land) and debt service.

All other spending categories were each less than 8% of the total. Federal and state grants, loans, and scholarships were 7.8% of all spending. Resale, which was 4.6% of the total, includes purchases of items resold to students, staff, and visitors in the colleges' gift shops, cafeterias, or at other locations.

**Table 3:
WTCS Spending by Expenditure Category
2005-06**

Expenditure Category	Amount	% of Total
Compensation	\$758,207,056	54.9%
Capital Exp. and Debt Service	\$225,056,590	16.3%
Grants/Loans/Scholarships	\$108,281,093	7.8%
Resale	\$63,219,213	4.6%
Professional Contracts	\$54,586,363	4.0%
Supplies	\$36,739,050	2.7%
Utilities	\$20,694,450	1.5%
Insurance	\$14,700,017	1.1%
Travel	\$12,707,098	0.9%
Repairs	\$7,521,732	0.5%
Rentals	\$6,452,017	0.5%
Advertising/Publications	\$5,841,016	0.4%
Student Activities/Clubs	\$5,718,732	0.4%
Professional Development	\$4,879,290	0.4%
Printing/Copying	\$4,839,083	0.4%
Other	\$50,884,414	3.7%
Total	\$1,380,327,214	100.0%

Compensation, which includes both salaries and benefits, accounted for 54.9% of the technical colleges' 2005-06 spending.

The model used for analysis here measures the input-output relationship among industries.

The RIMS II input-output model provides multipliers to calculate total impacts on output, earnings, and jobs.

INSTITUTIONAL IMPACT

Although Wisconsin's technical colleges have many economic impacts, the most direct effect is due to district spending. This section analyzes that spending and provides estimates of the total impact on the state's economy.

Method of Analysis

Technical college spending provides a source of income for approximately 10,000 full-time equivalent employees. It also contributes to the demand for certain goods and services through purchases of equipment, supplies, and other items necessary to run an educational institution.

Some of this spending goes to out-of-state vendors and, as a result, does not impact the state's economy. Most remains in-state and acts as an economic stimulus. This in-state spending is a measure of the direct economic effect of the colleges.

However, these direct expenditures have additional economic benefits. As college employees spend their wages and salaries, they help provide jobs and income for other state residents who work in various industries throughout the state. Similarly, the direct purchases of goods and services by technical colleges also help provide income and jobs in relevant industries. These effects continue to work through the economy in successively smaller amounts, thus multiplying the direct impacts of the technical colleges.

Input-Output Modeling. The most common way to measure these indirect effects is through input-output modeling. This approach measures input and output relationships among industries. The benefit of using an input-output model is its ability to measure all direct and indirect economic effects that result from technical college spending.

Input-output modeling requires breaking down an institution's spending into the various industries from which it makes purchases. Industry-by-industry spending is fed

into the model to create estimates of total direct and indirect economic impacts. The more detailed the industry breakdown, the more accurate the resulting estimates.

Multipliers. For each industry, the model generates three multipliers. The magnitude of the multiplier depends on factors such as the size of the area studied and the relationships between that industry and other industries in the study area.

An output multiplier tells us the total economic impact (statewide in this study) resulting from a one dollar increase in demand for a particular industry's goods or services. The earnings multiplier is an estimate of the increase in earnings due to a one dollar increase in industry demand. Finally, an employment multiplier reflects the number of jobs created in the study area for each \$1 million of new demand in the industry.

RIMS II. Several input-output models are available to researchers. Each model is constructed differently, resulting in slightly different multipliers from model to model. For this project, the Regional Input-Output Modelling System II (RIMS II) is used. RIMS II was developed by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA), and is respected as an industry standard for estimating economic impacts.

The RIMS II model is based on BEA's national input-output table. In addition, data from the agency's regional economic accounts are used to reflect regional industrial structures and trading patterns. The model has several advantages. First, empirical tests have shown RIMS II produces multipliers not substantially different from those generated by regional models that use expensive survey data. Second, the level of industry detail provided helps prevent aggregation errors. Third, the RIMS II multipliers are based on a consistent set of data across regions, making comparisons across study areas valid. Finally, the model

is current, using the most recent local wage, salary, and income data.

Expenditures. To estimate the economic impact of technical college spending, each of the UFFAS expenditure categories was translated into the industries used by the RIMS II model. Unfortunately, many of the UFFAS categories are broad and do not convert easily to RIMS II industry groupings.

To assist in creating a crosswalk between UFFAS categories and RIMS II industries, technical college business offices were asked to provide detail on many of their expenditures. For example, the UFFAS spending category “travel” was further divided into airfare, hotels, mileage, meals, and registrations. These finer categories are more easily translated into RIMS II industries. Other UFFAS spending areas in which additional detail was provided were duplicating, utilities, and resale goods (items purchased by the colleges for resale on the campuses). With this additional level of detail, all in-state technical college spending was matched to RIMS II industries.

Expenditures Without Impact. Not all spending detailed on page seven has a measurable impact on Wisconsin’s economy. For example, grants, loans, and scholarships are recycled back to the college as tuition payments or other expenditures. To the extent that students spend this money outside the technical college system, a small economic impact can occur. However, that effect will be small, and the data to measure it are not available. Further, some of the colleges’ purchases are from other colleges or from other departments within the college. These purchases do not impact the economy.

Included in capital expenditures is the purchase of land. Most studies of this type exclude land purchases, as asset transfers do not contribute to final economic demand. Again, there may be a small impact to the extent that the

former land owners use the sale to generate income that is spent in Wisconsin. However, we do not have the data to measure this effect. Moreover, total land purchases in 2005-06 were small, totalling \$1.6 million, and are thus excluded from the analysis.

Finally, since this study measures the impact of the technical colleges on the state economy, out-of-state expenditures are excluded. Each of the colleges was helpful in estimating the percentage of their purchases from out-of-state vendors. Using these figures, we were able to estimate that 65.5% of WTCS non-compensation purchases were made in state, thus impacting the state’s economy.

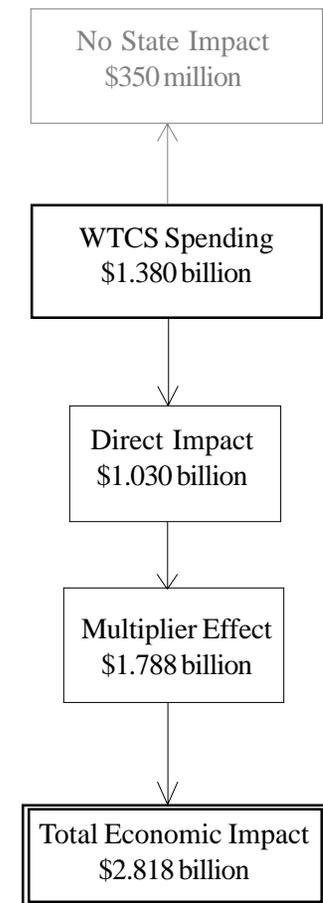
Economic Impacts

Total technical college in-state spending was used to estimate one part of the impact of the colleges on Wisconsin’s economy. In total, \$1.030 billion, or 75%, of the technical colleges’ expenditures directly impacted the state’s economy. As this spending cycled through the state economy, additional output, earnings, and employment are created. Based on the RIMS II multipliers, the following impacts were calculated.

Output. Of the \$1.380 billion of total spending, 75% (or \$1.030 billion) directly impacted the economy, while \$350 million was either spent outside the state or did not affect the state economy (see Figure 3 at right). As the in-state spending filtered through the economy, an additional \$1.788 billion of output was created, bringing the technical colleges’ total impact to more than \$2.8 billion.

Input-output models do not specify the time frame during which the economic activity is multiplied through the economy. However, it is generally assumed that these models are estimating short-term economic effects. Thus, to provide context, we report impacts as a percentage of 2005 statewide economic values.

**Figure 3:
WTCS’s 2005-06
Spending and Its Impact
on Wisconsin’s Economy**



At \$2.818 billion, the technical colleges' economic impact from spending was about 1.3% of total state output.

Wisconsin's estimated 2005 gross state product (total output) was \$216.3 billion. At \$2.818 billion, the technical colleges' economic impact from spending, both direct and indirect, was approximately 1.30% of this total.

Earnings. A second way to look at the colleges' impact is through their effect on statewide earnings. This effect is captured as part of the "output effect" previously discussed. However, the RIMS II model allows us to isolate the earnings impacts.

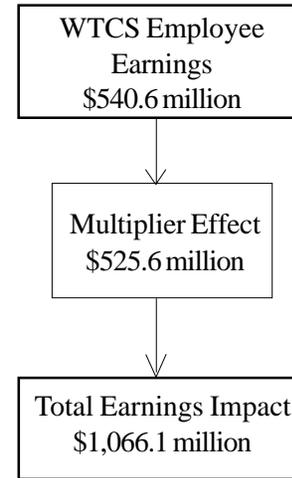
As previously mentioned, technical college spending affects in-state earnings in two ways. First, the colleges paid employees \$540.6 million in salaries and wages in 2005-06 (see Figure 4 at right). Second, as total technical college spending worked its way through the state economy, additional earnings were generated in affected industries. The RIMS II model estimates these indirect earnings effects.

Secondary effects generated additional earnings of \$525.6 million, bringing total earnings created by technical college spending to \$1.1 billion. That amount represented 1.0% of total 2005 state wage and salary disbursements.

Employment. The final economic impact that the RIMS II model allows us to measure is on employment. Technical colleges employed 9,998 FTE employees in 2005-06. College spending, along with that of their employees, was responsible for an additional 15,465 FTE jobs statewide. In total, technical college spending accounted for 25,461 jobs.

Providing context for this jobs figure is difficult because there are no estimates of the number of statewide FTE jobs. Rather, the Bureau of Labor Statistics (BLS) reports the total number of jobs, which includes both full-time and part-time. The 25,461 jobs figure represented 0.72% of the 2005 BLS figure.

**Figure 4:
WTCS's Estimated
Earnings Generation
2005-06**



Tax Revenue Generation

Not only do technical colleges contribute to the state economy, their spending generates tax revenues in several ways. College employees pay income taxes on their earnings, sales taxes on their spending, and property taxes on their homes. Additionally, earnings generated through "multiplier effects" provide further tax revenues in the same way.

Business taxes are also generated. Although technical colleges generally do not

pay these taxes, many of their suppliers do.

Although individuals and businesses pay property taxes, the economic activity created by the technical colleges does not necessarily generate additional property taxes. Each year, property taxes levied by schools, counties, and municipalities are set at levels needed by each unit of government. If, due to additional economic activity generated by technical colleges, there is more or higher-valued property, the local property tax rate will fall and revenues will be unchanged. Therefore, this report assumes there is no additional property tax generated from technical college operation.

To estimate state individual income, sales, and corporate income taxes generated, we examine relationships between collections and state output, earnings, and income. Using these relationships, we estimate state tax collections resulting from technical college spending.

Our estimates indicate that approximately \$88.4 million in-state individual income, sales, and corporate income taxes are a result of the economic activity generated by the technical colleges. That amount represented 56.9% of the \$155.3 million state investment in 2005-06.

Leveraging Tax Dollars

Combined state and local taxes flowing to the state's technical colleges totalled \$777.7 million in 2005-06. That money was leveraged with federal dollars, student tuition and fees, and other institutional money to generate more than \$2.8 billion of economic output, or a return of nearly four times.

STUDENT ECONOMIC IMPACTS

In addition to institutional impacts, technical colleges generate economic effects through the students they educate. On average, a recipient of an associate degree will have greater lifetime earnings than a high school graduate. The same can generally be said of an individual with a one- or two-year technical diploma. This section provides estimates of those impacts.

Table 4:
Profile of Technical College Graduates
2005-06

	Grad's	Avg. Age	Sem's to Grad.	Med. Salary
Applied Associate Deg.	8,452	29.2	5.6	\$32,004
Collegiate Transfer	318	26.7	5.7	na
Apprenticeship	869	29.1	6.3	na
Two-Year Tech. Dipl.	365	23.4	4.4	\$28,494
One-Year Tech. Dipl.	4,080	27.8	3.3	\$25,644
Short Term Tech. Dipl.	8,708	27.1	1.4	\$22,672
Total	22,792	28.0	3.6	

Graduates and Programs

Wisconsin technical colleges produce students with a variety of diplomas or degrees. Most graduates obtain either a short-term technical diploma or an applied associate degree (see Table 4 below). One-year technical diplomas are also popular. The collegiate transfer program, available on only three campuses, is the smallest of these degree programs. A total of 22,792 students graduated from all educational programs in 2005-06.

WTCS surveys its recent graduates to gather information on employment and earnings. The median (half lower, half higher) salary for 2005 graduates of the various degree programs is also listed in the table. Graduates with an applied associate degree earned the most (\$32,004), followed by those with a two-year technical diploma (\$28,494).

Economic Impacts

We measure the economic impact of the education provided by the technical colleges differently from most studies. Others generally report lifetime earnings gains from education by estimating the additional income a student with a specific degree would earn compared to a similar individual with only a high school education.

Instead, this study focuses on how that additional income translates into economic activity. To do that, estimates of individual earnings by education level and age are needed.

Earnings Estimates. U.S. Census figures on earnings by age and education level are used. When available, we use state-level data. Otherwise, national figures are adjusted to match Wisconsin wage characteristics.

Wisconsin's wage structure differs from the nation's in an important way. The average wage for a high school graduate here is 4% to 6% higher than the national average. However, average earnings for individuals with a

Wisconsin's wage structure differs from the nation's in that high school graduates tend to have above-average earnings; college graduates tend to earn less than other similarly educated workers nationwide.

Table 5:
Estimated Annual Earnings by Age and Education
2005

Age	H.S. Dipl.	Assoc. Deg.
25-29	\$26,611	\$31,953
30-34	\$30,934	\$36,800
35-39	\$32,618	\$39,423
40-44	\$35,011	\$41,779
45-49	\$35,497	\$43,398
50-54	\$36,045	\$40,924
55-59	\$34,387	\$41,473
60-64	\$33,466	\$42,095

The average annual gain for an associate degree generally rises with age, reaching more than \$8,000 for workers 60 to 64.

bachelors degree are below national norms. For those individuals with “some college” but not a bachelors degree, average pay is near the national norm according to Census data. Other data sources report pay for Wisconsinites with associate degrees above the national norm. One recent study cited the median (half higher, half lower) Wisconsin pay for a worker with an associate degree as more than one dollar per hour above the national median.

Estimated 2005 average annual earnings by age and education are shown in table 5 on page 11. The average gain for an associate degree generally rises with age, starting at \$5,342 for individuals 25 to 29 and climbing to more than \$8,000 for workers age 60 to 64.

The estimates for the associate degree appear consistent with WTCS’s follow-up report. For 2005 graduates, the median annual wage for someone with an associate degree graduate was \$32,004; the Census figures for someone 25 to 29 was \$31,953.

Estimating gains for other graduates was more difficult because Census data are not available for the technical diplomas. The Census reports figures for individuals with “some college,” which would include all individuals attending a college or university yet not receiving a degree. It would also include graduates with a technical diploma.

The estimated annual wage for a Wisconsin resident aged 25 to 29 with “some college” was \$29,774 in 2005. This is slightly above the median earnings of a technical college graduate with a two-year technical diploma (\$28,494). However, it is significantly higher than graduates with one-year (\$25,644) or short-term (\$22,672) diplomas.

Census estimates for “some college” along with WTCS’s follow-up survey are used to estimate earnings gains for individuals with two-year technical diplomas. For

the shorter term diplomas, some assumptions are necessary. First, we assume that graduates with one-year and short-term diplomas earn more than they would if they did not earn the diploma. Second, we assume that lifetime returns are positive, but less than those for the two-year diploma.

Estimated Impacts. To be consistent with previously reported institutional estimates, the one-year impact of technical college graduates on the state economy is estimated. We begin with annual figures on the number of graduates by program area. We then estimate the graduates’ ages in 2006 based on year of graduation. Finally, depending on the individual’s age and degree, we estimate the additional earnings gained in 2006 from that education.

Because not all graduates remain in the labor force, and not all stay in the state, we make assumptions about these percentages. Based on WTCS’s graduate follow-up reports, we assume 95% of graduates are employed and 90% remain in state. These estimates will have some error to the extent that workers change employment status or leave the state in years after the follow-up survey.

Given our assumptions, technical college education generated an additional \$1.732 billion in 2006 Wisconsin earnings for graduates. After adjusting for taxes paid (federal, state, and local), for saving, and for out-of-state spending, a total of \$1.380 billion in additional earnings was spent in Wisconsin, contributing to the state’s economy.

The additional household spending from those earnings translated into \$4.090 billion in total state output, \$2.398 billion in earnings statewide, and 24,151 jobs.

Tax Revenues Generated. As with the technical college spending impacts, these “earnings impacts” create additional state tax revenues. Again, we estimate only the additional state income and sales taxes. The additional

Technical college education generated an additional \$1.732 billion in 2006 Wisconsin earnings for graduates.

earnings may also generate other state revenues, but we do not have the data to estimate them, and they likely would be small relative to state income and sales taxes.

Based on the total output and earnings reported above, an estimated \$192.1 million in state taxes can be attributed to the educational gains from technical college education. This amount is more than double the estimated taxes generated from technical college spending.

Return on Investment

Typically, the return on investment for a graduate is calculated as the additional lifetime earnings gains relative to the individual's educational investment. These gains would then be summed across all graduates from a particular year to estimate the total returns.

In this study, we estimated the earnings gains in one year for many cohorts of graduates. Nearly all of the earnings gains are from past investments, not from those in 2005-06. Thus, we cannot calculate a return on investment consistent with the one previously reported for technical college spending.

However, an alternative calculation can be made; the additional earnings for 2005-06 graduates relative to the state-local investment in those students. This return cannot be compared with our previous calculation. That estimate was total output generated relative to state-local spent. This calculation is the current value of future earnings relative to state-local investment.

We estimate that \$360.6 million of state-local taxes were invested in the 2005-06 graduates during their course of study. That money was leveraged with student tuition and fees, federal dollars, and other revenues. Over their lifetimes, these graduates are estimated to earn (in 2006 dollars) an additional \$2.11 billion over what they would have earned as high school graduates. These additional earn-

ings represent a return on state and local tax investment of nearly six.

These additional earnings will also be translated into higher levels of output in future years. Our model is not designed to estimate these output increases.

Additionally, these higher earnings will translate into more state income and sales taxes. However, because we don't know about future income or sales tax rates, we cannot estimate this impact.

TOTAL IMPACTS

When the economic impact of 2005-06 technical college spending is combined with the effects of the earnings gains from current and past graduates, the annual total impact from the colleges was \$6.91 billion. That figure represented 3.2% of the 2005 state total.

In terms of jobs, 49,612 could be attributed to the technical colleges, or 1.4% of the total statewide. Finally, approximately \$3.46 billion of annual earnings was attributable to the colleges. That figure was 3.4% of all Wisconsin earnings.

The economic activity generated from these earnings gains and from the economic impact from the colleges' spending generated a total of \$280.5 million in state income and sales tax revenues. As previously mentioned, these are lower bounds as the earnings gains from non-graduates, non-programs students, and basic education students are not included. □

When the economic impact of technical college spending is combined with the effects of the earnings gains from graduates, a total of \$6.91 billion of 2005-06 state output could be attributed to the colleges.