



OKLAHOMA PUBLIC HIGHER EDUCATION: ECONOMIC AND SOCIAL IMPACTS



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CONTENTS:

EXECUTIVE SUMMARY	ES-1
I. INTRODUCTION	1
II. PUBLIC HIGHER EDUCATION IN OKLAHOMA	7
IV. INTRODUCTION TO THE FUNCTIONAL IMPACTS OF HIGHER EDUCATION	29
V. EDUCATION: THE FUNCTIONAL IMPACTS OF EDUCATION PROVIDED BY OKLAHOMA STATE SYSTEM OF HIGHER EDUCATION	33
VI. RESEARCH: THE FUNCTIONAL IMPACTS OF RESEARCH PROVIDED BY THE OKLAHOMA STATE SYSTEM OF HIGHER EDUCATION	43
VII. OUTREACH: THE FUNCTIONAL IMPACTS OF OUTREACH, EXTENSION, AND OTHER ASSOCIATED ACTIVITIES UNDERTAKEN BY THE OKLAHOMA STATE SYSTEM OF HIGHER EDUCATION.....	53
Appendix A: The Community College System in Oklahoma	65
Appendix B: Public Undergraduate Education in Oklahoma	67
Appendix C: Public Higher Education and the Mandates of the Global Economy.....	69
Appendix D: Individual College and University Impacts	73

EXECUTIVE SUMMARY

A. Introduction

Higher education in the U.S. comprises a varied system of providers (public and private) delivering a continuum of education from basic certificate courses, through two-year degrees, baccalaureate degrees, master's degrees, professional degrees, doctoral degrees and continuing education. It is also a system that produces new knowledge, via research, and diffuses this knowledge through publications, education and, in some instances, formal extension activities. These services of higher education represent particularly valuable assets within an economy and society increasingly characterized by technological advancement, a need for innovation, demand for increasing skills levels, and the need for lifelong learning.

At the current time, and into the foreseeable future, it is hard to overstate the importance of education, and especially higher education, to economic and social progress in the U.S. In a modern, knowledge-driven economy the most valuable asset a state can possess is a well-educated and skilled populace. Higher education and skills training drives productivity and efficiency—it also has a positive return on investment for individuals and society, thereby adding additional economic benefits.

Multiple recent reports and analyses ascribe three primary groups of private and social returns to investment in higher education.¹ These include:

- **Economic Benefits** – Enhanced economic output, government revenues, wealth generation and personal wages and earnings;
- **Personal/Family Benefits** – Enhanced non-market private satisfactions correlated with higher education attainment (such as better health, longevity, happiness); and
- **Societal Benefits** – Enhanced non-market social benefits, such as volunteerism, commitment to democratic processes, human rights etc. together with reduced social costs associated with lower rates of welfare, criminality, and anti-social behavior.

B. Public Higher Education in the U.S. and Oklahoma

In the United States public higher education institutions are of special importance in realizing higher education benefits for the nation, enrolling 77.6 percent of all students². In Oklahoma, the Oklahoma State System of Higher comprises 25 institutions, with the system coordinated by the Oklahoma State Regents for Higher Education (OSRHE).

The OSRHE system enjoys substantial enrollment, with over 190,000 students enrolled in the 2009–2010 academic year, a slight increase over previous years. State System institutions conferred over 30,000 degrees during that year, including approximately:

- 1,900 Certificates;
- 8,400 Associates;
- 15,500 Bachelor's, and

¹ See for example, discussions in Walter W. McMahon (2009). "Higher Learning, Greater Good: The Private and Social Benefits of Higher Education." The Johns Hopkins University Press.

² Ibid

- 4,800 graduate degrees.³

Importantly, the majority of Certificate, Associate and Bachelor's degree holders, who earn their credentials from State System institutions, remain in Oklahoma, engaged in the Oklahoma economy and its communities. Nearly 90 percent of Oklahoma public higher education graduates remain in the state to live and work one year after graduation, and over 70 percent still remain in the state five years after graduation.⁴

Public education in Oklahoma is making higher education available to a large and diverse student population, and as Battelle's analysis shows it is a system that pays-off by for the state by providing an educated populace and workforce that supports business growth, civic engagement and social progress. It is also, a system that performs basic and applied R&D to benefit the state and its industries, and a system with dedicated outreach and extension operations designed to diffuse innovations in knowledge and technology into application across the state.

C. The Battelle Analysis Commissioned by the State Chamber of Oklahoma

Recognizing both the extreme importance and relevance of public higher education to Oklahoma's prospects for continued success in the global economy, and some of the challenges facing education within the U.S. and its states, the State Chamber of Oklahoma approached the Battelle Memorial Institute's economic development analysis group (the Battelle Technology Partnership Practice) to commission a study of the current economic and functional impacts of public higher education in Oklahoma.

The Battelle analysis addresses two principal types of impacts: 1) backward linkage impacts, which are the result of institutional expenditures and the multiplier effect of these expenditures within the Oklahoma economy, and 2) forward linkage impacts, which are the functional, mission-based impacts generated by State System institutions' education, research and outreach activities. Battelle's findings show that the Oklahoma State System of Higher Education has large scale impacts on Oklahoma from both a forward and backward linkage perspective.

Note: From a comparative perspective, it is important to understand that the analysis presented within this report is fundamentally different from a 2008 analysis developed by REMI for the Oklahoma State System of Higher Education entitled, *The Economic Impact of the Higher Education System of the State of Oklahoma*. The Battelle analysis assesses both the backward and forward linkages of the current (FY 2011) operations of public higher education in Oklahoma, whereas the REMI study was explicitly designed to measure and then forecast potential economic activity associated with public higher education in the state of Oklahoma.

³ Ibid.

⁴ Oklahoma State Regents for Higher Education, Employment Outcomes Report, 2008.

D. Economic Impacts of Oklahoma Public Higher Education Institutional Expenditures

The Oklahoma State System for Higher Education generated operational expenditures of \$5.50 billion in FY 2011, with \$1.95 billion of this coming from state funding. With a total state economic (output) impact of \$9.22 billion, the estimated return on investment is \$4.72 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated throughout the state's economy through the operational expenditures of the faculty, staff and students of the State of Oklahoma's public higher education system. Table ES-1 details the FY 2011 expenditures used to calculate the State Systems' statewide economic impacts.

Table ES-1. State System Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$1,858.4
Research Expenditures	\$589.3
Intercollegiate Athletics	\$145.6
Other Auxiliary Enterprises and Related Expenditures	\$1,262.5
Building New Construction and Repair	\$197.1
Capital Equipment	\$13.9
Estimated Additional Student Spending	\$1,435.0
Total Expenditures	\$5,501.9

Sources: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

Using regional input/output modeling, Battelle calculates the **FY 2011 economic impact of Oklahoma's public higher education system expenditures on the State's economy to be more than \$9.2 billion** (Table ES-2). This overall impact is comprised of \$5.4 billion in direct expenditures on higher education operations and an additional \$3.8 billion in indirect and induced spending in the economy. This leads to an output multiplier of 1.71—meaning for every \$1 of direct higher education expenditures an additional \$0.71 is generated in the state. From an employment perspective the estimated 52,156 direct jobs (including direct FY 2011 construction jobs) supported an additional 33,192 jobs in the Oklahoma economy, for a **total employment impact of more than 85,000 Oklahoma jobs**.

Table ES-2. Oklahoma Public Higher Education Economic Impacts – Statewide Totals (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	52,156	\$2,030.8	\$2,669.9	\$5,386.0	\$186.3	\$370.4
Indirect Effect	14,633	\$555.0	\$1,066.3	\$1,842.4	\$85.2	\$131.9
Induced Effect	18,559	\$643.0	\$1,192.9	\$1,987.9	\$117.1	\$153.2
Total Effect	85,348	\$3,228.9	\$4,929.2	\$9,216.2	\$388.6	\$655.5
Impact Multiplier	1.6	1.6	1.8	1.7		

Sources: Core university data from OSRHE; Additional Battelle calculations and analysis; IMPLAN 2010 Oklahoma state model.

The direct higher education employment base receives more than \$2.0 billion in labor income (including salaries, wages, and fringe benefits). The ripple effect of higher education expenditures generates an additional \$1.2 billion in labor income to other state residents, for a total of more than \$3.2 billion throughout the state's economy.

As public sector entities, these academic institutions do not generate the same tax revenues as private industry with a similar level of output. However, the revenues generated through personal income taxes of university and associated employees still generate a significant tax base for the state amounting to more than \$186 million in FY 2011. As these individuals spend their incomes within the state and as suppliers make in-state purchases, an additional \$202 million in taxes (primarily through sales taxes) are generated within Oklahoma. Similar federal tax revenue is generated in the state, reaching more than \$655 million, in total, in FY 2011.

Beyond the estimation of these Oklahoma state-level economic impacts, the Battelle team was also charged with developing impact estimates for each of six geographic regions in the state. These regions include: the Oklahoma City MSA, the Tulsa MSA, the Northeast Region, the Southeast Region, the Southwest Region, and the Northwest Region, with findings for these analyses shown in the full project report.

E. Introduction to the Functional Impacts of Oklahoma's Public Higher Education System

While the Oklahoma public higher education system and its individual institutions demonstrate a substantial economic and employment impact through expenditures, public higher education institutions do not exist in Oklahoma to simply spend money and thereby create economic stimulus – rather **they are funded as institutions dedicated to generating specific functional impacts of central importance to society, the economy and individual Oklahomans.**

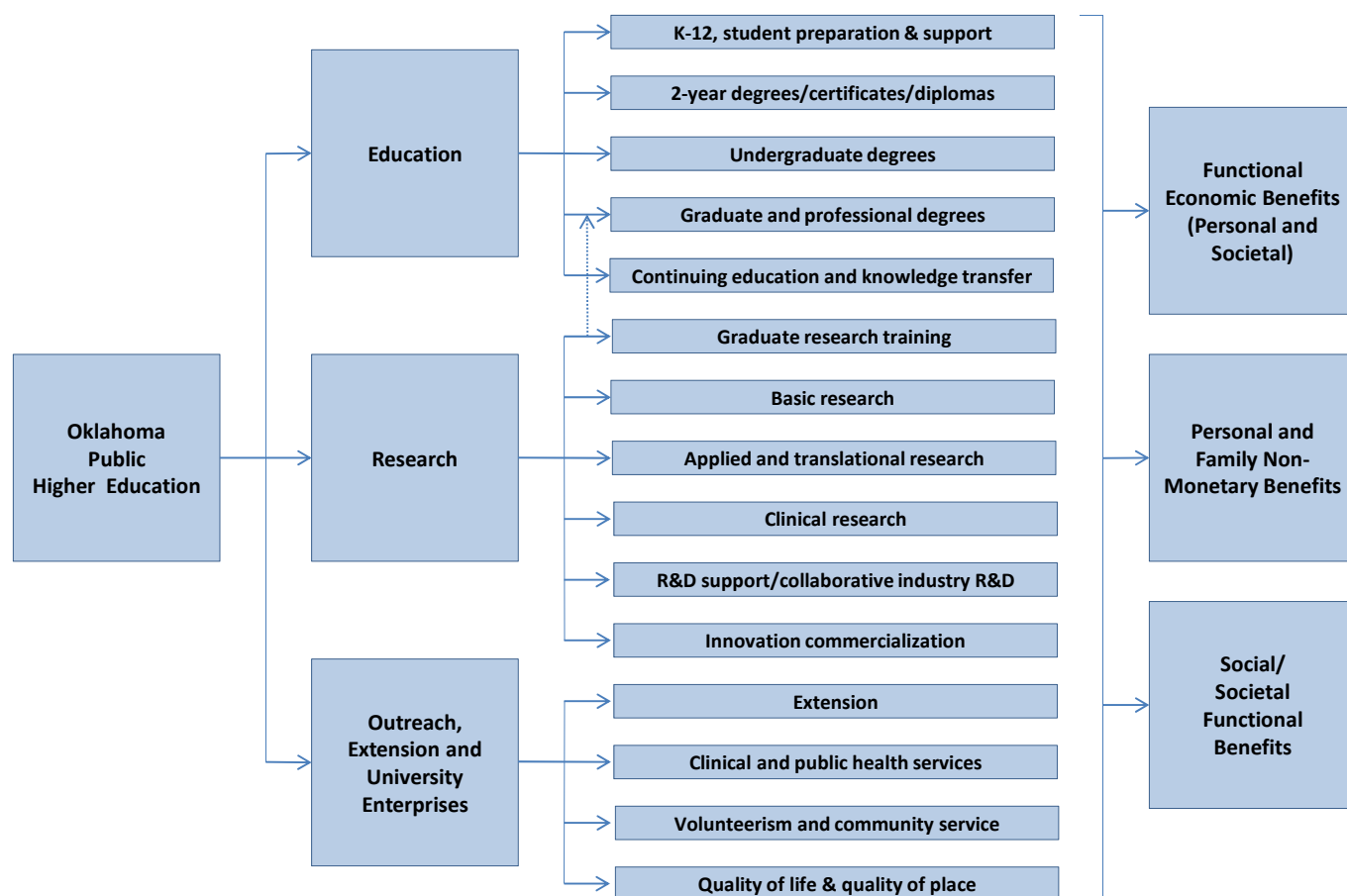
The functional impacts of the Oklahoma public higher education system, also known to economists as “forward linkage impacts”, are the impacts produced as Oklahoma's public higher education institutions accomplish their mission, institutional goals and objectives. **These are the positive impacts generated through the system's mission-based activities in education, basic and applied research, and community outreach and extension activities.**

The broad functional areas of Oklahoma's public higher education system include:

- **Education** across a range of certificate, diploma and degree programs, ranging from community college to doctoral and professional degree studies;
- **Research**, including basic and applied/translational research, across a broad range of disciplines in the humanities, social sciences, physical sciences, mathematics, engineering, and professions;
- **Outreach** activities in public and community service; healthcare, agricultural extension and innovation commercialization/knowledge transfer.

Key categories of functional impacts and their general benefit are summarized in Figure ES-1.

Figure ES-1: Public Higher Education in Oklahoma – Principal Functional Impacts and Benefits



As Figure ES-1 shows, the three core mission categories of education, research and outreach, have associated with them a spectrum of activities that lead to: **economic impacts** realized at the personal, family and societal level; **personal and family non-monetary benefits**, and **social/societal functional benefits** (both nonmonetary, such as civic engagement, and monetary such as negative government costs offset through lower use of welfare and other government programs associated with education attainment). The three core mission activities are introduced below, while the full Battelle report provides detailed discussion and analysis of these impacts in dedicated chapters:

Education. Oklahoma’s higher education institutions are engaged in the full spectrum of education within Oklahoma. At the K-12 level, these institutions are engaged in supporting curriculum development, teacher education and training, development of new approaches to K-12 pedagogy, and youth development through special programs such as Extension’s 4-H program. Community colleges are key providers of education tailored to the local educational needs of citizens and regional employers, and provide workforce education, certificate and diploma level education, two-year/associates degrees, and education that readily articulates into four-year degrees at other Oklahoma regional and research universities. Community colleges also provide specialized non-credit courses and continuing education opportunities to meet the unique needs of their communities and area residents. Oklahoma’s public universities provide a range of undergraduate, graduate and professional degree courses, and are

engaged in ongoing professional and continuing education and knowledge transfer activities. Topline findings from some of Battelle’s review of education functional impacts include:

<p>Personal Income Gains for Oklahomans</p> <p>Oklahomans’ realize substantial income increases associated with gaining successively higher levels of high education beyond high school. Average annual income gains in Oklahoma for each increased level of education are:</p> <p>High School → Associate Degree/Some College (+17.4%) → Bachelor’s Degree (+32.5%) → Graduate or Professional Degree (+21/1%).</p>	<p>Lifetime Earnings Benefit</p> <p>Over their full working life, those with a Bachelor’s degree will earn, on average, 1.66 times the earnings of a person ending their education at the high school graduate level. For Master’s degrees the benefit is 1.97x, for a Doctoral degree 2.58x and for a Professional degree 2.74x. For an Associate Degree the benefit is 1.24x. Also, in recent years, these earnings differentials have been widening.</p>
<p>Enhanced Financial Security</p> <p>Only 30% of those ending their education with a High School Diploma have employer provided pension plans, versus 65% of employees who have an Associate Degree and 70% for those with a Bachelor’s Degree or higher.</p>	<p>The State Realizes Revenue Gains</p> <p>Because earnings and higher education levels are closely related, federal and state income tax payments for those gaining higher education are higher. On average, those with a Bachelor’s degree pay twice the taxes of those with only a High School Diploma.</p>
<p>Productivity Gains in the Economy</p> <p>The economy benefits from an educated populace through the higher levels of workforce productivity allocable to the knowledge and skills graduates bring to the workforce.</p> <p>For the 2009/10 academic year in Oklahoma, Battelle estimates that graduates of OSRHE higher education institutions in that year provided a net present value to the economy of \$611 million.</p>	<p>Productivity Gains in the Economy</p> <p>A 2008 study by REMI estimated that state funding for higher education resulted in \$6.76 billion in economic activity within Oklahoma. Overall, REMI concluded that 68.4% in of these economic gains in gross state product, associated with higher education, <u>were allocable to the increased productivity of college graduates.</u></p>
<p>Other Key Functional Benefits of Higher Education Include:</p> <ul style="list-style-type: none"> • Increased job satisfaction • Higher objective measures of graduate “happiness” • Better personal and family health • Reduced poverty levels • Reduced used of state welfare programs and Medicaid • Lower levels of criminality, anti-social behavior and associated costs • Higher levels of civic engagement, voting and volunteerism. 	

Research. The vast majority of academic research in Oklahoma is performed by public universities, and academic research expenditures across State System institutions totaled over \$384 million in 2009-10. While multiple public universities engage in research activity, the overwhelming majority of academic research in the state is undertaken by the two public research universities in the state – Oklahoma State

University and the University of Oklahoma (which together account for more than 95 percent of OSRHE institution research expenditures). Research occurs across an extremely broad spectrum of inquiry – from basic inquiries through to highly applied work focused on specific needs concerning society, industry, and the environment. The output of research comprises expansion of humankind's base of knowledge (with diffusion of knowledge occurring largely through the academic publishing process and knowledge-transfer events such as research symposia), and the transfer of research innovations into use across society and industry. Covering a broad range of disciplines, research in Oklahoma universities leads to a range of innovations (in technologies, practice recommendations, processes and other arenas) that have application to economic and community development across the state. From direct start-up of new business enterprise based on university innovations, to the transfer of innovations and know-how to existing Oklahoma industry, Oklahoma's research universities are key contributors to modern economic development in the state. Funding for research comes from multiple sources, primarily including federal grants, sponsored industry research, private foundations and state funding. Topline findings from some of Battelle's review of academic research functional impacts include:

Expanding Research Volume	Stand-out Research Fields
<p>Public university research in Oklahoma grew by \$75 million from 2006-2010, a gain of 26%. In 2010, State System institutions (primarily the University of Oklahoma and Oklahoma State University) conducted \$360 million research.</p> <p>The rate of growth of research in Oklahoma outpaced the national rate of 22.1% in the 2006-2010 time period.</p> <p>Recently, for every \$1 in state funding, public universities in Oklahoma attracted an additional \$2.24 in federal funding.</p>	<p>Battelle's analysis of publications, citations and funding data show Oklahoma's public research universities as having particularly notable performance in:</p> <ul style="list-style-type: none"> • Agricultural and environmental sciences • Energy related research disciplines • Manufacturing related research disciplines • Clinical medicine • Broader physical and biological sciences. <p>Engineering, math and computer sciences (so important to economic development) saw growth outpacing national funding growth in 2006-10.</p>
<p>Some Additional Research Facts of Note for Oklahoma:</p> <ul style="list-style-type: none"> • Life sciences is the largest field of research, with \$188 million in research funding • There is a particularly strong publications and citations record for: particle and multidisciplinary physics; nuclear sciences; ocean engineering; internal medicine; dairy and animal sciences; manufacturing engineering, petroleum engineering; rheumatology; ecology; biodiversity; conservation; entomology, and applied psychology. • Chemical Engineering has seen particularly notable growth, rising from \$6.6 million in 2006 to \$23.3 million in 2010 (an increase of 252%) • Industry sponsored research has increased rapidly in Oklahoma compared to the overall research base and the nation. Industry sponsored research in Oklahoma rose 49.8% between 2006-2010 (far outpacing the national growth rate of 25.8%) • From 2005-2010, Oklahoma public research universities annually filed an average of 98 patents, received 23 patent awards, executed 12 new licenses, and created four new start-up businesses. 	

Outreach. A third major category of functional impacts derives from the purposeful activities of State System institutions and their associated faculty, staff and student populations to provide benefits for

Oklahoma via pathways other than direct degree education or formal research. For example, as a Land-grant university, Oklahoma State University operates a specific institutional organization dedicated to carrying university capacity and capabilities to serve communities, families, individuals, government and industry across the state – “Extension”. Particularly active in service to the agricultural sector and communities of all sizes, extension is a purpose designed outreach entity designed to extend university benefits to as broad a range of populations as possible. At the University of Oklahoma, the Health Sciences Center provides “outreach” of a different sort, providing Oklahomans with access to state-of-the-art clinical medicine, advanced specialty care, diagnostics and preventive medicine—and contributes to advancing the state of public health across Oklahoma. Extension services and academic medicine represent highly prominent examples of university outreach, but there are a diversity of additional outreach activities and associated benefits including volunteerism and community service offered by university populations, and the strong contributions of higher education institutions to “quality of life” and “quality of place” in Oklahoma through provision of community access to university and college resources, the provision of arts, entertainment and sporting events, and social diversity promoted by higher education institutions.

Conclusion

It is clear that public education brings highly substantial benefits for Oklahoma—benefits that are realized individually by Oklahomans, and collectively across the economy and society. For the individual, achieving higher education in Oklahoma brings financial benefits in terms of significantly enhanced income and employment benefit levels, but it also comes with additional personal benefits such as enhanced job satisfaction, happiness, health and longevity. Government, industry and society benefit directly from those achieving higher education through enhanced economic productivity, economic growth and government revenues, and through reductions in social programs costs and negative externalities. Furthermore, society benefits in general by having a more highly educated populace in terms of civic engagement, volunteerism, child welfare and a broad variety of other factors.

Economic performance and prospects are very much linked to research performance in the modern innovation-based economy, and State System institutions are at the forefront within Oklahoma in the performance of research. The research base in Oklahoma has been growing at a pace faster than that for the nation as a whole, contains a number of stand-out performers in science and engineering disciplines, and is doing well in both leveraging federal funds and in attracting industry sponsored research.

I. INTRODUCTION

A. Education as a Key Component of the American Experience

From colonial times to today, education has been a cornerstone of the success of Americans. Writing prior to the War of Independence, John Adams commented on the prevalence of an educated populace, noting (perhaps optimistically) that “a native of America who cannot read or write is as rare an appearance...as a comet or an earthquake”. Literacy, foundational educational skills and, for some, the opportunity to pursue higher education featured prominently in the early American experience—indeed, of the “55 delegates to the Continental Convention,” held in 1774, “30 were college graduates, an astounding number for the time.”⁵

As the United States expanded, so did its commitment to education. Access to public education began shortly after the Revolution, and the later emergence of the Industrial Revolution provided further impetus for development of a population with the education and skills required to participate in an increasingly more complex economy. In 1862, recognizing the importance of education to industrial and economic development, the Morrill Act paved the way for the formation of land-grant colleges in every U.S. state—institutions that tacitly acknowledged not only the importance of classical and liberal arts studies, but also emphasized the teaching of pragmatic agriculture, science and engineering disciplines. Subsequent expansions to the land-grant system, together with ongoing investment in public and private colleges and universities, have gone hand-in-hand with the growth of the U.S. geographically, demographically and economically.

Today, the population of the United States is served by a large and sophisticated system of educational institutions. The 2010 U.S. Census showed that the 309 million person population of the United States was served at the K-12 level by 98,817 public schools and 33,366 private schools. Postsecondary higher education was provided by 6,742 Title IV institutions, and qualified students could choose from 1,721 two-year colleges and 2,774 four-year colleges.⁶ Within this higher education spectrum, public higher education institutions are particularly important given the volume of students they serve, with public universities and colleges in the United States enrolling 77.6 percent of all students, and private nonprofit and private for-profit institutions enrolling the remainder.⁷

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Within higher education today, there exists a diverse mix of provider institutions—community colleges, regional universities, liberal arts colleges, research universities, etc. At the local level, community colleges are fundamental contributors. As Walter W. McMahon notes: “These colleges are very effective in relating higher education to local labor markets and to economic development in their local communities, and because 55 percent of the students in many of these colleges are engaged in lifelong learning, as over-age students who have come back to upgrade their skills.”⁸ Four-year degree

⁵ Martin Cochran. “The Classical Education of the Founding Fathers.” www.memorialpress.com/articles/founding-fathers.html

⁶ National Center for Education Statistics, Institute of Education Sciences. “Fast Facts: Educational Institutions.” Accessed online at <http://nces.ed.gov/fastfacts/display.asp?id=84>

⁷ Walter W. McMahon (2009). “Higher Learning, Greater Good: The Private and Social Benefits of Higher Education.” Page 11. The Johns Hopkins University Press.

⁸ Ibid

institutions, be they liberal arts colleges, regional universities, or national research universities, provide the preponderance of higher level baccalaureate level training and also the graduate level training increasingly in demand to fuel the U.S. economy. As McMahon notes: “The system works together to act as a major nationwide engine for creating new knowledge, transmitting new and existing knowledge, and encouraging knowledge-based growth”.⁹

Higher education in the U.S. cannot, therefore, be viewed as a monolithic whole, but rather comprises a varied system of providers delivering a continuum of education from basic certificate courses, through to two-year degrees, baccalaureate degrees, master’s degrees, professional degrees, doctoral degrees and continuing education. It is also a system that produces new knowledge, via research, and diffuses this knowledge through publications, education and, in some instances, formal extension activities. This continuum represents a particularly valuable asset within an economy and society increasingly characterized by technological advancement, a need for ever increasing skills and retraining in new knowledge and skills, and the pursuit of lifelong learning.

B. The Importance of Higher Education in the 21st Century: Economic and Social Benefits

At the current time, and into the foreseeable future, it is hard to overstate the importance of education, and especially higher education, to economic and social progress in the U.S. In a modern, knowledge-driven economy the most valuable asset a state can possess is a well-educated and skilled populace and workforce. Education and skills training drives productivity and efficiency—it also has a positive return on investment for individuals and society, thereby adding additional economic benefits.¹⁰

The importance of a well-educated, skilled, and creative workforce is crucial to ongoing American progress and economic productivity. Economists note that “the most important elements in the quest for a competitive advantage in commerce, be it at the micro, or firm, level or at the macro, or national, level, are the skills and initiative of its workforce.”¹¹ In a global economic climate, where natural resources, machines, and technology are made highly mobile, and thus relatively less important, the importance of education has significantly expanded. As Lester Thurow notes, “People will move, but more slowly. Skilled people become the only sustainable source of competitive advantage.”¹²

“An educated populace is a key source of economic growth both directly, through improved labor productivity, and indirectly, by spurring innovation and speeding the diffusion of advanced technologies”.

Claudia Goldin and Lawrence Katz
The Milken Institute Review

Multiple recent reports and analyses ascribe three primary groups of private and social returns to investment in higher education.¹³ These may be summarized as:

1. **Economic Benefits** – Enhanced economic output, government revenues, wealth generation and personal wages and earnings;

⁹ Ibid (Page 35).

¹⁰ Simon Tripp. (2006). “Projections of Economic Impact: The Role and Impacts of a Signature Research University in Southeast Minnesota.” Impact Economics LP, sponsored by the Rochester Higher Education Development Committee.

¹¹ Kenneth Gray and Edwin Herr (1998). “Workforce Education: The Basics.” Allyn & Bacon. Needham Heights, MA.

¹² Lester Thurow (1992). “Head to Head: The Coming Economic Battle among Japan, Europe, and America.” Morrow & Company. New York.

¹³ See for example, discussions in Walter W. McMahon (2009). “Higher Learning, Greater Good: The Private and Social Benefits of Higher Education.” The Johns Hopkins University Press.

2. **Personal/Family Benefits** – Enhanced non-market private satisfactions correlated with higher education attainment (such as better health, longevity, happiness); and
3. **Societal Benefits** – Enhanced non-market social benefits, such as volunteerism, commitment to democratic processes, human rights etc. together with reduced social costs associated with lower rates of welfare, criminality, and anti-social behavior.

That there are economic benefits accruing to increasing levels of educational attainment will not be a surprise to most. The recent national election placed the unemployment rate in an intense spotlight, and for 2011 the overall unemployment rate for all workers stood at 8.9 percent. However, the differences evident across educational attainment levels provide vivid testimony to the benefits of higher education in terms of personal economics and the value placed upon education by employers. Bureau of Labor Statistics data for 2011 show the clear inverse relationship between educational attainment and unemployment:

- Less than high school diploma: 14.1 percent
- High school: 9.4 percent
- Some college: 8.7 percent
- **Associate degree: 6.8 percent**
- **Bachelor's degree or higher: 4.3 percent.**¹⁴

“The real earnings of lower-skilled workers without more than a high school education have not increased since 1980, and by some measures have fallen. This has also contributed to the increase in the inequality in the distribution of income.”

Walter W. McMahon
Higher Learning, Greater Good.

While an individual's prospects for employment rise with education, so too do their prospects for experiencing rising income—and there is a clear financial penalty in the modern economy for those with low levels of educational attainment. As McMahon notes the “64 percent of the population that has only finished high school has seen no increase in their real earnings since 1980, whereas the real earnings of college graduates continue to rise sharply.”¹⁵ Claudia Goldin and Lawrence Katz note that “Education... affects far more than wage inequality. An educated populace is a key source of economic growth both directly, through improved labor productivity, and indirectly, by spurring innovation and speeding the diffusion of advanced technologies”.¹⁶

In addition to the macro-economic and personal economic benefits of higher education noted above, there are also significant non-monetary private returns to education and also broad societal benefits. These largely, but not exclusively, non-monetary benefits have been the subject of increasing study in recent years, including longitudinal tracer studies that have tracked student outcomes.

Research suggests, for example, that college graduates, in addition to contributing to higher rates of innovation and economic growth, also:

Education is a fundamental contributor to the foundational American ideals of “Life, Liberty and the pursuit of Happiness.”

Data indicate that higher education attainment is correlated with enhanced health and longevity, support of democratic ideals and institutions, reduced dependence on government institutions, and, interestingly, is associated with increasing levels of objective measures of happiness.

¹⁴ Bureau of Labor Statistics data accessed online at: <http://bls.gov/cps/cpsaat07.htm>

¹⁵ Walter W. McMahon (2009). “Higher Learning, Greater Good: The Private and Social Benefits of Higher Education.” Page 3. The Johns Hopkins University Press.

¹⁶ Claudia Goldin and Lawrence Katz. “The Future of Inequality: The Other Reason Education Matters so Much.” The Milken Institute Review.

- Enjoy higher quality jobs than non-graduates.
- Enjoy better health outcomes, by being less likely to smoke, more likely to exercise, and less prone to depression.
- Are more influential in the community, by being active citizens who are more likely to vote and participate in voluntary activities.
- Show positive attitudes towards diversity and equal opportunities, such as on race and gender equality issues.¹⁷

Also, college graduates' children benefit from the educational success of their parents: with graduates tending to have a greater involvement with their child's education.

McMahon summarizes many of the social impacts of higher education, noting that:

"The social benefits of higher education beyond income include benefits in the operation and development of civic institutions, including democratic processes and the rule of law with their effects on human rights and political stability. They include effects on the reduction of poverty and can include effects on the reduction of inequality. The social benefits include lower crime rates and criminal justice system costs, lower health care and public assistance costs, greater social cohesion, indirect effects on the sustainability of the environment, and benefits through the interdependence with research to the diffusion of new knowledge."¹⁸

"The wider social benefits of time spent in education are those benefits that accrue to society rather than to individuals. The literature suggests that benefits such as better health, better job prospects and higher social status are likely to accrue to individuals but have spin-off societal benefits including less need for national spending on health and welfare and a larger tax base to provide national social benefits."

Joy Murray (2009). Australian Council for Educational Research

In the U.S., OECD statistics show that "high educated" men live just over 8 years longer, on average, than "low educated" men. For women it is just over 5 years difference. Also in the U.S., for persons aged 25-34, "high educated" voter participation is 50% higher than for "low educated" and 40% higher for those in the 55-64 age group.

Education at a Glance 2012: Highlights. OECD 2012.

C. The Threats Attached to Complacency

Clearly, educational performance is of central importance to competitiveness in the global economy—and, therefore, U.S. education attainment is key to sustained economic success and leadership for the nation. There is an American tendency to assume that we are "Number One", but in many areas, including some key areas of education, it is simply not true.

As Goldin and Katz note: "The United States, once the world leader in the proportion of people finishing high school, has fallen to near the bottom of the (rich and relatively rich) nations that belong to the Organization of Economic Cooperation and Development (OECD). And while the United States is still a leader in college attendance, its college-completion rates for recent cohorts are lagging other nations."¹⁹

¹⁷ "Beyond the Financial Benefits of a Degree." 2005. Accessed online at: http://ww2.prospects.ac.uk/cms/ShowPage/Home_page/Labour_market_information/Graduate_Market_Trends/Beyond_the_financial_benefits_of_a_degree__Autumn_05_/p!eXeLcmm

¹⁸ Walter W. McMahon (2009). "Higher Learning, Greater Good: The Private and Social Benefits of Higher Education." Page 38. The Johns Hopkins University Press.

¹⁹ Claudia Goldin and Lawrence Katz. "The Future of Inequality: The Other Reason Education Matters so Much." The Milken Institute Review.

In terms of educational performance, statistics are also trending in the wrong direction with, for example, South Korea now ranking first in science and math scores and second in science scores for fifteen year olds, whereas the U.S. is, disturbingly, 23rd in both.

Underinvestment and underperformance in education have very real threats associated with them, and the U.S. and its individual states cannot afford to be complacent in the face of increasing global competition. McMahon notes that the basic problem “is the lack of sufficient college-level skills empowering the left-out majority to join in the benefits of economic growth.”²⁰ Underperformance in education creates a growing underclass who will increasingly struggle to compete in the labor market, to find employment that carries family sustaining wage levels.

The recent national recession and associated state level fiscal crises have exacerbated an increasing trend towards the reduction of state education spending (a disturbing trend given the earlier cited statistic of 77.6 percent of higher education being delivered by the public sector). This trend comes at a societal cost and contributes to a long-term cycle of economic and social challenges. As McMahon describes:

“money goes to prisons and state health care without recognition that these costs are high due to insufficient prior investment in education. State budgets become dominated by rising Medicaid, welfare, and prison system costs. State sales and income tax receipts, in turn, drop because taxpayers have insufficient earning capacity due to limited education. The squeeze on higher education budgets is part of a vicious cycle.”²¹

Also of concern is the fact that accessibility to education is trending in the wrong direction, largely driven by the increasing cost of higher education. For the 2010–11 academic year, annual current dollar prices for undergraduate tuition, room, and board were estimated to be \$13,600 at public institutions in the U.S., \$36,300 at private not-for-profit institutions, and \$23,500 at private for-profit institutions. Between 2001 and 2011, prices for undergraduate tuition, room, and board at public institutions rose 42 percent, and prices at private not-for-profit institutions rose 31 percent, after adjustment for inflation.²² McMahon reports that: “The net increase in costs to families has been accompanied by a reduction in participation by lower-income groups and minorities, as well as increased reliance on student loans at both public and private institutions.”²³ This then has the potential to feed the vicious cycle mentioned above. Goldin and Katz note that “without it [education], it appears that technological advances that largely drive economic growth will increasingly divide the nation.”²⁴

We have a situation upon which leading education commentators and economists agree. Education is of central importance to our economy, to society and to the individual. National and individual state competitiveness is underpinned by the education, knowledge and skills of the workforce and for families to thrive in this competitive global economy, they need access to quality, affordable education options. Failing to adequately support and sustain educational options and higher education accessibility carries very real costs for society, for government and for industry.

²⁰ Walter W. McMahon (2009). “Higher Learning, Greater Good: The Private and Social Benefits of Higher Education.” Page 23. The Johns Hopkins University Press.

²¹ Ibid (Page 15)

²² U.S. Department of Education, National Center for Education Statistics. (2012). Digest of Education Statistics, 2011. (NCES 2012–001) Chapter 3.

²³ Walter W. McMahon (2009). “Higher Learning, Greater Good: The Private and Social Benefits of Higher Education.” Page 1. The Johns Hopkins University Press.

²⁴ Claudia Goldin and Lawrence Katz. “The Future of Inequality: The Other Reason Education Matters so Much.” The Milken Institute Review.

II. PUBLIC HIGHER EDUCATION IN OKLAHOMA

A. The Higher Education System in Oklahoma – Size and Structure

In 1890, the first Oklahoma territorial legislature passed legislation creating three institutions of higher education in order to fulfill a requirement of the Organic Act of Congress establishing the territory. Congress required the territory to establish three types of public higher education: liberal arts and professional education (University of Oklahoma), agriculture and mechanical arts education (Oklahoma Agricultural and Mechanical College at Stillwater, today known as Oklahoma State University) to fulfill the land grant college provisions of the Morrill Act of 1862, and teacher training (Oklahoma Normal School for Teachers at Edmond, today known as University of Central Oklahoma).²⁵

Over the next 50 years, the increase in the number of institutions, and the corresponding competition each biennium for legislative appropriations, coupled with a considerable amount of political activity concerning institutional operations, led to calls for a coordinated state system of public higher education. As a result, the Oklahoma State System of Higher Education was created in 1941 by a vote of the people that amended the state's constitution to provide for such a system by creating the State System and the Oklahoma State Regents for Higher Education.²⁶

Today, the Oklahoma State System of Higher Education comprises 25 institutions, including:

Research Universities

- Oklahoma State University
- University of Oklahoma

Regional Universities

- Cameron University
- East Central University
- Langston University
- Northeastern State University
- Northwestern Oklahoma State University
- Oklahoma Panhandle State University
- Rogers State University
- Southeastern Oklahoma State University
- Southwestern Oklahoma State University
- University of Central Oklahoma

Public Liberal Arts University

- University of Science and Arts of Oklahoma

Community Colleges

- Carl Albert State College
- Connors State College
- Eastern Oklahoma State College

²⁵ Retrieved from <http://www.okhighered.org/state-system/overview/part2.shtml> on 11/30/2012

²⁶ Ibid.

- Murray State College
- Northeastern Oklahoma A&M College
- Northern Oklahoma College
- Oklahoma City Community College
- Redlands Community College
- Rose State College
- Seminole State College
- Tulsa Community College
- Western Oklahoma State College

In addition, the Oklahoma State System of Higher Education encompasses the following:

Constituent Agencies

- OSU Agricultural Experiment Station
- OSU Center for Health Sciences
- OSU College of Veterinary Medicine
- OSU Cooperative Extension Service
- OSU Institute of Technology, Okmulgee
- OSU-Oklahoma City
- OSU-Tulsa
- OU Geological Survey
- OU Health Sciences Center
- OU Law Center
- OU-Tulsa

Higher Education Programs/Sites

- Langston University, Oklahoma City
- Northern Oklahoma College, Stillwater
- OKC Downtown College
- University Center at Ponca City
- University Center of Southern Oklahoma

The State System is coordinated by the Oklahoma State Regents for Higher Education (OSRHE). The State Regents prescribe academic standards of higher education, determine functions and courses of study at state colleges and universities, grant degrees, and approve each public college's and university's allocations, as well as tuition and fees within the limits set by the Oklahoma Legislature.

While the State Regents are the coordinating board of control for all institutions in the State System of Higher Education, governing boards of regents and boards of trustees are responsible for the operation and management of each individual State System institution or higher education program.

The system is responsible for the education of a large number of Oklahomans, together with residents of other states and nations who choose to pursue higher education at Oklahoma's colleges and universities. 2011 saw 193,552 students enrolled in classes at Oklahoma's Institutions of Higher Education, and 30,674 students graduated in the 2009–10 academic year, receiving certificates or degrees. It is also particularly noteworthy that, according to the latest figures from the Oklahoma

Employment Security Commission, 89 percent of Oklahoma residents who graduate with a bachelor's degree remain in the state and have jobs in the state one year after graduation.²⁷

Public education in Oklahoma is making higher education available to a large and diverse student population, and it is a system that pays-off by for the state by providing an educated populace and workforce that supports business growth, civic engagement and social progress. It is also, as will be shown in this report, a system that performs basic and applied R&D to benefit the state and its industries, and a system with dedicated outreach and extension operations designed to diffuse innovations in knowledge and technology into application across the state.

B. Oklahoma's Public Higher Education System: Partners in Success

Multiple organizations and public bodies are vital to the success of the higher education system in Oklahoma. The resources mobilized by OSRHE and its partners and the reciprocity of the relationships directly affect the success of Oklahoma's higher education system.

The Oklahoma Legislature allocates state funds to the higher education system on an annual basis. The Legislature's commitment to the Regents each fiscal year has remained above 15 percent of total state appropriations, with only one exception since FY 1997, despite the recession of 2008–2009.²⁸ This is in the face of rising costs, and in turn the Regents have sought to accomplish savings in mandatory operating obligations of nearly \$350 million over five years, thus helping to keep higher education affordable for Oklahomans. In part as a result of these efforts, public higher education in Oklahoma has a cost 24 percent below the national average.²⁹

Business and industry in Oklahoma are also active participants, supporting higher education programs and communicating their research and workforce needs to higher education institutions. The Manufacturing Extension Agents program in cooperation with the Oklahoma Alliance for Manufacturing Excellence, several universities' technology commercialization programs, and industry sponsored research projects are excellent examples of the ongoing business and higher education partnership occurring in the State.

Local communities host and benefit from the presence of Oklahoma's public institutions of higher education. Student, staff, and faculty volunteerism, expert pro bono assistance, and donation of university space for community functions represent examples of some of the valuable contributions made to college and university host communities. Many programs (for example, the Women in Recovery career preparation program at the Oklahoma State University Institute of Technology, and the Making Places Matter program spearheaded by the Southern Oklahoma Impact Coalition that joins six technical schools, southern Oklahoma universities, and two councils of government in an effort to use university resources and expertise to improve community planning and development), arise in specific response to identified local community and regional needs.

The federal government is also a partner—comprising a significant source of research, educational, capital, and workforce development funds. In FY 2011, for example, \$205.5 million in federal research funds from the National Institutes of Health, the Centers for Disease Control and Prevention, the

²⁷ Oklahoma State Regents for Higher Education 2011 Annual Report. Retrieved from <http://www.okhighered.org/studies-reports/annual-report2011-text.pdf>

²⁸ OSRHE: Educational and General Budgets Summary and Analysis, Fiscal Year 2012, p 7.

²⁹ U.S. Department of Education, National Center for Education Statistics, 2008-09 and 2009-10 Integrated Postsecondary Education Data System (IPEDS), Fall 2008, Fall 2009, Spring 2009 and Spring 2010.

National Science Foundation and the Agency for Healthcare Research and Quality were awarded to Oklahoma institutions.³⁰ That same year the US Department of Education awarded Oklahoma \$411.5 million in higher education assistance grants.³¹ Workforce development funding comes, for example, through grants such as a recent U.S. Department of Labor award of a \$6 million green-job grant to train 4,700 workers for jobs in emerging industries such as energy efficiency and renewable energy.³² Training is taking place in State System institutions throughout the state.

Oklahoma businesses and economic development organizations profit by hiring qualified and highly motivated higher education system graduates. As noted previously, nearly 90 percent of Oklahoma public higher education graduates remain in the state to live and work one year after graduation, and over 70 percent still remain in the state five years after graduation.³³ This is favorable news to Oklahoma institutions, businesses, and taxpayers.

Clearly Oklahoma has developed a substantial public higher education system, producing significant volumes of educated and trained graduates available to generate the types of highly positive economic, private and social benefits for Oklahoma outlined in Chapter I.

C. The Battelle Analysis Commissioned by the State Chamber of Oklahoma

Recognizing both the extreme importance and relevance of public higher education to Oklahoma's prospects for continued success in the global economy, and some of the challenges facing education within the U.S. and its states, the State Chamber of Oklahoma approached the Battelle Memorial Institute's economic development analysis group (the Battelle Technology Partnership Practice) to commission a study of the current economic and functional impacts of public higher education in Oklahoma. The Technology Partnership Practice (TPP) comprises leading practitioners in impact analysis and has a considerable track record in the performance of studies focused on education and academic R&D as drivers of state and regional economic development. The team at Battelle also has direct experience working on previous projects in Oklahoma, with major studies performed for Oklahoma State University and for the Greater Oklahoma City Chamber of Commerce.

To analyze the full impact of Oklahoma's Higher Education System, an examination of the 25 public institutions and related constituent agencies and program sites' backward and forward linkages was performed by Battelle TPP.

The backward linkage impacts (also known as expenditure economic impacts) comprise the direct and indirect impact of the system and its institutional expenditures within the Oklahoma economy and are measured using seven regionally-specific IMPLAN regional input/output (I/O) models. IMPLAN is one of the most widely used I/O modeling systems in the nation and can be used to analyze the economic impacts of academic institutions, companies, projects or entire industries at multiple geographic scales. An input-output analysis examines the financial transaction relationships among the subject entity and its final consumers. For the IMPLAN analysis, operational data consisting of employment, wage and benefit figures, and revenue and expense figures were obtained from OSRHE and individual public institutions of higher education in the state. Additional data related to total student expenditures was estimated by Battelle using information from the State System institutions, the CollegeBoard, and

³⁰ Research America Report, <http://www.researchamerica.org/oklahoma>

³¹ US Department of Education: FY 2011 Tables by State.

³² Oklahoma Department of Commerce announcement, 2010. <http://okcommerce.gov/workforce-development/green-grant/>

³³ Oklahoma State Regents for Higher Education, Employment Outcomes Report, 2008.

others. Using custom state and regional IMPLAN models, estimates of direct, indirect, and induced impacts were developed for employment, labor income, output, and tax revenue measures for all of the institutions.

Also evaluated herein by Battelle are forward linkage impacts of public higher education in Oklahoma. The forward linkage impacts (also known as functional impacts) are the impacts generated by the actual functional activities of Oklahoma's institutions of higher education. While the various academic institutions' operational expenditures have a significant impact on the state, these expenditures are not the *raison d'être* for higher education in the state. The institutions exist to provide specific functional impacts related to education, research, outreach and community service and thus it is critically important that an impact analysis go beyond examination of expenditure impacts to better understand the broader impact implications for Oklahoma and its regions stemming from higher education functional impacts. Within this report the Battelle team discusses functional impacts in detail and highlights a broad range of examples of the benefits of these activities to the state and regional economies of Oklahoma.

Note: From a comparative perspective, it is important to understand that the analysis presented within this report is fundamentally different from a 2008 analysis developed by REMI for the Oklahoma State System of Higher Education entitled, *The Economic Impact of the Higher Education System of the State of Oklahoma*. The Battelle analysis assesses both the backward and forward linkages of the current (FY 2011) operations of public higher education in Oklahoma, whereas the REMI study was explicitly designed to measure and then forecast potential economic activity associated with public higher education in the state of Oklahoma. The Battelle study assesses as "direct expenditures" all higher education-related expenditures (including faculty and student spending, not just state spending), but does not attempt to forecast the economic effects of graduate wage differentials or other long-term measures. In both studies, however, it is possible to estimate a "return on investment" (or ROI) of public higher education spending. Given the exclusion of these graduate wage differentials, the ROI in the Battelle calculations will generally be smaller.

In the report chapters that follow, Battelle first presents the findings of the backward-linkage input-output modeling of public higher education expenditures in the State of Oklahoma. This is followed by subsequent reporting on the range of functional impact benefits provided by public higher education in specific chapters addressing education, research and outreach.

III. EXPENDITURE IMPACTS

A. Introduction

The following analysis examines the backward-linkage or expenditure impacts of the Oklahoma public higher education system as described in the previous section. The impacts measured through this analysis are those that are typically measured using quantitative economic models, and are most often described as the “economic impacts” for a program, institution, or industry.

In measuring these impacts the focus is on an assessment of the role these specific expenditures and employment play in generating overall regional economic activity from an operational perspective, and treats public higher education as if it were an “industry”, but with specific allowances for its public sector nature.

The impacts developed and modeled in this analysis consist of three types: **direct impacts** (the specific impact of the Oklahoma public higher education operations and expenditures in the first round of spending), **indirect impacts** (the impact of expenditures made to higher education suppliers), and **induced impacts** (the additional economic impact of the spending of Oklahoma higher education faculty, staff, and suppliers’ employees in the overall economy that can be attributed directly to Oklahoma public higher education expenditures). The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. In other words, I/O analysis models the flow of funds that originate from direct public higher education expenditures in the economy and the ongoing “ripple effect” of these expenditures”—i.e., every dollar spent in the economy may be partially re-spent (or recirculated) in the local economy, thereby generating additional economic activity and impact. The size of this ripple effect is characterized by the ratio of total impacts to direct impacts and is referred to as the **impact multiplier**.

B. Methodology

Economic Impact Models

Estimates of the individual institution and combined statewide Oklahoma public higher education economic impacts were calculated using 2010 IMPLAN U.S. specific I/O models generated by MIG, Inc.³⁴ The IMPLAN model system consists of specialized software for economic impact analysis and highly detailed data tables, available at the national, state, and county levels. I/O analysis represents the generally accepted standard methodology for measurement of economic impacts. IMPLAN models are widely used to analyze the economic impacts of companies, projects, or entire industries.

Battelle acquired the necessary data files for use with the IMPLAN system and developed customized models to quantify the direct, indirect and induced impacts of the Oklahoma public higher education system’s operations. Models were developed to represent statewide operations as well as six state regions—the Oklahoma City MSA, the Tulsa MSA, and aggregated county regions representing the remaining Northwest, Southwest, Northeast, and Southeast counties.

³⁴ At the time of this analysis IMPLAN models for 2010 are the most current available. Therefore, FY 2011 data was collected and applied into these models as current dollars.

Modeling Approach

As is standard practice when modeling the economic impacts of higher education or other non-profit institutions, the Oklahoma public higher education systems' economic impact is derived, in part, by using expenditures as the most relevant measure of institutional output. Expenditures, with one exception noted below, provide a more concrete basis for the actual economic activity that occurred within the fiscal year.

Based upon available expenditure data for public higher education operations in Oklahoma, Battelle developed an operational modeling approach for the input data sectors. This approach is used to provide a more realistic modeling and estimation of the impacts versus treating the expenditure and employment data as simply "university" data. For example, the spending within the various institutions' research operations is more similar to other organization's R&D operations than it is to general broad university spending. Similarly, the substantial economic impacts that flow to the state from expenditures related to intercollegiate athletics is of a different form and profile than more traditional education expenditures. This operational modeling approach, while more robust, provides additional challenges to estimating overall economic impact.

Data Collection

For this analysis, expenditure data was provided to the Battelle team from the Oklahoma State Regents for Higher Education (OSRHE) on behalf of and with the cooperation of the state's public sector research universities, regional universities, and community colleges. These data were provided at an institutional level corresponding to the 25 institutions and 10 constituent agencies.³⁵

The structure of these total expenditure data for various operational categories (e.g., Part I or Part II funding sources or Auxiliary Services) did not make it possible to distinctly identify the amount of the expenditures spent internally within the institution versus the amount that was spent with specific suppliers or contractors. Hence, the direct impacts estimated and provided in this analysis consist of all first order expenditures by the Oklahoma institutions. This does not affect the measurement of total impacts. However, this may portray impact multipliers that are, by definition, more conservative in nature as more expenditures are captured within the institutions' direct impacts.

Additional Data Assumptions and Estimations

To model the size and extent of the economic impacts of Oklahoma's public higher education system, required the Battelle team to make assumptions regarding certain expenditures and to estimate the size and profile of additional expenditures.

Use of FTE University Employment – The data provided by OSRHE included FY 2011 FTE employment figures for the 25 institutions and 10 constituent agencies. The employment structures within the IMPLAN model, however, are modeled as jobs. While some conversion ratios exist to estimate the number of workers included in FTE figures, due to the potential wide variations in the conversions that might be necessary given our operational modeling approach, the Battelle team chose to use the FTE

³⁵ An attempt was made to collect and develop data down to a campus level to improve the granularity of the regional analysis. However, the accounting practices and systems in place among the institutions made this level of detail extremely difficult to capture. In the end Battelle, in consultation with OSRHE and Oklahoma 21st Century, determined that the benefits of this level of detail did not warrant the level of effort required by the various institutions to provide the data in this form.

figures for entry into the model. The effect of this decision is likely a somewhat more conservative employment figure for the resulting employment impacts.

Student Spending – Student spending is one of three key drivers of measuring the economic impacts of higher education, with the other two being the spending of state-level funding (referred to as Part I Funding within Oklahoma), and the spending of external funding from federal government, foundation, or private industry sources (referred to as Part II funding within Oklahoma). Not only are the expenditures on tuition and fees of the more than 137,000 FTE students a substantial economic factor statewide, but these students’ spending generates significant economic effects within the state and each of the six regions.

To estimate and model these students’ spending data, the Battelle team used information from a variety of sources to develop an estimated student spending profile reflecting a general “market basket” of core student expenditures.³⁶ The sectors selected for these student profiles are provided in Table 3-1. These profiles do not include the specific costs of education (primarily tuition & fees) as the value of these expenditures is already captured within the higher education data provided by OSRHE. The Battelle team also made the assumption that educational books and supplies were purchased from institutionally-related bookstores, and hence the value of these expenditures are also captured within the auxiliary enterprises expenditure data also provided by OSRHE.

These spending profiles were applied, as appropriate, to a university’s “cost of attendance” as available. For those institutions, primarily the community colleges, where cost of attendance data for *non-education spending* was unavailable, an average student spending figure for each of the six regions is used. Since this spending primarily occurs within the community, these regional averages should provide a fairly realistic approximation of these students’ spending, regardless of the tuition costs of the institutions in question. As part of this overall student spending effort, a housing spending profile was developed to apply to the number of students living in off-campus housing. Limited information is available as to the specific and true costs of off-campus housing—and depending on the individual student, off-campus housing expenses could be more or less than traditional on-campus room and board. Therefore, for the purposes of this economic impact analysis, the Battelle team used the value of on-campus room and board, as a surrogate for off-campus housing expenses and spread these expenses through both the housing student spending housing profile and food student spending food profile, using living expense data and ratios developed by the CollegeBoard.³⁷ Based upon an examination of the literature, similar studies, and many Oklahoma public institution “cost of attendance” profiles, this is likely a conservative estimate—off campus student expenditures (and hence, impacts) for housing, utilities, and food are likely higher than we are able to estimate. Finally, this estimation of student off-campus living expenses does include the impact of those students living at home, as these students could choose to attend other institutions outside of their home region or out-of-state, taking the impacts of their support and expenditures with them. Hence, their spending is assumed to be directly attributed to attendance at an Oklahoma higher education institution.

Capital Expenditures – For capital expenditures, the Battelle team developed a representative “aggregate” profile consisting of a variety of suitable sectors representing the types of capital

³⁶ These sources included Oklahoma institutional cost of attendance information, other similar studies, and the income-based spending profiles for Oklahoma that are included with the IMPLAN model.

³⁷ CollegeBoard 2011 Living Expense data, <http://professionals.collegeboard.com/higher-ed/financial-aid/living-expense/2011>, downloaded June, 13, 2012.

equipment purchases made by higher education institutions of all types (research universities to community colleges). The sectors included in this representative mix are shown in Table 1.

Expenditures Not Included – Analyzed expenditures do not include the cost of land purchases or payments on annual bonds, loans, or other investment vehicles, per standard economic impact methodology. The analysis focuses on actual expenditures made in FY 2011 for the delivery of products or services to students, faculty, staff, and the state and regional communities.

Tax modifications – The estimations of local, state, and federal tax revenues are modified to reflect the public sector nature of these Oklahoma higher education institutions.

Capturing Visitor Expenditures – An attempt was made to collect visitor expenditure information from the various Oklahoma institutions. Due to the complexity of administering visitor surveys to capture visitor spending information (which was beyond the scope of this effort) only a limited number of institutions were able to provide visitor expenditure data of sufficient detail to be used for impact modeling purposes. The Battelle team therefore chose to not include visitor expenditures within the institution's communities within this analysis. Visitor direct spending with the colleges and universities is captured to some degree through the expenditures of the institutions to provide these services (e.g., expenditures on events for which visitors purchase tickets, expenditures by campus bookstores for branded merchandise purchased by alumni and visitors).

Table 1. IMPLAN Sector Use for Estimating Oklahoma Public Higher Education Economic Impacts

Model Sector Aggregation	IMPLAN Sector
Education, Administration and General Services	392 Junior colleges, colleges, universities, and professional schools
Research	376 Scientific research & development services
New Construction & Maint./Repair Construction	34 Construction of new nonresidential commercial & health care structures
	36 Construction of other new nonresidential structures
	39 Maintenance and repair construction of nonresidential structures
Representative Capital Equipment Purchases	203 Farm machinery and equipment manufacturing
	210 Vending, commercial, industrial, and office machinery manufacturing
	211 Optical instrument and lens manufacturing
	212 Photographic and photocopying equipment manufacturing
	214 Air purification and ventilation equipment manufacturing
	216 Air conditioning, refrigeration, and warm air heating equipment manufacturing
	234 Electronic computer manufacturing
	250 Automatic environmental control manufacturing
	254 Analytical laboratory instrument manufacturing
	277 Light truck and utility vehicle manufacturing
	295 Wood kitchen cabinet and countertop manufacturing
	299 Institutional furniture manufacturing
	300 Office Furniture
New Construction & Maint./Repair Construction	34 Construction of new nonresidential commercial & health care structures
	36 Construction of other new nonresidential structures
	39 Maintenance and repair construction of nonresidential structures
Student Spending - Food	324 Retail Services - Food and beverage
	413 Restaurant, bar, and drinking place services
Student Spending - General & Miscellaneous	322 Retail Services - Electronics and appliances
	325 Retail Services - Health and personal care

Table 1. IMPLAN Sector Use for Estimating Oklahoma Public Higher Education Economic Impacts

Model Sector Aggregation	IMPLAN Sector
	327 Retail Services - Clothing and clothing accessories
	328 Retail Services - Sporting goods, hobby, book and music
	329 Retail Services - General merchandise
	330 Retail Services - Miscellaneous
	331 Retail Services – Non-store, direct and electronic sales
	351 Telecommunications
	409 Amusement parks, arcades, and gambling recreation
Student Spending - Off Campus Housing	419 Personal care services
	31 Electricity, and distribution services
	32 Natural gas, and distribution services
	33 Water, sewage treatment, and other utility services
	360 Real estate buying and selling, leasing, managing, and related services
Student Spending - Transportation	412 Other accommodation services (includes fraternity & sorority houses)
	326 Retail Services - Gasoline stations
	414 Automotive repair and maintenance services, except car washes

Source: Battelle assessment and mapping with assistance from MIG, Inc.

C. Expenditure (Backward Linkage) Economic Impact of Oklahoma’s Public Higher Education System

This section details the results of economic impact analysis for the public higher education system of the state of Oklahoma. For each region examined Battelle provides the direct effect values driving the model; additional I/O model-estimated indirect and induced impacts; and a summation of the total impacts (direct, indirect, and induced). An impact multiplier is also provided for each of the core economic measures—for every one job or dollar of direct effect, the multiplier number will equal the total (including the direct effect) number of jobs or dollars created in the regional economy (e.g., a 1.7 employment multiplier equates to one direct job plus 0.7 indirect and induced jobs).

The following data are provided from each model: **employment** (combined number of full and part-time workers), **labor income** (measures cash, benefits and non-cash payments received by individuals in the economy, including sole proprietors), **value added** (the difference between an industry’s or an establishment’s total output and the cost of its intermediate inputs), **economic output** (the dollar value of sales, goods, and services produced in an economy, is sometimes referred to as business volume, and represents the typical measure expressed as the **economic impact** in a standard economic impact study), **state and local tax revenue** (including sales, income, and property taxes), and **federal tax revenue** (including sales and income taxes, and both institutional and employee contributions to Social Security).³⁸

³⁸ Note: multipliers are not meaningful in the context of tax revenue data, i.e., a dollar of tax revenue does not generate additional tax revenue. Furthermore, the estimation of tax revenue is subject to significant variability due to ever-changing rate structures, the use of available exemptions, and the accounting of potential income, if any, subject to taxation. These figures should be viewed with some measure of caution in this analysis.

Statewide Total Impacts

The Oklahoma State System for Higher Education generated operational expenditures of \$5.50 billion in FY 2011, with \$1.95 billion of this coming from state funding. With a total state economic (output) impact of \$9.22 billion, the estimated return on investment is \$4.72 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated throughout the state's economy through the operational expenditures of the faculty, staff and students of the State of Oklahoma's public higher education system. The following table details the FY 2011 expenditures used to calculate the State Systems' statewide economic impacts.

Table 2. State System Operational Expenditures, FY 2011
(\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$1,858.4
Research Expenditures	\$589.3
Intercollegiate Athletics	\$145.6
Other Auxiliary Enterprises and Related Expenditures	\$1,262.5
Building New Construction and Repair	\$197.1
Capital Equipment	\$13.9
Estimated Additional Student Spending	\$1,435.0
Total Expenditures	\$5,501.9

Sources: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

Using the data provided and modeled, Battelle TPP estimates **the FY 2011 expenditure economic impact of Oklahoma's public higher education system on the state's economy to be more than \$9.2 billion** (Table 3). This overall impact is comprised of \$5.4 billion in direct expenditures of higher education operations and an additional \$3.8 billion in indirect and induced spending in the economy. This leads to an output multiplier of 1.7—meaning for every \$1 of direct higher education expenditures an additional \$0.70 is generated in the state. From an employment perspective the estimated 52,156 direct jobs (including direct FY 2011 construction jobs) supported an additional 33,192 jobs in the Oklahoma economy, for **a total employment impact of more than 85,000 Oklahoma jobs**.

Table 3. Oklahoma Public Higher Education Economic Impacts – Statewide Totals (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	52,156	\$2,030.8	\$2,669.9	\$5,386.0	\$186.3	\$370.4
Indirect Effect	14,633	\$555.0	\$1,066.3	\$1,842.4	\$85.2	\$131.9
Induced Effect	18,559	\$643.0	\$1,192.9	\$1,987.9	\$117.1	\$153.2
Total Effect	85,348	\$3,228.9	\$4,929.2	\$9,216.2	\$388.6	\$655.5
Impact Multiplier	1.6	1.6	1.8	1.7		

Sources: Core university data from OSRHE; Additional Battelle calculations and analysis; IMPLAN 2010 Oklahoma state model.

Those directly employed in the context of Oklahoma's public higher education operations receive more than \$2.0 billion in labor income (including salaries, wages, and fringe benefits). The ripple effect of higher education expenditures generates an additional \$1.2 billion in labor income to other state residents, for a total of more than \$3.2 billion throughout the state's economy.

As public sector entities these academic institutions do not generate the same tax revenue of an industry with a similar level of output. However, the revenues generated through personal income taxes of university and other direct employment still generate a significant tax base for the state amounting to more than \$186 million in FY 2011. As these individuals spend their incomes within the state and as suppliers make in-state purchases, an additional \$202 million in taxes (primarily through sales taxes) are generated within Oklahoma. Similar federal tax revenue is generated in the state, reaching more than \$655 million, in total, in FY 2011.

Regional Impacts

Beyond the estimation of these Oklahoma state-level economic impacts, the Battelle team was charged with developing impact estimates for each of six geographic regions in the state. These regions include: the Oklahoma City MSA, the Tulsa MSA, the Northeast Region, the Southeast Region, the Southwest Region, and the Northwest Region.

As discussed, the location of the main campus was used to determine which of the six regions an institution's expenditures and impacts are associated with. Table 4 provides a list of institutions for each region. It should be noted that two constituent institutions, the Oklahoma State University's Cooperative Extension Services and Agricultural Experiment Stations, were not included within a specific regional model. These two programs are statewide programs, managed within the state's land-grant institution. The operational data for these programs include employment and expenditures that actually reside and occur in nearly every county of the state (especially within the Cooperative Extension Services program). Therefore, the Battelle team decided to exclude these two constituent institutions from a specific regional model, though their data is included in the statewide impact results.

Table 4. Institutions Included in Oklahoma State System of Higher Education Economic Impacts, by Region

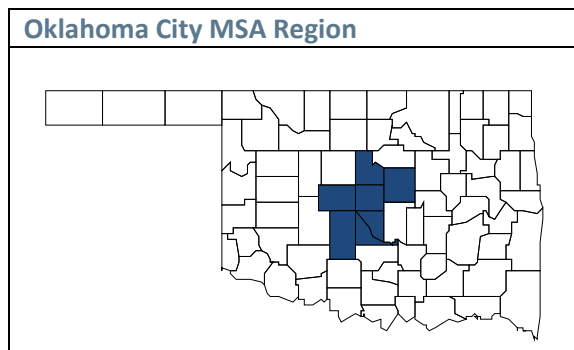
Oklahoma Institution	Institution Type
Oklahoma City MSA	
Oklahoma State University - Oklahoma City Technical Branch	Research Institution – Constituent Agency
University of Oklahoma, Health Sciences Center	Research Institution – Constituent Agency
University of Oklahoma, Law Center	Research Institution – Constituent Agency
University of Oklahoma, Main Campus	Research Institution
Langston University	Regional University
University of Central Oklahoma	Regional University
University of Science & Arts of Oklahoma	Regional University
Oklahoma City Community College	Community College
Redlands Community College	Community College
Rose State College	Community College
Oklahoma State Regents for Higher Education Office (OSRHE)	State Regents
Tulsa MSA	
Oklahoma State University - Tulsa	Research Institution – Constituent Agency
Oklahoma State University, Center for Health Sciences - Tulsa	Research Institution – Constituent Agency
Oklahoma State University, Institute of Technology	Research Institution – Constituent Agency

University of Oklahoma - Tulsa	Research Institution – Constituent Agency
Rogers State University	Regional University
Tulsa Community College	Community College
Northeast Region	
Oklahoma State University, Center for Veterinary Health Sciences	Research Institution – Constituent Agency
Oklahoma State University, Main Campus	Research Institution
Northeastern State University	Regional University
Connors State College	Community College
Northeastern Oklahoma A&M College	Community College
Northern Oklahoma College	Community College
Southeast Region	
East Central University	Regional University
Southeastern Oklahoma State University	Regional University
Carl Albert State College	Community College
Eastern Oklahoma State College	Community College
Murray State College	Community College
Seminole State College	Community College
Southwest Region	
Cameron University	Regional University
Southwestern Oklahoma State University	Regional University
Western Oklahoma State College	Community College
Northwest Region	
Northwestern Oklahoma State University	Regional University
Oklahoma Panhandle State University	Regional University
Statewide Institutions <i>Not Included</i> in a Specific Regional Model	
Oklahoma State University, Agricultural Experiment Station	Research Institution – Constituent Agency
Oklahoma State University, Cooperative Extension Services	Research Institution – Constituent Agency

Oklahoma City MSA

Oklahoma's State System institutions in the Oklahoma MSA generated operational expenditures of \$2.8 billion in FY 2011, with \$886 million of this coming from state funding. With a total regional economic (output) impact of \$4.8 billion, the estimated return on investment is \$5.45 for every \$1.00 of state funding.

The seven-county Oklahoma City MSA region includes among its higher education facilities the principal campus of 11 public higher education operations, including the main campus of the University of Oklahoma, three constituent agencies, the University of Central Oklahoma, the third largest public university in the state, Langston University, and the OSRHE office in Oklahoma City. The Oklahoma City MSA region accounts for 65,400 students or 42 percent of all FY 2011 FTE students within the state's public higher education system.



There are direct, indirect, and induced economic benefits generated in the Oklahoma MSA regional economy by the operational expenditures of the faculty, staff and students of the State System

institutions in the region. With total direct spending of nearly \$2.8 billion, the Oklahoma MSA region drives 51 percent of all Oklahoma modeled public higher education expenditures (from both institutions and students). Table 5 details the FY 2011 expenditures used to calculate the region's institutional economic impacts.

Table 5. State System Operational Expenditures in Oklahoma MSA, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$864.0
Research Expenditures	\$375.3
Intercollegiate Athletics	\$86.8
Other Auxiliary Enterprises and Related Expenditures	\$728.9
Building New Construction and Repair	\$100.1
Capital Equipment	\$2.7
Estimated Additional Student Spending	\$656.3
Total Expenditures	\$2,814.1

Sources: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

At these levels of expenditures, public higher education institutions in the Oklahoma City MSA generate more than \$4.8 billion in total output, for a regional output multiplier of 1.7 (Table 6). The direct expenditures of these institutions generate 26,350 direct jobs in the region and ultimately support more than 44,000 workers in the Oklahoma City MSA. Combined, these jobs receive a total of more than \$1.6 billion in labor income.

Table 6. Oklahoma Public Higher Education Economic Impacts – Oklahoma City MSA Totals (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	26,350	\$972.1	\$1,266.6	\$2,771.1	\$91.5	\$172.8
Indirect Effect	8,354	\$327.7	\$634.2	\$1,034.1	\$51.3	\$77.8
Induced Effect	9,427	\$354.2	\$637.1	\$1,020.7	\$61.0	\$81.6
Total Effect	44,131	\$1,653.9	\$2,537.9	\$4,826.0	\$203.9	\$332.1
Impact Multiplier	1.7	1.7	2.0	1.7		

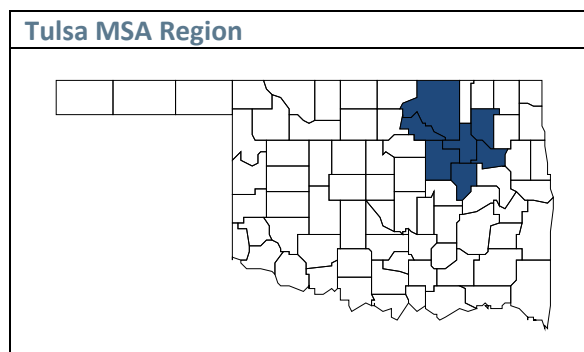
Sources: Core university data from OSRHE; Additional Battelle calculations and analysis; IMPLAN 2010 Oklahoma multi-county model.

The expenditures generated by public higher education also contribute significantly to the region's tax base. Tax revenues total \$204 million in state and local taxes and \$332 million in federal taxes.

Tulsa MSA

Oklahoma's State System institutions in the Tulsa MSA generated operational expenditures of \$691 million in FY 2011, with \$254 million of this coming from state funding. With a total regional economic (output) impact of \$1.2 billion, the estimated return on investment is \$4.73 for every \$1.00 of state funding.

The seven-county, Tulsa MSA region includes among its higher education presence four constituent agency Tulsa-based operations and Tulsa Community College, the largest community college in the state, in terms of students, and the fourth largest public higher education institution in Oklahoma. In total, 23,410 FTE students were served by Tulsa MSA-based public higher education institutions in FY 2011. With \$673 billion in total direct expenditures, the Tulsa MSA region accounts for the third largest total among the six regions at 12 percent of statewide expenditures (Table 5).



There are direct, indirect, and induced economic benefits generated in the Tulsa MSA regional economy by the operational expenditures of the faculty, staff and students of the State System institutions in the region. Table 7 details the FY 2011 expenditures used to calculate the region's institutional economic impacts.

Table 7. State System Operational Expenditures in Tulsa MSA, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$251.2
Research Expenditures	\$22.5
Intercollegiate Athletics	\$0.1
Other Auxiliary Enterprises and Related Expenditures	\$145.3
Building New Construction and Repair	\$11.1
Capital Equipment	\$1.7
Estimated Additional Student Spending	\$259.0
Total Expenditures	\$691.0

Sources: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

With an output multiplier of 1.8 these expenditures generate nearly \$530 million in additional economic activity within the Tulsa MSA region, leading to a total economic impact of \$1.2 billion in FY 2011. This output multiplier is the largest among the six Oklahoma regions (Table 8).

These direct expenditures generate nearly 6,200 jobs, which in turn support an additional 4,300 indirect and induced jobs, leading to a total employment impact of public higher education in the Tulsa MSA of more than 10,500 jobs—an employment multiplier of 1.70 (also the largest among the six Oklahoma regions).

Table 8. Oklahoma Public Higher Education Economic Impacts – Tulsa MSA Totals (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	6,161	\$283.8	\$394.9	\$673.0	\$27.0	\$53.5
Indirect Effect	1,596	\$69.3	\$130.8	\$217.3	\$10.1	\$16.3
Induced Effect	2,747	\$106.0	\$189.0	\$312.0	\$17.2	\$24.8
Total Effect	10,504	\$459.0	\$714.7	\$1,202.3	\$54.2	\$94.6
Impact Multiplier	1.7	1.6	1.8	1.8		

Sources: Core university data from OSRHE; Additional Battelle calculations and analysis; IMPLAN 2010 Oklahoma multi-county model.

These public higher education institutions generate a significant tax stream for communities within the Tulsa MSA. Direct expenditures generate nearly \$27 million, and through the ripple effect of follow-on regional spending, generate an additional \$27 million (a total of \$54 million in state and local tax revenues).

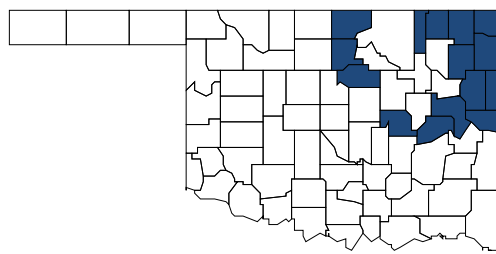
Northeast Region

Oklahoma's State System institutions in the Northeast Region generated operational expenditures of \$1.2 billion in FY 2011, with \$469 million of this coming from state funding. With a total regional economic (output) impact of \$1.7 billion, the estimated return on investment is \$3.53 for every \$1.00 of state funding.

The fifteen-county Northeast Oklahoma region includes six main campus locations, including the Oklahoma State University main campus and Center for Veterinary Health Sciences in Stillwater. The Northeast region was the administrative home for 36,404 FTE students in FY 2011 or 21 percent of all Oklahoma public higher education students.

There are direct, indirect, and induced economic benefits generated in the Northeast Region's economy by the operational expenditures of the faculty, staff and students of the State System institutions in the region. Table 9 details the FY 2011 expenditures used to calculate the region's institutional economic impacts.

Northeast Region

**Table 9. State System Operational Expenditures in Northeast Region, FY 2011 (\$ in Millions)**

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$437.5
Research Expenditures	\$97.6
Intercollegiate Athletics	\$53.2
Other Auxiliary Enterprises and Related Expenditures	\$211.6
Building New Construction and Repair	\$73.1
Capital Equipment	\$8.7

Estimated Additional Student Spending	\$312.2
Total Expenditures	\$1,193.8

Sources: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The education of these students and the service, research and other functions of these regional institutions directly generate more than \$1.1 billion in output in FY 2011 (Table 10). This constitutes 23 percent of all public higher education-related expenditures in the state and is directly associated with nearly 12,000 jobs in the regional economy. Through the multiplier effects of these expenditures, an additional \$510 million in output is generated and an additional 4,900 jobs are supported—for a total impact of 16,652 jobs and nearly \$1.7 billion in output.

Labor income attributable to the Northeast region's public higher education employment exceeds \$360 million on a direct basis and more than \$500 million in total. Tax revenues generated through public higher education in the region total nearly \$68 million in state and local taxes and more than \$105 million in federal taxes.

Table 10. Oklahoma Public Higher Education Economic Impacts – Northeast Region Totals (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	11,775	\$360.5	\$498.6	\$1,140.0	\$40.0	\$69.1
Indirect Effect	2,477	\$74.5	\$157.0	\$282.0	\$12.8	\$18.9
Induced Effect	2,401	\$67.1	\$136.5	\$232.2	\$15.1	\$17.1
Total Effect	16,652	\$502.0	\$792.2	\$1,654.2	\$67.9	\$105.2
Impact Multiplier	1.4	1.4	1.6	1.5		

Sources: Core university data from OSRHE; Additional Battelle calculations and analysis; IMPLAN 2010 Oklahoma multi-county model.

Southeast Region

Oklahoma's State System institutions in the Southeast Region generated operational expenditures of \$364 million in FY 2011, with \$122 million of this coming from state funding. With a total regional economic (output) impact of \$498 million, the estimated return on investment is \$4.06 for every \$1.00 of state funding.

The Southeast Oklahoma region consists of 20 counties and includes the main campus of two regional universities and four community colleges. Combined these six institutions instructed 15,150 FTE students in FY 2011, or 10 percent of all public higher education students.

There are direct, indirect, and induced economic benefits generated in the Southeast Region's economy by the operational expenditures of the faculty, staff and students of the State System institutions in the region. Table 11 details the FY 2011 expenditures used to calculate the region's institutional economic impacts.

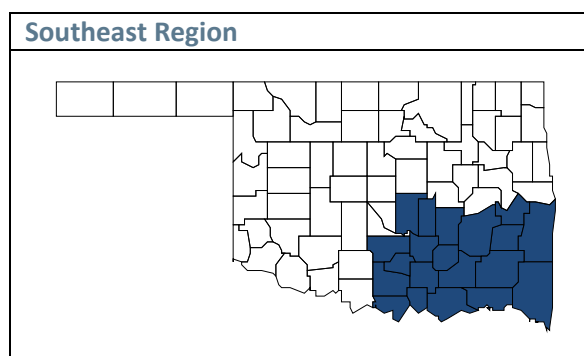


Table 11. State System Operational Expenditures in Southeast Region, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$122.3
Research Expenditures	\$26.5
Intercollegiate Athletics	\$2.9
Other Auxiliary Enterprises and Related Expenditures	\$91.1
Building New Construction and Repair	\$1.8
Capital Equipment	\$0.3
Estimated Additional Student Spending	\$118.7
Total Expenditures	\$363.6

Sources: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The direct expenditures related to these students and other functions of the regional universities and colleges total \$345 million (Table 12). This spending level leads to the direct employment of 3,293 workers in the region. Total related output reaches \$498 million through additional spending within the region. This spending comes from institutional employees spending their wages and through the purchases from downstream suppliers. This additional spending also supports 1,400 other jobs in the regional economy, for a total employment impact of 4,700 jobs.

Table 12. Oklahoma Public Higher Education Economic Impacts – Southeast Region Totals (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	3,293	\$120.3	\$169.0	\$344.9	\$14.1	\$23.0
Indirect Effect	657	\$20.5	\$42.8	\$80.3	\$3.5	\$5.2
Induced Effect	754	\$20.7	\$42.1	\$72.5	\$4.5	\$5.3
Total Effect	4,704	\$161.5	\$253.9	\$497.6	\$22.1	\$33.6
Impact Multiplier	1.4	1.3	1.5	1.4		

Sources: Core university data from OSRHE; Additional Battelle calculations and analysis; IMPLAN 2010 Oklahoma multi-county model.

The 4,700 jobs combine to earn more than \$160 million in wages and benefits. Through the generation of sales taxes on purchases, personal income taxes on these wages, and other business and excise taxes on suppliers, the economic activity associated with the Southeast region's public higher education generates nearly \$56 billion in local, state, and federal taxes.

Southwest Region

Oklahoma's State System institutions in the Southwest Region generated operational expenditures of \$248 million in FY 2011, with \$105 million of this coming from state funding. With a total regional economic (output) impact of \$344 million, the estimated return on investment is \$3.28 for every \$1.00 of state funding.

The Southwest Oklahoma region consists of 13 counties and is home to two regional universities and one community college. These three institutions instructed 8 percent of all Oklahoma public higher education students; a total of 11,730 FTE students.

There are direct, indirect, and induced economic benefits generated in the Southwest Region's economy by the operational expenditures of the faculty, staff and students of the State System institutions in the region. Table 13 details the FY 2011 expenditures used to calculate the region's institutional economic impacts.

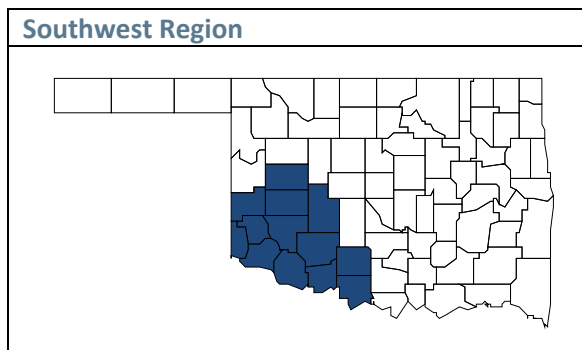


Table 13. State System Operational Expenditures in Southwest Region, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$104.6
Research Expenditures	\$10.7
Intercollegiate Athletics	\$1.0
Other Auxiliary Enterprises and Related Expenditures	\$63.4
Building New Construction and Repair	\$0.1
Capital Equipment	\$0.1
Estimated Additional Student Spending	\$68.0
Total Expenditures	\$247.9

Sources: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The direct regional output from the combined higher education and student expenditures reached \$240 million in FY 2011. This spending generates more than \$100 million in additional spending in the region for a total economic impact of \$344 million (Table 14). The estimated employment associated with the direct spending reaches 2,408, and through the regional multiplier effect supports 945 additional workers for a total employment impact in the region of 3,353 jobs.

Table 14. Oklahoma Public Higher Education Economic Impacts – Southwest Region Totals (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	2,408	\$90.8	\$121.4	\$239.8	\$9.6	\$15.1
Indirect Effect	422	\$13.3	\$29.8	\$53.8	\$2.6	\$3.3
Induced Effect	523	\$14.2	\$29.7	\$50.8	\$3.3	\$3.4

Total Effect	3,353	\$118.3	\$180.9	\$344.5	\$15.4	\$21.9
Impact Multiplier	1.4	1.3	1.5	1.4		

Sources: Core university data from OSRHE; Additional Battelle calculations and analysis; IMPLAN 2010 Oklahoma multi-county model.

Northwest Region

Oklahoma's State System institutions in the Southwest Region generated operational expenditures of \$87 million in FY 2011, with \$40 million of this coming from state funding. With a total regional economic (output) impact of \$118 million, the estimated return on investment is \$2.95 for every \$1.00 of state funding.

The fifteen-county Northwest Oklahoma region accounts for only two State System institutions and the fewest number of FY 2011 FTE students among the six regions at 3,119. These two institutions account for 2 percent of all Oklahoma public higher education students and at \$80 million, 1 percent of all direct (including student) expenditures.

There are direct, indirect, and induced economic benefits generated in the Northwest Region's economy by the operational expenditures of the faculty, staff and students of the State System institutions in the region. Table 15 details the FY 2011 expenditures used to calculate the region's institutional economic impacts.

Northwest Region

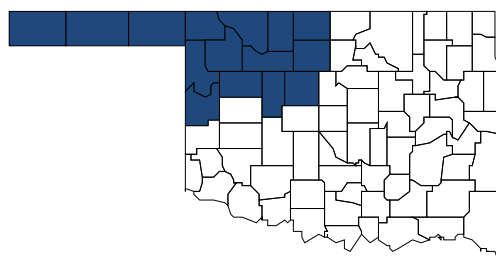


Table 15. State System Operational Expenditures in Northwest Region, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$39.9
Research Expenditures	\$1.6
Intercollegiate Athletics	\$1.5
Other Auxiliary Enterprises and Related Expenditures	\$20.3
Building New Construction and Repair	\$2.7
Capital Equipment	\$0.3
Estimated Additional Student Spending	\$20.9
Total Expenditures	\$87.3

Sources: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

These direct expenditures generate an additional \$38 million of spending in the regional economy for a total economic impact of \$118 million (Table 16).

The regional employment generated by the direct operations of the region's public higher education institutions and the associated student living expenses reached 725 workers in FY 2011. Indirect and induced employment yields an additional 359 jobs for a total employment impact of nearly 1,100 jobs.

Table 16. Oklahoma Public Higher Education Economic Impacts – Northwest Region Totals (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	725	\$37.3	\$43.1	\$79.8	\$3.2	\$6.5
Indirect Effect	136	\$4.2	\$8.7	\$16.3	\$0.8	\$1.1
Induced Effect	223	\$6.3	\$12.8	\$21.9	\$1.4	\$1.7
Total Effect	1,084	\$47.8	\$64.7	\$118.1	\$5.3	\$9.3
Impact Multiplier	1.5	1.3	1.5	1.5		

Sources: Core university data from OSRHE; Additional Battelle calculations and analysis; IMPLAN 2010 Oklahoma multi-county model.

D. Summary

The operations of the state of Oklahoma’s public higher education system lead to significant economic impacts. This full assessment of direct expenditures including not only the spending of Part I and Part II funding, but also the expenditures stemming from auxiliary services and intercollegiate athletics and the direct spending of students with their institution’s community, yields a direct expenditure or output level of nearly \$5.4 billion in FY 2011. Through the multiplier effect of these expenditures, Oklahoma’s public higher education system generates a total expenditure based (backward-linkage) economic impact of \$9.2 billion. The workforce directly employed by higher education or supported through student, faculty, and supplier spending reaches more than 85,000 jobs in the state.

As would be expected, the geographic distribution of these impacts correlates strongly with the size and number of public higher education institutions in each region. The largest impact levels are reached in the Oklahoma City MSA, the Northeast Region, and the Tulsa MSA.

IV. INTRODUCTION TO THE FUNCTIONAL IMPACTS OF HIGHER EDUCATION

A. Introduction to the Functional Impacts of Oklahoma’s Public Higher Education System

While Oklahoma public higher education system and its individual institutions demonstrate a substantial economic and employment impact through expenditures, the Regents’ expectations are that impacts should reach much further into many aspects of life in Oklahoma and the nation. Public higher education institutions do not exist in Oklahoma to simply spend money and create economic stimulus—rather they are funded as institutions dedicated to generating specific **functional impacts** of central importance to society, the economy and individual Oklahomans.

The functional impacts of the Oklahoma public higher education system, also known to economists as “forward linkage impacts”, are the impacts produced as higher education institutions accomplish their mission, institutional goals and objectives. **These are the positive impacts generated through the Oklahoma higher education system’s mission-based activities in education, basic and applied research, and community outreach and extension activities.** These constitute impacts and benefits to the people, industries, communities and public and private institutions within the State. Though challenging to measure, they comprise impacts of considerably larger importance than the basic institutional expenditure impacts.³⁹ This section of the report discusses and outlines many of the key forward linkage impacts accruing within the State of Oklahoma as a result of the functional activities of the State’s public higher education system.

As the Regents note, the mission of the Oklahoma State System of Higher Education is:

“to build a nationally competitive system of higher education that will provide educational programs and services universally recognized for excellence, expand frontiers of knowledge and enhance quality of life.”⁴⁰

The resulting system has an impact on many fronts in Oklahoma. For the purposes of this report Battelle evaluates the Oklahoma public higher education system’s forward-linkage impacts in the following core functional areas of its mission: **education, research, and public service/outreach.**

B. Pathways to Functional Impacts

Functional impacts are identified herein according to the generally accepted literature in economic and social science on the impacts of higher education institutions and are evaluated using data provided by the Regents and a variety of third-party data sources used to track the system’s performance. Accessing these resource allows for an examination of the broader societal benefits of these functions and an assessment of the future importance of the Oklahoma public higher education system.

The broad functional areas of Oklahoma’s higher education system are similar to those of many other public higher education systems:

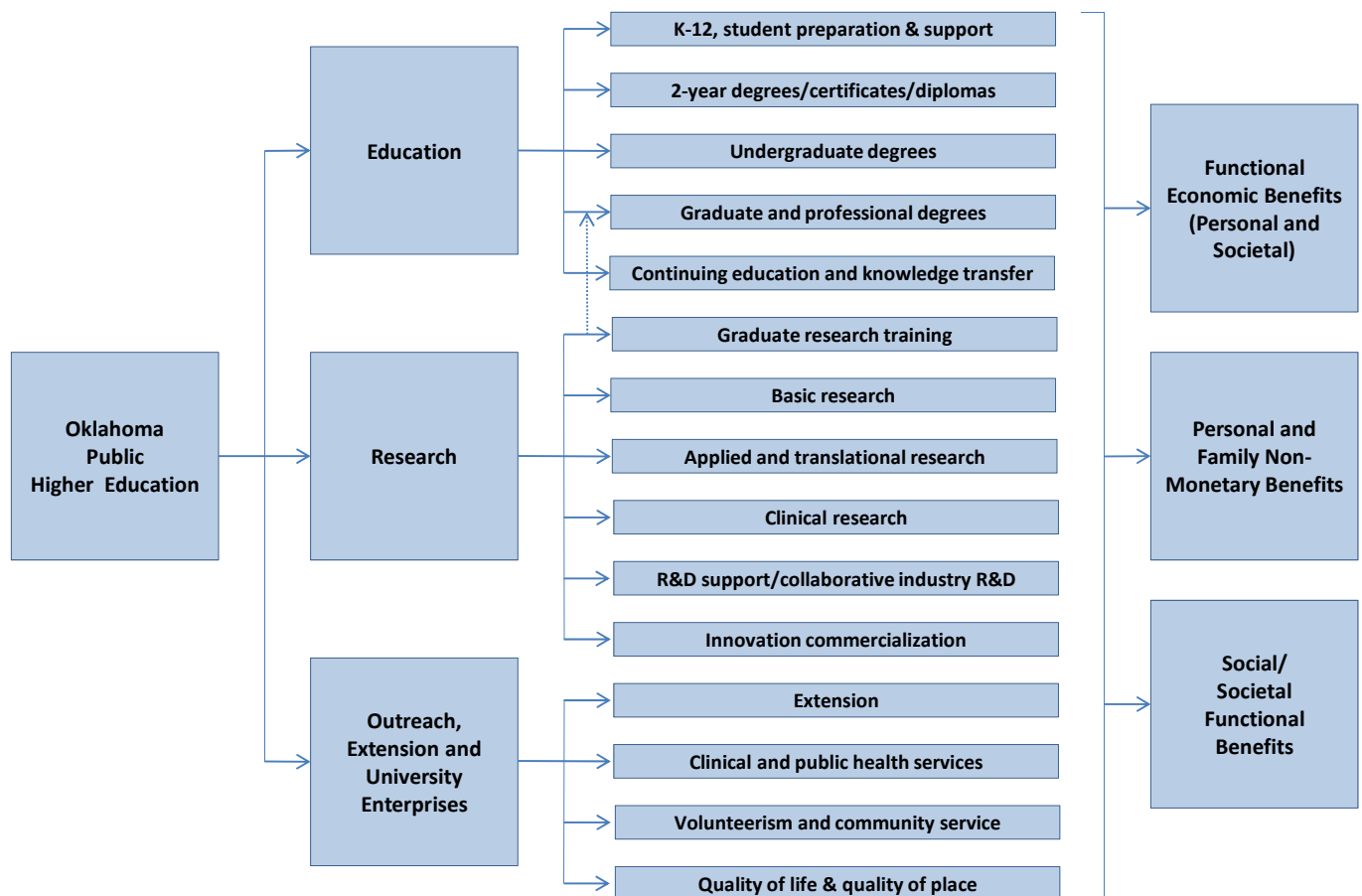
³⁹ Functional impacts are a challenge to quantify. Some aspects such as degrees conferred, research volume, innovation generation, patents, publication citations, and commercialization can be quantified, as can monetary or staff-hour contributions to public and community service. Other functional impacts, such as the increase in quality of life or intellectual fulfillment, are simply too large and diverse to readily quantify. Assigning economic value to these aspects of the functional benefits of Oklahoma’s public higher education system would be an impractically complex process, and Battelle has not attempted to do so.

⁴⁰ Oklahoma State Regents for Higher Education (OSRHE): Annual Report 2011, February 2012.

- **Education** across a range of certificate, diploma and degree programs, ranging from community college to doctoral and professional degree studies;
- **Research**, including basic and applied or translational research across a broad range of disciplines in the humanities, social sciences, physical sciences, mathematics, engineering, and professions;
- **Outreach** activities in public and community service; healthcare, agricultural extension and innovation commercialization/knowledge transfer.

Key categories of functional impacts and their general benefit are summarized in Figure 1:

Figure 1: Public Higher Education in Oklahoma – Principal Functional Impacts and Benefits



As Figure 1 shows, the three core mission categories of *education*, *research* and *outreach*, have associated with them a spectrum of activities that lead to: economic impacts realized at the personal, family and societal level; personal and family non-monetary benefits, and social/societal functional benefits (both nonmonetary, such as civic engagement, and monetary such as negative government costs offset through lower use of welfare and other government programs associated with education attainment). The three core mission activities are introduced below, and then discussed in further detail in individual report chapters that follow:

Education. Oklahoma’s higher education institutions are engaged in the full spectrum of education within Oklahoma. At the K-12 level, these institutions are engaged in supporting curriculum development, teacher education and training, development of new approaches to K-12 pedagogy, and youth development through special programs such as Extension’s 4-H program. Community colleges are key providers of education tailored to the local educational needs of citizens and regional employers, and provide workforce education, certificate and diploma level education, two-year/associates degrees, and education that readily articulates into four-year degrees at other Oklahoma regional and research universities. Community colleges also provide specialized non-credit courses and continuing education opportunities to meet the unique needs of their communities and area residents. Oklahoma’s public universities provide a range of undergraduate, graduate and professional degree courses, and are engaged in ongoing professional and continuing education and knowledge transfer activities. As will be discussed further in the education chapter of this report (Chapter V), higher education yields a broad range of functional benefits and impacts in the state that are realized by individuals, families, communities, the economy, society and government.

Research. The vast majority of academic research in Oklahoma is performed by public universities, and academic research expenditures across the State System institutions totaled over \$384 million in 2009–10. While multiple public universities engage in research activity, the overwhelming majority of academic research in the state is undertaken by the two public research universities in the state—Oklahoma State University and the University of Oklahoma (which together account for more than 95 percent of OSRHE institution research expenditures). Research occurs across an extremely broad spectrum of inquiry—from basic inquiries through to highly applied work focused on specific needs concerning society, industry, and the environment. The output of research comprises expansion of humankind’s base of knowledge (with diffusion of knowledge occurring largely through the academic publishing process and knowledge-transfer events such as research symposia), and the transfer of research innovations into use across society and industry. Covering a broad range of disciplines, research in Oklahoma universities leads to a range of innovations (in technologies, practice recommendations, processes and other arenas) that have application to economic and community development across the state. From direct start-up of new business enterprise based on university innovations, to the transfer of innovations and know-how to existing Oklahoma industry, Oklahoma’s research universities are key contributors to modern economic development in the state. Funding for research comes from multiple sources, primarily including federal grants, sponsored industry research, private foundations and state funding. As will be discussed further in the research chapter of this report (Chapter VI), the research activity undertaken by Oklahoma’s universities generates significant functional benefits and impacts in the state that, like educational benefits, are realized by individuals, families, communities, the economy, society and government.

Outreach. A third major category of functional impacts derives from the purposeful activities of the State System institutions and their associated faculty, staff and student populations to provide benefits for Oklahoma via pathways other than direct degree education or formal research. For example, as a Land-grant university, Oklahoma State University operates a specific institutional organization dedicated to carrying university capacity and capabilities to serve communities, families, individuals, government and industry across the state—“Extension.” Particularly active in service to the agricultural sector and communities of all sizes, extension is a purpose designed outreach entity designed to extend university benefits to as broad a range of populations as possible. At the University of Oklahoma, the Health Sciences Center provides “outreach” of a different sort, providing Oklahomans with access to state-of-the-art clinical medicine, advanced specialty care, diagnostics and preventive medicine—and contributes

to advancing the state of public health across Oklahoma. Extension services and academic medicine represent highly prominent examples of university outreach, but there are a diversity of additional outreach activities and associated benefits including volunteerism and community service offered by university populations, and the strong contributions of higher education institutions to “quality of life” and “quality of place” in Oklahoma through provision of community access to university and college resources, the provision of arts, entertainment and sporting events, and social diversity promoted by higher education institutions. Chapter VII discusses these outreach and extension benefits in further detail, providing examples of many of the broad impacts being generated across the state.

V. EDUCATION: THE FUNCTIONAL IMPACTS OF EDUCATION PROVIDED BY OKLAHOMA STATE SYSTEM OF HIGHER EDUCATION

A. Introduction to Education Impacts

As noted previously, the achievement of higher education carries with it economic benefits (both personal and macro-economic), personal non-monetary benefits, and broad ranging societal benefits. These benefits are discussed within this chapter.

In a knowledge-driven economy, education is a critically important input to economic success and global competitiveness. For a state like Oklahoma to prosper in the modern global economy, it has to possess a literate, skilled, knowledgeable and innovative population and it is OSRHE higher-education institutions that are the primary providers of higher education in the state.

B. Educational Attainment in Oklahoma

The most fundamental metric for OSRHE higher education is volume: degrees and certifications conferred to its graduates. The system enjoys substantial enrollment, with over 190,000 students enrolled in its 25 colleges and universities in the 2009–2010 school year, a slight increase over previous years. Over 30,000 degrees were conferred during that year, including approximately:

- 1,900 Certificates;
- 8,400 Associates;
- 15,500 Bachelors, and
- 4,800 graduate degrees.⁴¹

Importantly, the majority of Certificate, Associate and Bachelor's degree holders, who earn their credentials from State System institutions, remain in Oklahoma, engaged in the Oklahoma economy and its communities. As noted earlier, nearly 90 percent of Oklahoma public higher education graduates remain in the state to live and work one year after graduation, and over 70 percent still remain in the state five years after graduation.⁴² This is vital to maintaining a sustainable employment base for Oklahoma and to providing sufficient numbers of qualified workers for Oklahoma employers to operate, expand and compete. The expertise Oklahoma public higher education graduates attain assists existing companies to address numerous administrative, logistical, process, innovation and technological challenges in their operations, and these graduates' skills are also available for engagement in community affairs, local institutions, and civic leadership.

While Oklahoma's higher education system is enrolling and graduating a substantial volume of students, there is still room to grow in terms of overall educational attainment statistics in the State. The 2011 American Community Survey data⁴³, shown on Table 10, indicate that the percentage of the population of Oklahoma (25 years of age or older) with a higher education degree is lower than for the nation overall—ranging from 10.8 percent lower at the Associate degree level through to 30.4 percent lower at the graduate or professional degree level. It should be noted that these statistics cover higher education provided by both public and private institutions.

⁴¹ Ibid.

⁴² Oklahoma State Regents for Higher Education, Employment Outcomes Report, 2008.

⁴³ U.S. Census Bureau. American Community Survey 2011.

Table 17: Level of Education Attainment in Oklahoma Versus the Nation (2011)

Education Level	U.S.	Oklahoma	Oklahoma Percent Higher/Lower than Nation
High School Graduate (or equivalent)	28.4%	31.4%	+10.0%
Some College, No Degree	21.2%	24.1%	+12.8%
Associate	7.8%	7.0%	-10.8%
Bachelor's	17.9%	16.0%	-11.2%
Graduate or Professional Degree	10.6%	7.8%	-30.4%

Source: Battelle analysis of American Community Survey data

In terms of the population in Oklahoma with a high school education or higher, Oklahoma actually outperforms the nation slightly, with half a percentage point higher educational attainment (Table 18). However, at the Bachelor's or higher degree level, this flips significantly, with Oklahoma having 23.8 percent of its population educated at this level, 18 percent less than the national level of 28.5 percent.

Table 18: Level of Education Attainment in Oklahoma Versus the Nation (2011)

Education Level	U.S.	Oklahoma	Oklahoma Percent Higher/Lower than Nation
High School Graduate (or equivalent) or Higher	85.9%	86.3%	+0.5%
Bachelor's Degree or Higher	28.5%	23.8%	-18.0%

Source: Battelle analysis of American Community Survey data

C. Financial Returns to Oklahoma Public Higher Education

Ultimately, pursuing higher education is a personal decision—a decision made based upon anticipated benefits for the individual. Such individual benefits take many forms. Higher education may be undertaken for the purpose of intellectual curiosity, expansion of personal horizons, or for highly pragmatic reasons such as to enhance one's prospects for employment and to achieve higher levels of income. An education represents a personal good that delivers for an individual throughout their lifetime intellectually, socially and economically.

With educational attainment so closely related to marketable personal economic capacity in an advanced western economy, one of the core metrics for evaluating higher education is the personal (private) economic returns to individuals gained through acquiring higher education credentials. On average, successively higher levels of education come with realization of increased income, and this is certainly the case in Oklahoma. Specific data for Oklahoma (Table 19) present a compelling private financial case for pursuit of higher education.

Table 19: Median Income Levels by Level of Education in Oklahoma

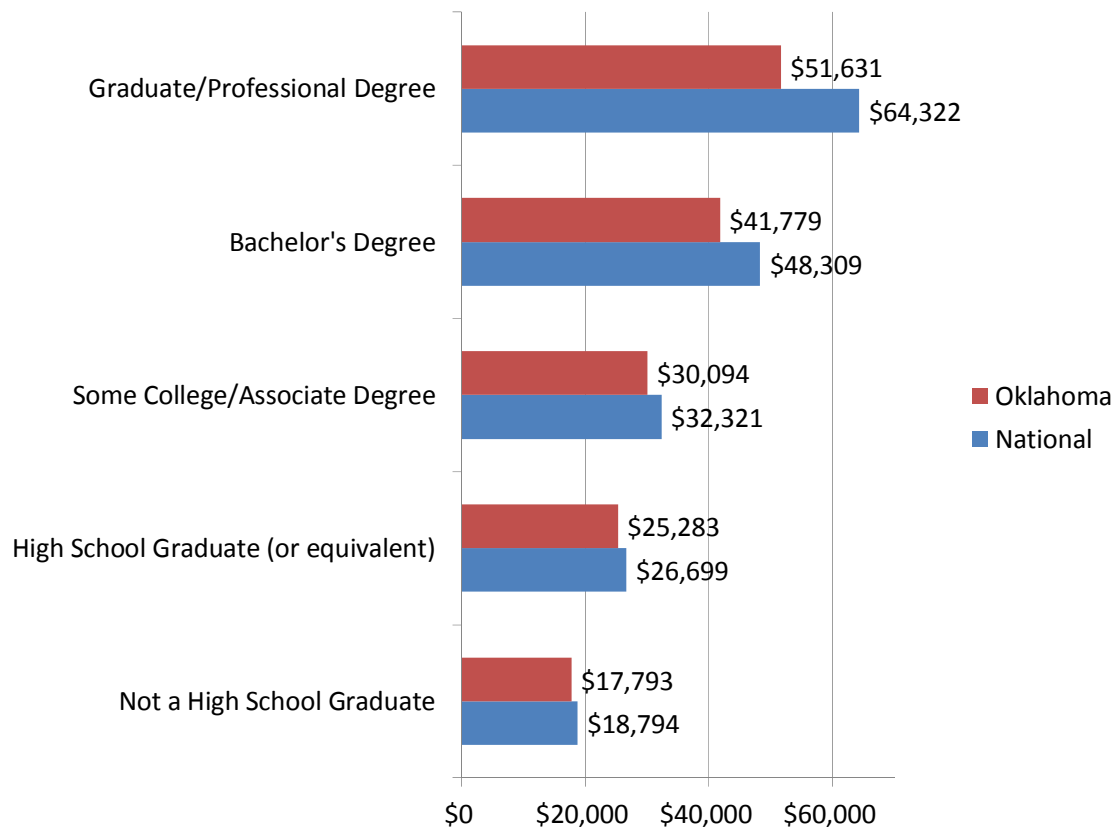
Level of Education	Oklahoma Median Earnings for Past 12 Months (2011 Inflation Adjusted Dollars) Person 25 Years or Older	Percent Increase Over Previous Level of Education	Percent Increase/Decrease Over a High School Diploma
Less Than High School	\$17,793	--	-34.8%
High School Graduate (or equivalent)	\$25,283	34.8%	--
Some College/Associate Degree	\$30,094	17.4%	17.4%
Bachelor's Degree	\$41,779	32.5%	49.2%
Graduate or Professional Degree	\$51,631	21.1%	68.5%

Source: Battelle analysis of American Community Survey data

As Table 19 shows, each successively higher level of educational attainment, on average in Oklahoma, carries with it a substantial rise in median income. Highly telling in these data is the substantial private financial return afforded to attaining a high school diploma, with high school graduates having a median income almost 35 percent higher than those not completing high school. Moving on to higher education and completing some college or an Associate degree brings a 17.4 percent increase in median annual income (from \$25,283 for high school graduates, to \$30,094 for an individual in the “some college/Associate degree” category). Gaining a Bachelor’s degree, on average, adds an additional \$11,685 in annual income over the “some college/Associate degree” category (a substantial 32.5 percent increase), a Graduate or Professional degree in Oklahoma moves the average degree recipient to an average median income of \$51,631 representing a 21.1 percent increase over the Bachelor’s level and more than a 68 percent increase over high school graduate level only.

Figure 2 graphically shows the rising levels of income in Oklahoma at each successive level of education attainment. It also shows that, on average, earnings are lower in Oklahoma than for the nation as a whole. From an economic development perspective, these data may indicate that educated personnel may be a comparative value in Oklahoma versus the cost of labor in the nation on average.

Figure 2: Median Wages by Educational Attainment for Oklahoma and the U.S.⁴⁴



It should be noted that over a lifetime the personal income benefits of gaining an education really add-up and the results show that investment in higher education is unquestionably advantageous.

Figure 3 shows earnings for various education levels versus high school graduates (set at the baseline level of 1.0).⁴⁵ On average, over their working life a person with a Bachelor's degree will earn 1.66 times the earnings of a person ending their education at the high school graduate level. Those with graduate and professional degrees will earn between 1.97 and 2.74 times the person who ends their education with a high school diploma.

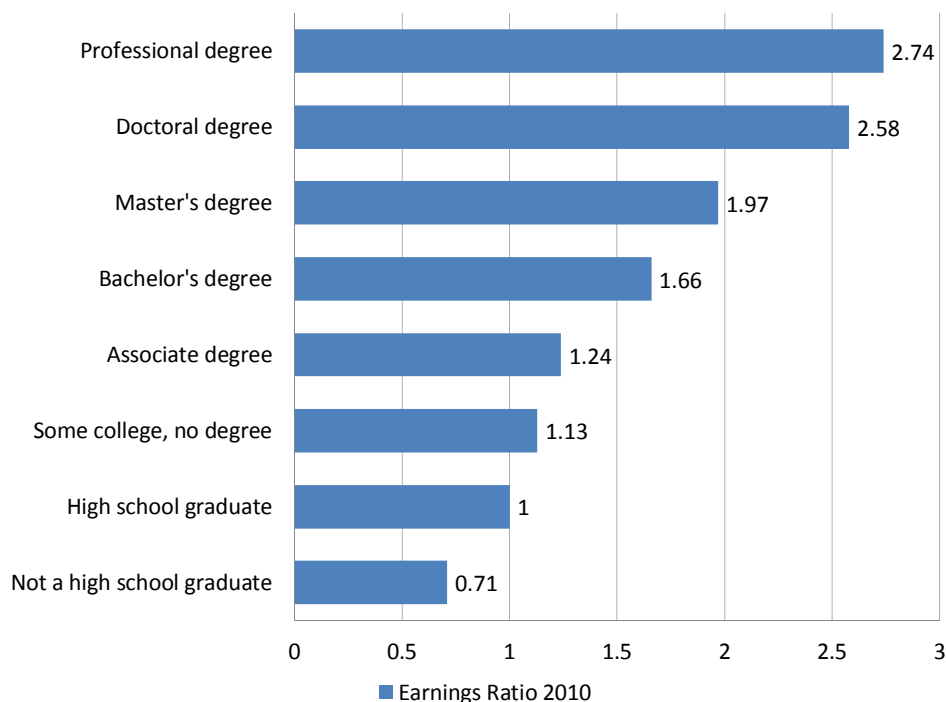
Recently, it should be noted that **the differential in earnings attributed to successively higher levels of attained education has been widening.** In the knowledge-driven 21st century economy, this trend is likely to continue.

It is also important to note that financial security into retirement is also a personal financial benefit associated with gaining higher levels of education. **The likelihood of a person being covered by an employer-provided pension plan increases significantly with educational attainment.** Census Bureau data for 2009 indicate that only 30 percent of persons without a high school diploma are covered by employer-provided pension plans, whereas 65 percent of those with an Associate degree are so covered, and 70 percent of those with a Bachelor's degree or higher.⁴⁶

⁴⁴ Source: Battelle analysis of U.S. Census Bureau *American Community Survey* data

⁴⁵ Sandy Baum and Jennifer Ma (2010). *Education Pays: The Benefits of Higher Education for Individuals and Society*. Trends in Higher Education Series. College Board.

⁴⁶ Ibid

Figure 3: Expected Lifetime Earnings Relative to High School Graduates, by Education Level⁴⁷

Societal Government Revenue and Productivity Returns

It should of course be noted that higher incomes also equate to a benefit for the state, in that higher incomes will result in higher tax payments by individuals to federal and state governments. Baum and Ma's analysis of 2008 Internal Revenue Service data show that, on average, a high school graduate would have paid \$7,100 in taxes in 2008, versus \$13,000 for a person with a Bachelor's degree (almost twice the amount paid by a person with only a high school education), while a person with a Doctorate averaged \$23,100 in taxes paid and those with a Professional degree paid \$25,600.

Economic research shows that there are also societal economic benefits from citizens' educational attainment. These gains come through increased economic productivity that graduates' increased knowledge and skills bring to the workforce.

A 2006 study performed by Simon Tripp of Impact Economics (now Senior Director of the Battelle TPP and an author of this Battelle report) estimated the societal economic returns from education attributable to projected graduates from an expanded University of Minnesota Rochester.⁴⁸ The Tripp study used productivity gain estimates adopted by the Office of the Comptroller in the State of Texas⁴⁹, which were originally

Society as a whole also enjoys a financial return on the investment in higher education. In addition to widespread productivity increases, the higher earnings of educated workers generate higher tax payments at the local, state, and federal levels. Consistent productive employment reduces dependence on public income-transfer programs and all workers, regardless of education level, earn more when there are more college graduates in the labor force.

S. Baum and J. Ma
Education Pays: The Benefits of Higher
Education for Individuals and Society

⁴⁷ Sandy Baum and Jennifer Ma (2010). *Education Pays: The Benefits of Higher Education for Individuals and Society*. Trends in Higher Education Series. College Board.

developed by Black and Lynch⁵⁰ at the National Bureau for Economic Research. They used data from a large-sample survey to calculate that a 10 percent increase in the average educational level of workers results in a 5.9 percent to 12.7 percent increase in nonmanufacturing industries' productivity.

The State of Texas study used the lower range of productivity gains of nonmanufacturing workers to derive a conservative estimate of impacts. Their analysis accounts for the costs involved in earning higher-education credentials, concluding that the net present value (to the economy via productivity enhancement) per student per year of higher education amounts to \$39,000. The study for the University of Minnesota used the same \$39,000 value figure; and, to keep estimates consistent, the same figure has been used by Battelle TPP to estimate the potential benefit of higher education in other state economies⁵¹ and in Oklahoma.

Carrying these figures through to the 15,671 graduates of the Oklahoma public higher education system's 2009–2010 Bachelor's degree programs, the net present value of their educational attainment is estimated at a conservative \$611.2 million. Of course, this represents a rolling benefit for Oklahoma's economy, with each consecutive graduating baccalaureate class generating similar lifetime productivity gains across the economy.

Analysis performed in 2008 by REMI for OSRHE provide another important perspective on gains in the Oklahoma economy from the education and services performed by State System institutions. The REMI modeling estimated the impact of education on Gross State Product (GSP) for 2008, and provided projections forward for 2018, 2028, 2038 and 2048. The analysis show large-scale and expanding GSP benefits for Oklahoma today and into the future. REMI analysts concluded that:

In the first analysis year, \$1.099 billion of state higher education funding results in \$6.76 billion of economic activity. In other words, one dollar from the state enables \$5.15 of additional economic activity that is directly attributable to the activities linked to the institutions of higher education. Furthermore, that initial investment of one dollar yields \$27.07 over the analysis period as the effects of graduate earnings and productivity make their mark on the economy.⁵²

REMI's analysis concludes that the largest contributions to overall GSP impacts in the State from higher education are associated with graduate productivity increases allocable to their education. REMI concluded that 68.4 percent of the cumulative growth in GSP in Oklahoma allocable to higher education in State System institutions would be the result of workforce productivity increases of system graduates.

D. Personal Nonmonetary Benefits Associated with Oklahoma Public Higher Education

While achieving higher levels of educational attainment is associated, as we have seen, with higher income levels and overall financial security, there are also significant personal non-monetary benefits that accrue to higher education. Some of the non-monetary benefits identified include:

⁴⁸ S. Tripp, Impact Economics, LP (2006). "Projections of Economic Impact: The Role and Impacts of a Signature Research University in Southeast Minnesota." Performed for the Rochester Higher Education Development Committee. April.

⁴⁹ C. K. Strayhorn (2005). "The Impact of the State Higher Education System on the Texas Economy." Office of the Comptroller of Texas: Special Report.

⁵⁰ S. Black and L. Lynch (1995). "Beyond the Incidence of Training: Evidence from a National Employers Survey." Working Paper No. 5231, National Bureau of Economic Research (Cambridge, MA).

⁵¹ Battelle TTP: The Impact of the University of Arkansas for Medical Sciences, December 2010.

⁵² REMI. (2008) "The Economic Impact of the Higher Education System of the State of Oklahoma." Regional Economic Models, Inc. September 2008.

- **Increased Job Satisfaction.** In examining 2008 data, Baum and Ma found that 58 percent of college graduates and persons with some college education reported being “very satisfied” with their jobs. The contrasting figure for those with less than a high school diploma was just 40 percent.⁵³
- **Higher Objective Measures of Happiness.** McMahon notes that economists find that happiness increases with income, and of course that income is correlated with education levels.⁵⁴ It should be noted, however, that there seems to be a cap on happiness increases associated with income, with increases occurring as a person increases income to circa \$20,000 per capita, or \$80,000 for a family of four (evidence is weaker that education contributes happiness further beyond that level of income).
- **Health Benefits.** Studies that have controlled for other factors such as IQ (inherent capability), occupation and income, have found that higher education attainment is associated with objectively enhanced measures of personal health and longevity.⁵⁵ Baum and Ma, for example, show data that graphically illustrate differences in smoking rates by education level (higher education correlated with lower smoking rates) and obesity levels (lower levels of obesity associated with higher levels of education attainment). Persons with higher educational attainment are also more likely to exercise on a regular basis, while women are more likely to give birth to babies with normal birth weight.⁵⁶ A study performed in the State of Washington found that “people who attain higher levels of education report they feel healthier than people who do not.”⁵⁷ The authors note that “nationally, at every age and income level, individuals with higher education attainment report better health than those with less postsecondary education.”

It is beyond the scope of this study to provide a comprehensive listing of all the non-monetary benefits that may accrue to individuals via their higher education, but an excellent discussion and analysis of the topic may be found in the work of McMahon, Baum and Ma and others previously cited herein. Of particular interest to the reader, however, should be the fact that multiple researchers have concluded that non-market benefits (i.e., non-income benefits) associated with higher levels of educational attainment may actually exceed the already substantial monetary benefits. In a meta-analysis of other economic studies, McMahon places a monetary value on the non-market benefits (non-earnings benefits) of gaining higher education—deriving an annual benefit figure of \$31,174 allocable to better health, increased longevity, better health of the educated person’s children, and other miscellaneous factors.⁵⁸

⁵³ Sandy Baum and Jennifer Ma (2010). *Education Pays: The Benefits of Higher Education for Individuals and Society*. Trends in Higher Education Series. College Board.

⁵⁴ Walter W. McMahon (2009). “Higher Learning, Greater Good: The Private and Social Benefits of Higher Education.” Page 119. The Johns Hopkins University Press.

⁵⁵ For example, see Michael Grossman (2006). “Education and non-market outcomes.” Chapter in E. Hanushek and F. Welch (editors) “Handbook of the Economics of Education” Amsterdam, North Holland.

⁵⁶ Sandy Baum and Jennifer Ma (2010). *Education Pays: The Benefits of Higher Education for Individuals and Society*. Trends in Higher Education Series. College Board.

⁵⁷ “Key Facts about Higher Education in Washington.” Chapter VI: Public Benefits of Higher Education. Accessed online at: <http://www.wsac.wa.gov/KeyFacts2012>

⁵⁸ Walter W. McMahon (2009). “Higher Learning, Greater Good: The Private and Social Benefits of Higher Education.” Table 4.3, Pages 156–161. The Johns Hopkins University Press.

E. Societal Benefits Associated with Oklahoma Public Higher Education

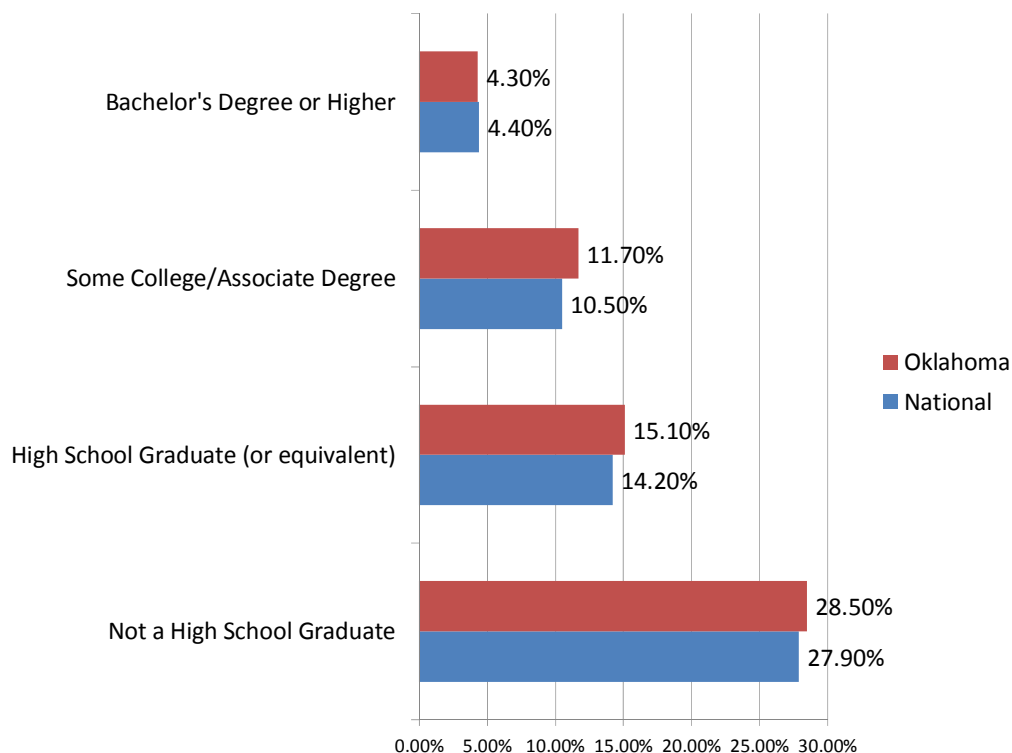
While the decision to pursue higher education is an individual decision, it is also a decision, that research shows, benefits society overall.

The State of Oklahoma supports public higher education for many reasons. Certainly there is state recognition for the personal benefits of higher education that will accrue to Oklahomans through accessing higher education services, but there is also recognition that an educated populace carries social and economic benefits for the State of Oklahoma overall.

State Government in Oklahoma seeks to enhance the economic performance of the state and, as has been discussed, a skilled and educated populace is of central importance to economic growth and competitiveness in an increasingly global economy. For Oklahoma to successfully compete it has to have a workforce that is productive and innovative.

There are also negative social and governmental costs that are associated with lower levels of education that higher education ameliorates. Poverty, for example, comes with a significant cost for state government in the form of welfare payments, Medicaid costs, etc. and the difference in the poverty rate across education levels is stark. Figure 4 shows the large-scale drop in the incidence of poverty associated with various education levels in Oklahoma and the U.S.

Figure 4: Poverty Levels in Oklahoma and the Nation by Education Level⁵⁹



In terms of the percentage of persons participating in **Medicaid public assistance**, there is clear data to show that the need to rely on Medicaid for health care declines significantly with education attainment. Nationally, those with a Bachelor's degree or higher only participate in Medicaid at a rate of 7 percent,

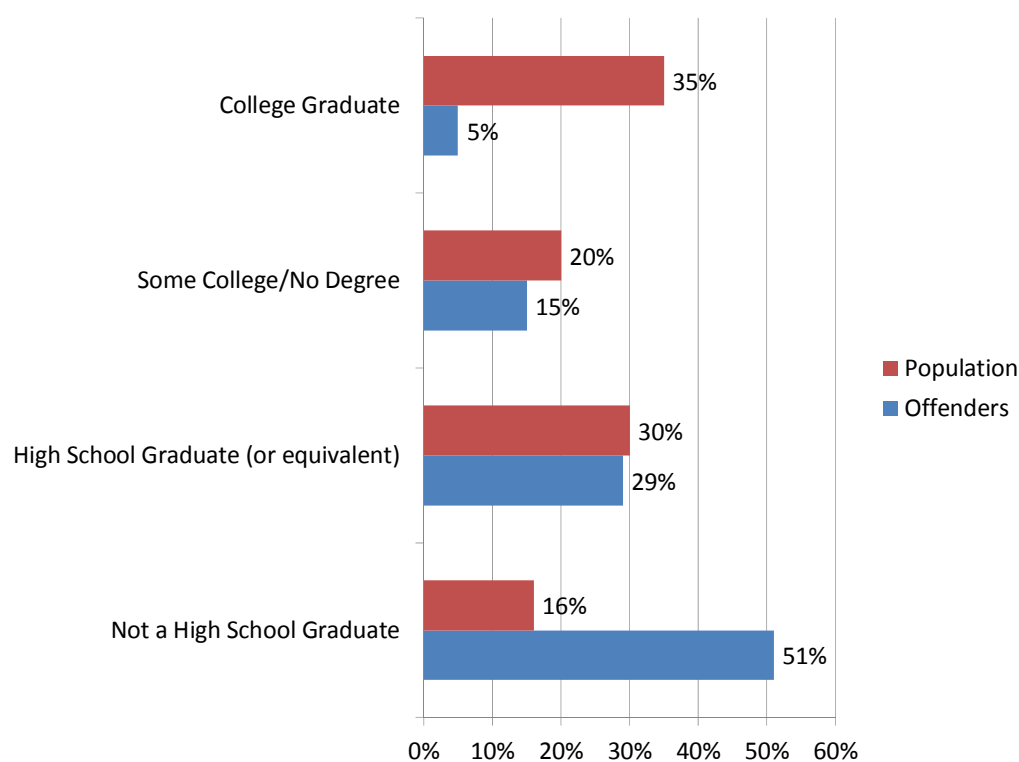
⁵⁹ Source: Battelle analysis of U.S. Census Bureau *American Community Survey* data

versus 14 percent of those with an Associate degree, 16 percent for “some college no degree,” 21 percent for high school graduates, and 38 percent for those without a high school diploma or equivalent.

Similar trends are readily apparent in U.S. Census statistics for **food stamp programs** and for **school lunch public assistance**. Only 1 percent of those with a Bachelor’s degree or higher require food stamps, while 8 percent of high school graduates do so and 18 percent of non high-school graduates. In terms of subsidized school lunches these figures repeat (1 percent, 8 percent and 18 percent).⁶⁰

Of great concern to states are crime rates and the rise in incarceration and associated criminal justice costs. Data and many individual research studies show that criminal behavior decreases substantially as educational attainment increases. Figure 5 graphically illustrates this, at the national level, with data for offenders sentenced in U.S. District Courts as compared to the U.S. population 25 and over, by education level. As researchers in Washington state have noted “individuals who attain higher levels of education tend to be less likely to enter the criminal justice system and thus avoid attendant costs to the state.”⁶¹

Figure 5: Offenders Sentenced in U.S. District Courts as Compared to U.S. Population 25 and Over, by Education Level. Offenders Sentenced under the U.S. Sentencing Commission Guidelines.⁶²



Other social benefits accrue to states that are correlated with educational attainment. Bureau of Labor statistics data for 2009, reported by Baum and Ma, show that those with a higher level of education are **more likely to perform volunteer services** in their community. The national data show only 9 percent of

⁶⁰ Source: U.S. Census Bureau data for 2009.

⁶¹ “Key Facts about Higher Education in Washington.” Chapter VI: Public Benefits of Higher Education. Accessed online at: <http://www.wsac.wa.gov/KeyFacts2012>

⁶² Source: Sourcebook of Criminal Justice Online: 2010.

those individuals who do not have a high school diploma performing volunteer activities on an annual basis, versus 30 percent of those with “some college or an Associate degree” and 43 percent of those with a Bachelor’s degree or higher. Civic engagement, as measured by **voting activity** for example, also increases substantially with education level with, for example, 76 percent of Bachelor’s degree recipients aged 25 or older reported voting in the 2000 presidential election, compared to 56 percent of those with a high school diploma only.⁶³

Conclusion

It is clear that public education brings highly substantial benefits for Oklahoma—benefits that are realized individually by Oklahomans, and collectively across the economy and society. For the individual, achieving higher education in Oklahoma brings financial benefits in terms of significantly enhanced income and employment benefit levels, but it also comes with additional personal benefits such as enhanced job satisfaction, happiness, health and longevity. Government, industry and society benefit directly from those achieving higher education through enhanced economic productivity, economic growth and government revenues, and through reductions in social programs costs and negative externalities. Furthermore, society benefits in general by having a more highly educated populace in terms of civic engagement, volunteerism, child welfare and a broad variety of other factors.

⁶³ Institute for Higher Education Policy (2005). “The Investment Payoff: A 50-State Analysis of Public and Private Benefits of Higher Education.” Washington DC. IHEP.

VI. RESEARCH: THE FUNCTIONAL IMPACTS OF RESEARCH PROVIDED BY THE OKLAHOMA STATE SYSTEM OF HIGHER EDUCATION

A. Why Research Matters

In an interesting paradox, the more global our economy has become the more local R&D know-how, entrepreneurial culture, workforce skills and manufacturing competencies matter for economic success. Unlike the past when competition from developing nations was limited to low-cost, commodity driven production, today these developing nations are making significant advancements in their education levels and technological capabilities that is allowing them to compete for an ever increasing range of higher value goods and services.

In this global, knowledge-based economy, it is not surprising that university research is viewed as a critical asset for a state's economic development. As the National Governors' Association, in its guidance to governors on State Leadership in the Global Economy, explains:

*World class research is a passport to success in the global economy. Industry can no longer compete by selling standard products made with standard processes and that could be produced anywhere in the world at lower cost. Businesses must constantly innovate to raise the quality of production, introduce new product lines or services, and add greater value to their outputs. For this reason, states must create an environment that supports continuous innovation. This requires investment in cutting-edge research, facilities and equipment.*⁶⁴

Indeed, the evidence on the importance of research universities to advancing technology-based economic development is overwhelming:

- The Milken Institute notes that research centers and institutes are “indisputably the most important factors in incubating high-tech industries.” In a widely cited study, they found that 65% of the difference in economic success for regions from 1975 to 1998 is accounted for by the presence and growth of high-technology industries.⁶⁵
- According to a study prepared for the U.S. Small Business Administration, “Research universities and investment in research universities are major factors contributing to economic growth in the labor market areas in which the universities are situated.”⁶⁶
- Studies by the Office of Technology Policy and others have found that all areas of technology-based economic development in the United States have strong concentrations of both university and private research.⁶⁷
- A long term longitudinal study of the relationship between the stocks of knowledge from academic publications and industrial productivity found a significant and large impact.⁶⁸

⁶⁴ National Governor's Association, “A Governor's Guide to Trade and Global Competitiveness,” 2002, page 5.

⁶⁵ Milken Institute, *America's High-Tech Economy*, 1999.

⁶⁶ Bruce Kirchhoff, “The Influence of R&D Expenditures on New Firm Formation and Economic Growth,” Maplewood, N.J.: BJK Associates, 2002.

⁶⁷ U.S. Department of Commerce, Office of Technology Policy, *The Dynamics of Technology-based Economic Development: State Science and Technology Indicators*, Washington, D.C., 2000.

⁶⁸ James D. Adams, “Fundamental Stocks of Knowledge and Productivity Growth, *Journal of Political Economy*, 98:673–702

- An industry survey by Carnegie Mellon University found that university and government laboratory research importantly affects industrial R&D across much of the manufacturing sector, equally through suggesting new projects and contributing to the completion of existing projects and that the influence of research on industrial R&D is disproportionately greater for larger firms as well as start-ups.⁶⁹

Each state has its own set of research university drivers upon which to draw in order to raise its level of innovation and skills to compete globally. In many of the leading regions in knowledge-based development these relationships are highly notable, such as in Boston (with Harvard and MIT) or Research Triangle (with University of North Carolina, NC State and Duke University) or Silicon Valley (with Stanford University). The benefits that a state's university research base can advance are best considered through a number of standpoints:

- What is the overall university research growth trajectory and its ability to compete for federal research funding;
- Where are the areas of research excellence that stand out and how do they align with key industry drivers;
- How well is the university research base directly connected to industry;
- How does the university research base perform in turning transferring their discoveries to the marketplace.

Regions such as Boston, Silicon Valley, and, more recently, Austin, TX, and the Greater Washington, DC, Corridor, utilize the research strengths of their leading universities, research institutes, and private industry to build new industries and generate broad economic gains. It is essential to recognize, however, that states that will excel in the future will not pursue research for research's sake. Instead, they will develop integrated, comprehensive development strategies that link core research strengths with technology industry drivers, both existing and emerging.

B. University Research Trends

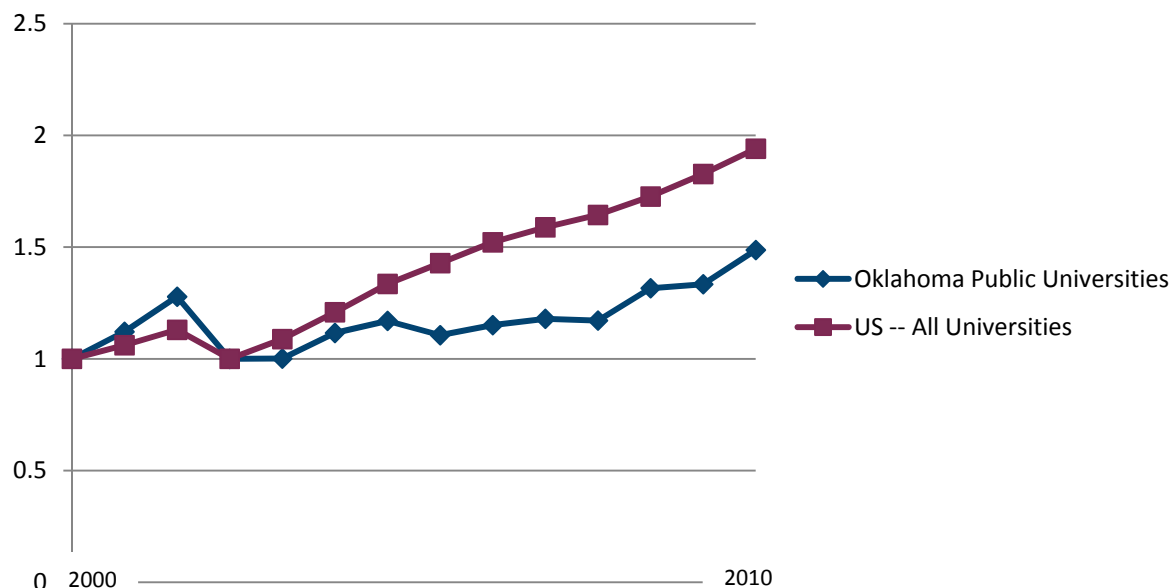
In Oklahoma, the state's two public research universities—Oklahoma State University and the University of Oklahoma—are the key drivers of the state's overall university research base. Together these two state research universities comprise 92 percent of all public and private university research in Oklahoma. Other public colleges and universities play an important role in economic development as well, but largely for their efforts in talent generation and workforce development.

In recent years public university research growth in Oklahoma has picked up, after a weak period of growth in the first half of the decade. Public university research in Oklahoma grew by \$75 million from 2006 to 2010, a gain of 26.1 percent and stood at \$360 million in 2010. This growth outpaced the national growth in total university research of 22.1 percent over the 2006 to 2010 period.

But prior to the recent strong surge in public university research growth in Oklahoma, the state was falling behind the nation. From 2000 to 2005, Oklahoma grew in public university research by only 15 percent compared to total university research growth of 52 percent for the nation.

⁶⁹ Cohen, Nelson and Walsh, "Links and Impacts: the Influence of Public Research on Industrial R&D, Management Science, January 2002, Vol. 48, No 1.

Figure 6: Trends in Oklahoma Public Universities Research Expenditures and Total U.S. University Research Expenditures, 2000 to 2010



Federal research funding increases led this recent growth in Oklahoma public university research

growth from 2006 to 2010. Over the 2006 to 2010 period, federal funding for public university research in Oklahoma grew by \$34 million, contributing 45 percent to the increase. By comparison, state funding for public university research grew \$15 million. So for every \$1 in state funding, the public universities in Oklahoma were able to generate an addition \$2.24 in federal funding.

This growth in federal research funding is equivalent to bringing new economic wealth into Oklahoma, and so on its own contributes to economic development in the state.

Federal research funding growth also points to the competitiveness of the public university research underway in Oklahoma since nearly all federal funding is peer-reviewed and competitively awarded.

C. Defined Areas of Excellence in Research Found Across Public Universities in Oklahoma

One way to consider areas of excellence in research is to identify specific research fields in which Oklahoma's public universities stand out. This is possible by examining research expenditure data reported by all universities to the National Science Foundation, which tracks research funding from all sources (federal, state, industry, non-profits, institutional and others) by the specific fields and subfields in engineering, physical sciences, environmental sciences and life sciences (see Table 20).

Environmental sciences is the major field that stands out in research funding among public universities in Oklahoma. Oklahoma's public universities conducted \$43.6 million in research in environmental sciences in 2010, comprising nearly 1.5 percent of all national research in this major field—more than double the overall state average level of national university research expenditures—and have well outpaced national growth from 2006 to 2010. Within environmental sciences, Oklahoma is a national leader in **atmospheric sciences**, with 5.8 percent of all university research conducted nationally, and in **earth sciences**, with 1.7 percent of all university research conducted nationally. These two fields are critical for agricultural industries and underpin the growing climate research area.

In two major fields—“engineering” and “mathematics and computer sciences”—Oklahoma has been growing significantly in research funding from 2006 to 2010 and well outpacing the nation. In engineering, Oklahoma public research universities have grown by 74 percent compared to 32 percent for the nation from 2006 to 2010, while in mathematics and computer sciences the state’s public universities rose by 68 percent in research funding from 2006 to 2010 compared to 15 percent for the nation. Within engineering, particularly strong growth has been recorded in **chemical engineering** at Oklahoma’s public research universities, which rose from \$6.6 million in 2006 to \$23.3 million in 2010—a substantial 252 percent increase—which now places Oklahoma’s public universities among the national leaders with 2.9 percent of the national university research funding in this area. Chemical engineering encompasses two important areas of technology development in Oklahoma, petroleum engineering and bioprocessing.

The largest field of research overall in Oklahoma is in life sciences, with \$188 million in research funding or slightly more than half of all research conducted by public universities in the state. Despite its size, Oklahoma’s life sciences research base is slightly below the overall state average of national university research expenditures and has not been growing as fast as the nation. One subfield of life sciences where Oklahoma stands out, though, is in **agricultural sciences**, with \$40.5 million in research funding in 2010, representing 1.4 percent of university research funding across the nation, and growing slightly faster than the nation from 2006 to 2010 (7.4 percent in Oklahoma compared to 6.8 percent nationally).

An even more refined examination of research excellence can be obtained by examining publications activities in peer-reviewed journals. Publications activities are a key measure of scholarly activity and a critical factor in tenure and other faculty promotion decisions. Two measures of publications activity capture how specific fields of research stand out within the universities of a state. One is the share of U.S. publications, which measures level of activity, and the other is the state’s level of citations per publication compared to the U.S. average for that field, which offers a perspective on the quality of publications generated. Both of these measures are provided by Thomson Reuters’ University Science Indicators database that tracks major university and medical center publications activity across well over 200 discrete research fields associated with specific peer-reviewed journals (see Table 21).

An examination for Oklahoma State University and the University of Oklahoma reveals that 48 specific research fields with at least 50 publications from 2006 to 2010 stand out in either the share of national publications or quality of the publications, or both:

- 13 fields have both a high share of U.S. publications (1 percent or more) and a higher citations per publication average (5 percent or higher) in Oklahoma, including particle and multidisciplinary physics, nuclear sciences, ocean engineering, internal medicine, dairy and animal sciences, manufacturing engineering, petroleum engineering, rheumatology, ecology, biodiversity conservation, entomology and applied psychology.
- 12 fields have a 5 percent or higher average citations per publication—a measure of quality of publications—compared to the U.S. average, including: instrumentation, otorhinolaryngology (ENT), genetics and heredity, hematology, marine and freshwater biology, ophthalmology, obstetrics & gynecology, cardiac and cardiovascular systems, mathematical physics, evolutionary biology, water resources and operations research.
- 23 fields have a higher than 1 percent share of all U.S. publications, including over 1.5 percent for agricultural economics, meteorology, veterinary sciences, horticulture, agronomy, soil

sciences, business, parasitology, communications, and educational psychology.

What emerges from this review of publications activity are strengths that span more broadly across the research base and include:

- **Agricultural and environmental sciences**, which are critical for the state's traditional strength in agriculture. Here the excellence in scholarly activity is quite extensive ranging from numerous fields in animal sciences to plant sciences to water management to atmospheric sciences.
- **Energy**, another important economic driver, with particular strengths found in Oklahoma in petroleum engineering and nuclear sciences.
- **Manufacturing-related fields** with strengths in industrial engineering, operations research and business.
- **Clinical fields of medicine**, representing both an emerging area of new industry development and a key quality of life driver for the state in its quality of health care excellence. Among the clinical areas of medical research that stand out are internal medicine, rheumatology, ear, nose and throat, ophthalmology, obstetrics & gynecology, and cardiology.
- **Broader physical and biological sciences**, which offer enabling research to more applied fields of sciences, particularly particle and multidisciplinary fields of physics, genetics and heredity, evolutionary biology, biodiversity, and entomology.

Table 20. Research Funding Levels, Share of U.S. and Growth Trends for Oklahoma Public Universities

Research Fields	2010 Funding Levels (\$ in thousands)	Oklahoma Share of U.S. 2010	Percentage Change 2006-2010	
			Oklahoma	United States
Aeronautical and Astronautical	367	0.06%	69.9%	64.0%
Bioengineering/ Biomedical Engineering	719	0.10%	4.1%	55.6%
Chemical Engineering	23,294	2.92%	252.2%	45.7%
Civil Engineering	8,288	0.78%	30.7%	24.0%
Electrical Engineering	7,623	0.38%	-0.6%	24.7%
Mechanical Engineering	6,272	0.44%	7.0%	36.8%
Other Engineering	21,939	1.25%	82.9%	16.8%
ENGINEERING TOTAL	68,502	0.73%	74.0%	32.1%
Chemistry	10,777	0.62%	14.4%	23.0%
Physics	11,219	0.56%	29.0%	24.5%
PHYSICAL SCIENCES TOTAL	21,996	0.48%	18.7%	21.0%
Atmospheric Sciences	24,747	5.78%	9.5%	-15.5%
Earth Sciences	18,275	1.68%	53.5%	20.9%
Other Environmental Sciences	551	0.12%	81.3%	27.1%
ENVIRONMENTAL SCIENCES TOTAL	43,573	1.46%	24.9%	14.9%
Mathematical Sciences	2,888	0.48%	175.0%	13.0%
Computer Sciences	3,827	0.23%	30.0%	15.3%
MATH + COMPUTER SCIENCES TOTAL	6,715	0.30%	68.2%	14.7%
Agricultural Sciences	40,548	1.36%	7.4%	6.8%
Biological Sciences	76,897	0.70%	15.3%	21.0%
Medical Sciences	65,860	0.34%	12.0%	21.2%
Other Life Sciences	4,819	0.27%	15.8%	52.4%
LIFE SCIENCES TOTAL	188,124	0.54%	12.4%	21.1%
PSYCHOLOGY	4,557	0.42%	63.5%	23.1%
SOCIAL SCIENCE TOTAL	13,237	0.66%	4.6%	17.0%
OTHER SCIENCES	13,716	1.19%	121.6%	30.4%
TOTAL SCIENCE AND ENGINEERING R&D	360,420	0.62%	26.1%	22.1%

Source: National Science Foundation, Higher Education Research and Development Survey, FY 2010

Table 21. Publications Activity for Scholarly Fields with High Share or High Quality Across Oklahoma Public Research Universities*

Field	Citations	Papers	Share of U.S. Papers	Citation Impact
High Share and High Impact				
Physics: Particles & Fields	4735	185	1.36%	2.94
Nuclear Science & Technology	400	82	0.97%	2.00
Engineering: Ocean	253	57	3.74%	1.86
Medical: General & Internal	910	141	4.03%	1.82
Agriculture: Dairy & Animal Science	283	89	6.96%	1.76
Physics: Multidisciplinary	6,442	395	1.94%	1.48
Engineering: Manufacturing	187	61	1.37%	1.42
Engineering: Petroleum	118	79	3.70%	1.38
Rheumatology	945	73	1.38%	1.28
Ecology	2,943	365	1.31%	1.13
Biodiversity Conservation	390	68	1.17%	1.13
Entomology	537	152	1.62%	1.12
Psychology: Applied	441	103	1.55%	1.09
High Impact Only				
Instruments & Instrumentation	565	102	0.86%	1.86
Otorhinolaryngology	228	50	0.66%	1.29
Genetics & Heredity	3,947	248	0.73%	1.20
Hematology	2,464	165	0.79%	1.16
Marine & Freshwater Biology	462	91	0.76%	1.14
Ophthalmology	678	103	0.74%	1.13
Obstetrics & Gynecology	842	153	0.94%	1.12
Cardiac & Cardiovascular Systems	1,999	181	0.64%	1.12
Physics: Math	305	63	0.56%	1.10
Evolutionary Biology	820	79	0.77%	1.10
Water Resources	403	100	0.95%	1.08
Operations Research & Management	232	84	0.95%	1.05
High Share Only				
Agricultural Economics & Policy	95	62	2.33%	0.49
Meteorology & Atmospheric Sciences	1,981	398	2.27%	0.71
Veterinary	918	353	2.19%	0.89
Horticulture	124	68	1.90%	0.69
Agronomy	473	144	1.89%	0.97
Agriculture: Soil Sciences	238	75	1.87%	0.76
Business	615	165	1.74%	0.96
Parasitology	424	76	1.66%	0.79

Communication	182	86	1.58%	0.97
Psychology: Educational	160	64	1.55%	0.68
Sport Sciences	598	167	1.35%	0.81
Engineering: Chemical	526	181	1.33%	0.69
Plant Sciences	1,544	243	1.29%	0.87
Management	589	150	1.28%	1.03
Microbiology	2,920	313	1.23%	0.92
Business Finance	148	80	1.21%	0.55
Information Science & Library Science	145	69	1.18%	0.83
Education: Scientific Disciplines	87	73	1.17%	0.55
Psychology: Social	232	91	1.15%	0.59
Engineering: Industrial	103	51	1.13%	0.97
Family Studies	127	58	1.12%	0.71
Chemistry: Inorganic & Nuclear	558	96	1.09%	0.94
Nutrition & Dietetics	460	119	1.04%	0.54

Source: Thomson Reuters, University Science Indicators. Covers University of Oklahoma and Oklahoma State University

*High share is 1% or more of all U.S. publications for field; High quality is measured by 5% or higher than U.S. average of citations per publication for the field

D. Direct Economic Development Connections: Industry Sponsored Research and Commercialization of Research

Universities also have direct connections to economic development through industry sponsored research activities and commercialization of their research results.

The level of industry sponsored research points to not only the relevance of university research expertise to meeting industry needs, but also its openness to address research questions of relevance to industry.

Oklahoma has a high level of industry sponsored research, which is growing faster than the overall research funding at Oklahoma's public universities. In 2010, industry sponsored research at Oklahoma public universities stood at over \$20 million, comprising 5.7 percent of the university research base. By comparison, industry sponsored research across the nation stood at only 3.6 percent in 2010—so Oklahoma's level of industry sponsored research compared to its overall research activity is 1.5 times higher than the nation.

Industry sponsored research has also increased rapidly in Oklahoma compared to the overall research base and to the nation. While total public university research activity increased by 26.1 percent in Oklahoma from 2006 to 2010, industry sponsored research rose by 49.8 percent—so nearly double the rate of the total increase in public university research funding. This 49.8 percent increase in industry sponsored research funding in Oklahoma from 2006 to 2010 well outpaced the national average increase of 25.8 percent.

Another key measure of a public university's direct economic development contribution is its commercialization of research. Since the passage of the Bayh-Dole Act, universities have a responsibility to move research discoveries into the marketplace. This is often managed by a university's technology transfer office, but involves a broader commitment of a university's leadership to support commercialization with dedicated resources and to set incentives for faculty to participate in

commercialization as well as reflects the university's culture and the interests of faculty in advancing the commercialization of their research.

There is a continuum of activities that underpin university technology transfer that begins with the disclosure of new discoveries through protecting intellectual property and then licensing to companies or start-up enterprises. Gaps in any part of this continuum hold back a university's overall performance in commercializing its research.

Data reported to the Association of University Technology Managers (AUTM) suggests that Oklahoma public universities have active technology transfer and commercialization programs, but have mixed results compared to the national average. The only two universities reporting technology transfer data to AUTM from Oklahoma are the University of Oklahoma and Oklahoma State University, which together represent the lion's share of public research in the state (Table 22). In viewing the technology transfer data over the last five years, while there are ups and downs in any individual year in Oklahoma, the pattern is consistent. Therefore, it is useful to consider the five year average to better smooth out these yearly variations.

On average from 2005 to 2010, Oklahoma public universities annually generated 96 disclosures, file 98 patents (some can be from prior year disclosures), received 23 patent awards, executed 12 new licenses and started four new companies. This suggests an active technology transfer and commercialization effort underway with tangible results.

In terms of how this performance stacks up, the best way to compare technology transfer activity to other universities across the nation is through standardizing these technology transfer activities as a percent of the research base. What this reveals is that Oklahoma public universities are higher in patenting activity and start up activity, but slightly lagging in their performance in disclosures and significantly lagging in licensing activities.

Table 22. Technology Transfer Measures of Performance for Oklahoma Public Universities* Compared to the Nation, Annual Average for 2005 to 2010

		Disclosures	Patents Filed	Patents Awarded	Licenses Executed	License Income	Start-Ups Formed
Oklahoma Average Levels, 2005 to 2010		95.8	98.5	23.2	12.3	\$1.62 m	4.3
Range for Oklahoma in 2005 to 2010		75-115	80-124	10-35	8-19	\$1.350m to \$1.896m	3-8
Per \$10m of Research Funding	Oklahoma	3.39	3.48	0.82	0.44	\$57,170	0.15
	U.S.	3.86	3.32	0.67	0.86	\$469,996	0.11

Source: Association of University Technology Managers

*Results are for University of Oklahoma and Oklahoma State University

VII. OUTREACH: THE FUNCTIONAL IMPACTS OF OUTREACH, EXTENSION, AND OTHER ASSOCIATED ACTIVITIES UNDERTAKEN BY THE OKLAHOMA STATE SYSTEM OF HIGHER EDUCATION

A. Introduction to Outreach Impacts

While all institution within the Oklahoma State System of Higher Education engage in teaching, and many take part in conducting research, it is the third critical mission, outreach, which often has the most significant impact on the businesses and communities that partner with State System institutions. Through outreach, the State System institutions “extend” their resources, solving public needs with university-based intellectual capital through multiple activities.

Today, State System institutions focus on a wide array of critical issues affecting people’s daily lives and the state’s future. Through their activities, State System institutions have a substantial track record in contributing to Oklahoma’s overall quality of life and positively impacting the economy of the state. As “knowledge” and intellectual capacity become the foremost drivers of modern economies, it is likely that higher education outreach activities will grow in their central importance to economic progress. Strengthening the lives and communities of Oklahoma through research-based educational outreach are keys to the long-term competitive sustainability of Oklahoma’s standard of living.

B. Agbioscience Outreach

The agricultural bioscience (agbioscience) sector is a knowledge-based industry cluster that is constantly reinvented as researchers discover new technologies that impact food and fiber production and consumption, and educators disseminate these technologies through extension programs for clientele. Furthermore, advances in the agbioscience sector have shifted agriculture’s focus beyond food and fiber production toward goals of discovering alternative energy sources, improving public health and social well-being, and sustaining the environment. Agriculture is playing a new and different role in delivering nutritional, pharmaceutical, and bio-based products; in providing sound stewardship of resources; and in supporting rural communities. These technological breakthroughs take shape in new and innovative products used in everyday life.

For Oklahoma’s agbioscience sector to remain competitive, the state’s producers must be equipped with the knowledge, skills, tools, and inputs required to generate quality products at competitive prices. It may come as a surprise that agriculture, perhaps more than any other industry, requires specialized local industry research and development (R&D) to remain competitive. Unlike producers of the typical manufactured product, agricultural producers must work within an environment that contains great year-to-year variability, uncertainties, and risks.

As a Land-grant University, Oklahoma State University operates a specific institutional organization dedicated to carrying university capacity and capabilities to serve communities, families, individuals, government and industry across the state—“Extension.” Particularly active in service to the agricultural sector and communities of all sizes, Extension is a purpose designed outreach entity designed to extend university benefits to as broad a range of populations as possible.

The modern Oklahoma economy is firmly rooted in advanced agriculture and agribusiness activities. Analysis by Battelle⁷⁰ indicates that agriculture, agribusiness, and agricultural support activities provide more than 17 percent of state employment (jobs for more than 343,000 Oklahomans). Oklahoma is a key hub for U.S. agricultural production, ranking sixth among all states in agricultural employment and generating a direct agricultural output of \$4.7 billion.

For a modern state like Oklahoma, competing in the global agricultural and agbioscience economy requires constant innovation, practice improvement, new technology introduction, skills enhancement, and global intelligence—exactly the competitive factors that Oklahoma State University’s Division of Agricultural Sciences and Natural Resources (DASNR) works to enhance, develop, and support.

In earlier analysis conducted by Battelle,⁷¹ three case studies were chosen that are representative of both the breadth and depth of DASNR’s outreach work within the agbiosciences:

- Wheat—Leading crop in terms of acres harvested in the state;
- Beef Livestock—Number one area of Oklahoma agriculture in terms of dollar output;
- Turfgrass—Representative of DASNR’s work in nontraditional crops.

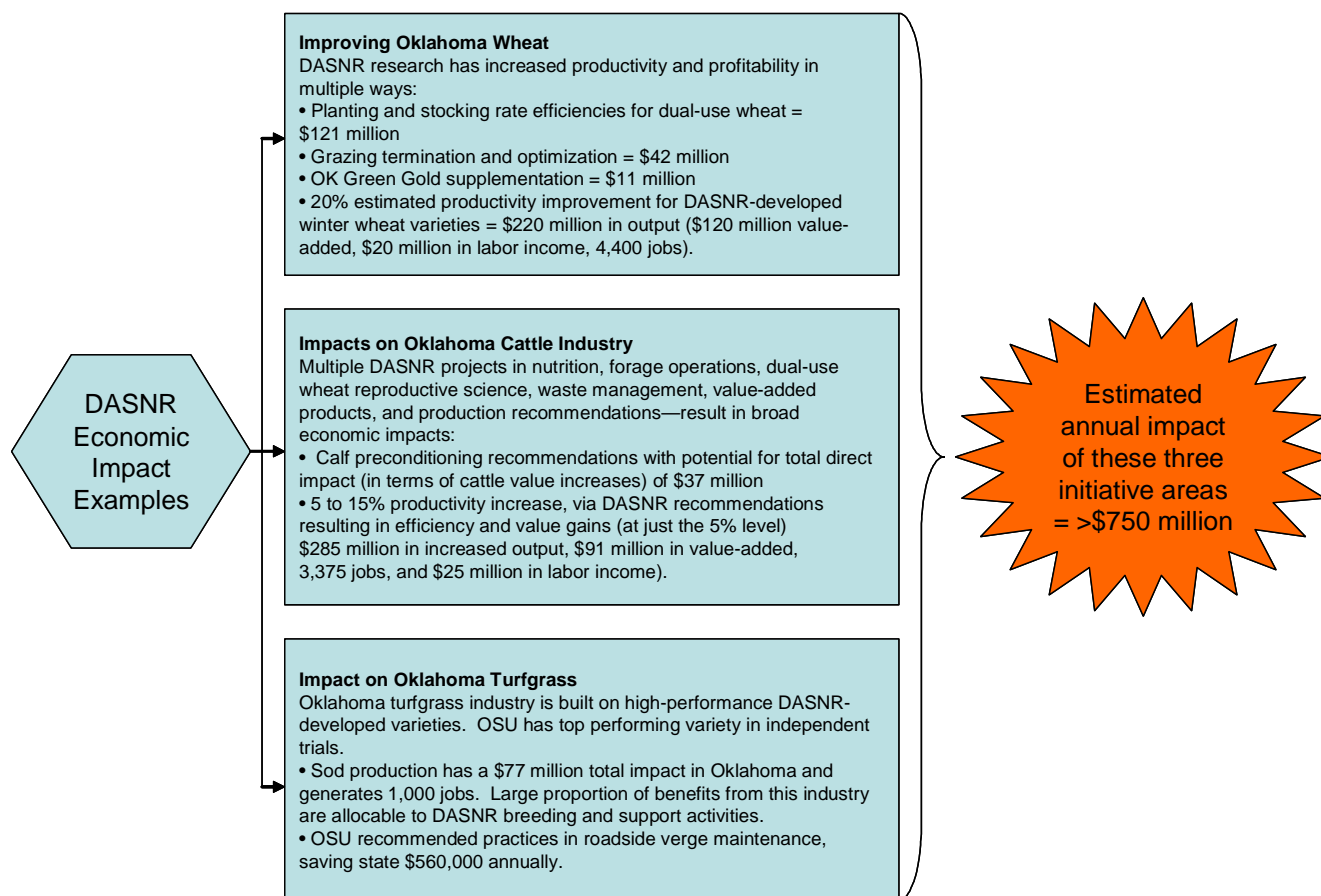
Figure 7 illustrates the impact of a select few of DASNR’s outreach activities related to sustaining and growing Oklahoma’s agriculture, agbioscience, and agriculture-related industry sectors leading to readily observable impacts.

DASNR is clearly an institution that is positively impacting the profitability and sustainability of Oklahoma’s staple crops, vertically integrated livestock industry, and agribusiness sectors while working proactively to develop new products and opportunities that diversify and strengthen Oklahoma’s economic base.

⁷⁰ *Phase I: Quantitative Analysis of DASNR’s Agbioscience Activities*. Battelle Technology Partnership Practice. Prepared for Oklahoma State University’s Division of Agricultural Sciences and Natural Resources, March 2007.

⁷¹ *Phase II: DASNR’s Agbioscience Activities Deliver Positive Economic Benefits for Oklahoma*. Battelle Technology Partnership Practice. Prepared for Oklahoma State University’s Division of Agricultural Sciences and Natural Resources, August 2007.

Figure 7: Examples of DASNRR Agbioscience Economic Impact Case Studies



C. Manufacturing/Industrial Outreach

In a knowledge-driven economy, intellectual property has become the most valuable property of all. As the previous chapter indicated, as State System institutions' researchers conduct R&D, discoveries lead to internal university invention disclosures. Professionals in technology transfer, licensing and technology commercialization at the universities then step-in to evaluate these invention disclosures and determine their potential application to commercial needs and opportunities. In many cases discoveries are quickly disseminated into practice in the field, usually through outreach activities, without the university seeking intellectual property protection. Indeed, one of the foundational principals of public universities is this diffusion of university-generated knowledge into practice. In today's knowledge-driven, technology-based economy, however, it is often the case that the innovations generated have significant intellectual property value, and the universities then seek to patent these innovations thereby creating licensing revenue streams.

Either way, the act of disseminating this knowledge into manufacturing/industrial practice is critical to the growth of Oklahoma's economy. For example, the Robert M. Kerr Food and Agricultural Products Center (FAPC) at Oklahoma State University is structured to support the creation of value-added food processing companies in Oklahoma, with the goal of converting basic agricultural commodities into high-

value export products for the state. Areas of outreach involve both food and nonfood value-added applications of commodity ag-production, including programs focused in the following areas:

- Biomass and biofuels;
- Pathogen prevention and intervention strategies;
- Probiotics development (for livestock and companion animal applications);
- Food safety technologies and advanced training services;
- Oilseed chemistry and technologies (for nutraceutical, chemical, and biodiesel applications);
- Wheat proteomics (focused on wheat proteins and effects on dough properties).

FAPC generates major business volume, serving upwards of 200 clients per month. Clients range from major food and ag-product companies to small businesses and individual entrepreneurs. For the smaller clients the Center is able to work through the business planning and market development phases of projects, in addition to product development R&D.

Examples of impacts⁷² being achieved just through FAPC include the following:

- VAP – Where FAPC assisted in developing a co-op enterprise to produce frozen pizza dough, adding value to the principal local commodity crop. Today, the plant employs more than 80 employees.
- Allison’s Gourmet Kitchen – Where FAPC worked on extending product stability and shelf life for products supplied to the food service, hotel, and restaurant industries.
- Baras Foods – For which FAPC has worked on multiple product development projects for value-added meat products. OSU helped develop the products and required processing technology and ran the consumer focus groups. FAPC has also helped this company with food safety/pathogen management training and other training materials and on-site courses. Additional work is taking place in management of waste streams from Baras Foods manufacturing operations, including work to convert waste into energy for powering the company facilities (using off-the-shelf technologies).
- Schwann’s Foods – With which FAPC has consulted in process development and waste stream management—including waste-to-energy conversion opportunities. This company operates the world’s largest pie manufacturing plant in Oklahoma (receiving 17 truckloads of flour per day).
- Advanced Foods – With which FAPC has worked from its conception as a start-up enterprise through its growth into a \$1 billion corporation today. The Center has been engaged with the company in multiple projects, including product development, production systems, specifications auditing, and oil stability work.
- Bamma Industries – For which FAPC has provided assessments of lines and staff training. This company supplies McDonald’s Corporation with baked products, including apple pies and biscuits.

The FAPC reached its 15-year anniversary in 2011, and continues to contribute significantly to the Oklahoma economy. The FAPC’s most recent annual report indicates that the Center impacts the Oklahoma economy by more than \$200 million each year. Additionally, it was reported that FAPC has played a major role in the launch of more than 50 entrepreneurial businesses that have added more

⁷² *Phase II: DASNR’s Agbioscience Activities Deliver Positive Economic Benefits for Oklahoma*. Battelle Technology Partnership Practice. Prepared for Oklahoma State University’s Division of Agricultural Sciences and Natural Resources, August 2007.

than 300 jobs in rural areas of Oklahoma and more than \$6 million in annual sales revenue in Oklahoma.⁷³

The OSRHE Economic Development Grant for the Partnership Recognition Program is designed to highlight successful outreach partnerships between higher education institutions and businesses. In 2012, examples of partnerships that focused on outreach to the manufacturing/business community of the State of Oklahoma included:

- **Redlands Community College and Oklahoma Folding Carton and Printing Co.** – Local manufacturers often need technical outreach assistance to improve processes, penetrate markets with new products, or develop an appropriate workforce for their operations. To respond to this need, Manufacturing Extension Agents have been established in several areas across Oklahoma to work with companies where there is a significant manufacturing base. One such partnership between the Oklahoma Manufacturing Alliance and Redlands Community College (RCC) provides a manufacturing extension agent who serves surrounding counties, providing staff development, training courses, product assistance, and market and/or labor analysis to more companies throughout the region. For example, the Oklahoma Folding Carton and Printing Co. (OFC) partnered with RCC and the Oklahoma Manufacturing Alliance to expand its services through the purchase of a new six-color printing press. This new equipment required an 11,000-square-foot expansion and allowed the company to bring all of its prepress operations in-house. This expansion created 15 new jobs and allowed OFC to be accepted into the Oklahoma Quality Jobs Program. Owner Bruce Baade states that through the expansion they have created additional jobs for the citizens of Minco and helped generate new revenue to help support the community. By adding the new prepress machine to its operation, OFC will save more than \$250,000 in overtime expenses and will add more than \$450,000 in new payroll in the first year.⁷⁴
- **Northern Oklahoma College (NOC) and the Tonkawa Tribe** – NOC and the Tonkawa Tribe have partnered to develop and implement the Gaming Management Institute (GMI) program. NOC is working with the tribe and its casinos to develop courses and programs to enhance the business-related skills of tribal members who work in the local casinos. Initial funding for the program was provided by a donation from the tribe. Currently, the partnership includes a series of seminars in such areas as conflict resolution, motivation and teamwork. To date, more than 30 casino employees have participated in the seminars. The partnership has also included seminars in accounting-related topics, including casino math, Casino Accounting 101 and internal controls for casinos. Future course work is being developed to include emphasis on customer service, hospitality management and human resource management.⁷⁵

D. Clinical and Public Health Services

At the University of Oklahoma, the Health Sciences Center provides “outreach” of a different sort, providing Oklahomans with access to state-of-the-art clinical medicine, advanced specialty care, diagnostics and preventive medicine – and advances the state of public health across Oklahoma.

⁷³ 2011 Annual Report: Robert M. Kerr Food and Agricultural Products Center. Retrieved from <http://fapc.okstate.edu/files/annualreport/annualreport2011.pdf> on December 9, 2012.

⁷⁴ Retrieved from <http://www.okhighered.org/news-center/ed-partner2012.shtml> on December 9, 2012.

⁷⁵ Retrieved from <http://www.oacc.onenet.net/pdf/NOC%20Newsletter.pdf> on December 9, 2012.

The functional impacts of the University of Oklahoma's Health Sciences Center (OUHSC) are many and varied. First and foremost, OUHSC generates health care and public health benefits for Oklahoma citizens through the provision of high quality diagnostics, clinical care and specialized health care services. The population in the state benefits from having access to the specialized knowledge, infrastructure and care provided by a modern academic medical center.

Academic medical centers are unique institutions, serving not only as providers of primary care and routine patient services, but also as centers for innovative and technically sophisticated medical and health care services and discoveries. Academic medical centers lie at the heart of American biomedical and health sciences research and associated innovations and advancements, and operate translational outreach programs to move discoveries and innovations from "the bench to the bedside"—advancing the state of care and the practice of modern medicine. Academic medical centers also demonstrate a disproportionately high commitment to the provision of care for underserved populations. Furthermore, these institutions are differentiated by their commitment to medical, biological sciences and allied health sciences education and continuing education programs—assuring that states have the skilled professionals required to meet their health care needs.

OUHSC provides all of these specialized academic medical center benefits—namely:

- Provision of state-of-the art health care;
- Research and the translation of research discoveries into tangible products and protocols for patient care;
- Health sciences education and workforce development;
- Outreach to the underserved and specialized services to benefit the community-at-large.

In addition, OUHSC's Office of Community Partnership and Health Policy has been extremely active in its outreach related to science, technology, engineering, and mathematics (STEM) education as it works to ensure that there is a critical mass of allied healthcare workers to meet the demands of Oklahomans in the future. Two examples of outreach programs are:

- **The College of Medicine Summer Program** creates a summer program experience for high school juniors and seniors that introduces options for careers in medicine to academically promising high school students. The four week program increases students' awareness of the various areas related to the medical profession. As a result of participating in the program, students' confidence in their ability to pursue medical training increases. At the same time, they are introduced to the academic rigor required in the profession. Students also gain firsthand knowledge of the requirements to be accepted into medical school. During the four week program, students complete a research project on a medical topic of interest. Clinical opportunities are also provided.
- **Future Health Scientists Partnership Program (FHSP)** is a program that selects fifty 5th graders each year to participate in activities during the school year as well as the summer. Participation in the program is intended to continue through high school and enrollment in a college or university. There is no financial cost to participate in the program. FHSP is committed to preparing young students to ultimately enter into health science professions such as medical doctors, nurses, pharmacists, dentists, epidemiologists, physical therapists, radiographers, speech pathologists, research scientists and many other related professions. Beginning in 5th grade and continuing through enrollment in a college or university, the program provides academic support and college/career awareness and enrichment for students. The program also works with parents to help them become more informed educational advocates for their

children. During the school year, monthly activities that focus on science, math and language arts are provided—all in a fun environment.

Some examples of other State System institutions' efforts in healthcare outreach include:

- **University of Central Oklahoma (UCO) and Mercy Health Network** – The partnership between UCO and Mercy Health allowed for expanded services at the health center, including radiology services and urgent care capabilities to serve students, staff and faculty along with employee dependents and the surrounding Edmond community. UCO benefits fiscally through redistribution of funding for areas such as health promotion and outreach programs. The collaborative opportunities between Mercy and UCO faculty and staff include Edmond Public Schools' Boulevard Academy for health education and health assessments through telemedicine and a partnership with Good Shepherd Catholic School serving as a special education clinical site for UCO students training to teach children with autism.⁷⁶
- **Connors State College (CSC) and Muskogee Regional Medical Center (MRMC)** – MRMC provides support to CSC by providing student internships for academic credit in health care, administration and communications. As an extension of this partnership effort, the leadership at MRMC has provided the academic leadership at CSC with workforce needs data specific to the Muskogee-area health care industry. This has shaped a new set of allied health career program and degree options that is graduating and putting students to work in health care fields in the region. This partnership is critical to providing hands-on experience and training that benefits students, potential employers and the community as a whole.⁷⁷

E. Quality of Life and Quality of Place

A community's quality of life and quality of place is the sum of those cultural, social, recreational, environmental, educational, and personal development assets that serve the needs of the population. Institutions of higher education recognize the reciprocal nature of their relationships with their host communities and the regions beyond those communities. They therefore often engage those communities to offer their expertise. Effective community outreach most often mobilizes institutional resources to solve problems within its community or among constituent communities, and often by doing so improves the university's own programs and initiatives.

Within this context, strong evidence suggests that the State System institutions are of substantial importance to sustaining and improving quality of life and quality of place in Oklahoma through their outreach efforts. Many of the State System institutions are involved in what is often termed "Community Development"—helping local business communities, current and emerging community leaders, and elected and appointed government officials investigate and create viable options for economic and community development by:

- Increasing the knowledge base for individual and community decisions;
- Developing clientele skills necessary to help achieve their individual and community goals; and
- Helping create an inclusive decision-making environment.

Many State System institutions are involved to some degree in community planning, by virtue of faculty, staff, and student expertise and that the institutions have a footprint in their community. Higher education institutions and consortiums of institutions and agencies are well-suited to larger-scale

⁷⁶ Retrieved from <http://www.okhighered.org/news-center/ed-partner2012.shtml> on December 9, 2012.

⁷⁷ Ibid.

collaborative efforts, and are also an effective means to convene public, private, and institutional resources and expertise to solve large and complex problems. Initiatives in community planning range from making the interaction between an institution and its community more harmonious to establishing multi-county economic development efforts. Some examples include:

- **Making Place Matter (MPM)**, a program of the American Association of Colleges and Universities and adopted by the Southwest Oklahoma Impact Coalition (SOIC), is an effort to mobilize the assets at universities and community colleges to champion the stewardship and enhancement of the quality of place in target communities. SOIC is a regional partnership consisting of the five universities and colleges, six career technology institutions, and two councils of government in southwest Oklahoma. Other partners include local and state economic development organizations. The MPM program seeks models for the intellectual capital and public resources at institutions of higher learning to operate outside their traditional boundaries, such as with chambers of commerce, local development organizations, or other educational or training entities. SOIC is also currently working on developing a career pathways system at a pilot site in southwest Oklahoma that can be replicated throughout the state.
- **The Texoma Regional Consortium (TRC)** is a leadership network serving 13 counties around Lake Texoma in south central Oklahoma and northern Texas. These counties include Cooke, Fannin and Grayson counties in Texas and Atoka, Bryan, Carter, Coal, Garvin, Johnston, Love, Marshall, Murray and Pontotoc counties in Oklahoma. Since its inception, the TRC has brought together business and industry, economic development, workforce development and higher education to find collaborative solutions to address regional workforce issues. In 2007, the TRC and its partners released *Bridging the Red River: A Regional Economic Strategy for the Texoma Regional Consortium* a regional workforce and economic development plan that identified key strategies focusing on the identified regional workforce issue. As a consequence of the regional strategy, industry workgroups have launched to implement the specific plan elements.
- **Carl Albert State College and the City of Poteau** have collaborated on environmental, tourism and civic improvement projects over recent years. The most current collaboration, the Fort Smith Regional Alliance created in April 2011, represents years of effort for the formation of a two-state regional economic development entity. The alliance is comprised of 14 communities in Arkansas and Oklahoma inside the eight counties that make up a 50-mile radius around Fort Smith, Arkansas. The City of Poteau and the college worked through most of the past decade to make this organization a reality. A five-year planning document for the Alliance is currently being completed, and a director, based in Fort Smith, has been hired. According to CASC and Poteau officials, the outlook for long-term economic benefits from the alliance for the entire region is excellent.

F. Volunteerism and Community Service

With a mission that includes the promotion of the public good, one of higher education's major functions is to engage in public service. The goal is to apply the considerable expertise developed within the institutions' walls to their host communities and beyond. State System institutions encourage direct volunteer efforts where they operate. While it is an immediate payback for public investment, it also serves as hands-on learning experience for students.

State System institutions are engaged in a broad variety of volunteer outreach activities. Efforts range from agricultural workers' welfare, to regional planning, to Native American language preservation to sustainability initiatives to arts and cultural events.

An example of a statewide outreach effort that focuses on volunteerism is the Oklahoma Campus Compact (OkCC). OkCC supports the development of students as citizens by assisting member institutions in their efforts to develop citizenship skills by promoting and advancing methodologies including service-learning, volunteerism, community service, and political engagement.

Campus Compact, founded in 1985 in Boston, is a national member organization committed to help students develop the knowledge and skills of civic participation through involvement in public service. Oklahoma joined the National Campus Compact network in August 2000. Thirty-six Oklahoma higher education institutions are OkCC members. OkCC is housed at OSRHE Academic Affairs Division and was the first State System office to form a state Campus Compact office.

OkCC provides essential services to members who are interested in fostering civic engagement, enhancing student learning, and engaging in the community. Examples of these services include:

- Faculty Development Initiatives (service-learning workshops and conferences).
- Student-led Civic Engagement (support for student-led initiatives to increase student involvement in public life).
- Awards (student, faculty, and institution/community partner recognition).
- Resource Development (identify sources of financial support for member institutions).
- Sub-grants (provide funds to develop service-learning courses or initiatives that engage students).
- Training and Technical Assistance (assessment of members' needs and tailor workshops to program age, size, location, and specific requests).
- AmeriCorps*VISTA State Program (administration of state grant for 12 VISTA volunteers on various campuses).
- Support for the Oklahoma Civic Health Index to strengthen citizenship and increase civic participation.
- Information Services (provide publications and journals, serve as a clearinghouse for information on effective models of community service and service-learning, and host Regional Campus Compact Speakers Bureau online).
- Research and Evaluation (serve as clearinghouse of information on research and evaluation).
- State and National Legislative Policy Advocacy (informing about legislative developments).

The OkCC volunteer program constitutes a valuable contribution to local communities. The value of over 3.6 million hours of Oklahoma students' service has been calculated to be over \$74 million based on a national value per hour of \$20.25 for the various service activities.⁷⁸ This is in addition to the pre-career experience for students, which provides valuable knowledge by engaging students with community stakeholders to solve problems and initiate activities, as well as leveraging university resources for community benefit.

⁷⁸ Campus Compact OK Statistics, 2009

APPENDICES

APPENDIX A: THE COMMUNITY COLLEGE SYSTEM IN OKLAHOMA

Community College Education

Developed intensively in each region in Oklahoma during the late 1960's and early 1970's as "junior colleges", Oklahoma's community colleges offer several options for preparation for careers and further higher education study. Community college and technical education has been consistently the best education value among higher education options in terms of cost-benefit comparison. 53 percent of Oklahoma public higher education students are community college students. Tuition is \$2,775 per student for community colleges, \$4,394 for regional universities, and \$6,781 for comprehensive public research universities. Oklahoma's community colleges receive 19 percent of state appropriations for higher education, compared to 28 percent for regional universities and 53 percent for the comprehensive research universities.⁷⁹ While associate's degree earnings are 17 to 20 percent less than a bachelor's degree graduate after five years, tuition at community college for an associate's degree is 67 percent less than a bachelor's degree at a public regional university (37 percent less for two years) and 80 percent less (59 percent less for two years) than a bachelor's degree at a research university.⁸⁰

Oklahoma's community colleges also serve as a bridge to undergraduate education by including, in two-year curricula, core courses for articulation to four-year colleges that avoids unnecessary duplication. Many support programs help to ensure students' remedial instruction and academic success so that they can complete their degrees and be eligible for employment that offers higher income. The rigor and student performance of community colleges is comparable to that of four-year college students. Grade point averages for 30 to 60 hours are equal with four-year students at 2.41. They are higher than four-years: 2.82 for community college students and 2.46 for four-year students for 60-90 hours; and roughly equal: 2.89 compared to 2.87, for 90+ hours of study.⁸¹

Community colleges are vital to many industries and sectors in Oklahoma. In health care, for instance, community college graduates include the vast majority of emergency first responders (80 percent), new nurses (54 percent), and health care professionals (60 percent) by employment.⁸²

Many community college programs have been developed in direct response to labor market needs, providing technical training as well as foundational academic instruction. Oklahoma's community colleges provide "job pipeline opportunities" through technical certifications in business, communications, emergency medical technician services, energy, health care, manufacturing, software development, and veterinary medicine. Where workforce analysis indicates new occupations in demand

An example of community college professional education is the *Scholars for Excellence in Childcare Program*. OSRHE, the Oklahoma Department of Human Services, and 12 of the state system's two-year institutions have partnered to provide certification opportunities for child care professionals in licensed child care facilities. Since the inception of the *Scholars* program in 2000, 392 child care professionals have earned a Child Development Associate (CDA) Credential, 2,685 have received Certificates of Mastery, 753 have earned associate degrees in child development or early childhood education, and 209 have been awarded Director's Certificates of Completion.

⁷⁹ OSRHE: Tuition Impact Report, 2011–2012

⁸⁰ Ibid.

⁸¹ OSRHE: Annual Report, 2011.

⁸² Ibid.

or the need for job training for specific industry needs, the community college system provides flexible curriculum planning to address changing workforce needs. They also provide continuing education opportunities as well, addressing the credential-income gap, enabling thousands who have college credit but have not yet completed their degree to earn an Associate degree. Thirty-one new two-year programs have been approved by the Oklahoma Regents for Higher Education in the field of entrepreneurship and business skills.

Results and Outcomes in Community College Education

Community college graduates earned 8,419 Associate's degrees in the 2009–2010 school year. Student retention increased from 66.4 percent to 69.4 percent at community colleges.⁸³ As of spring 2011, a total of 167 students have received their degrees in the Reach Higher program for students who had previously earned college credit but who have not finished their degrees, and as of fall 2011, there were 702 majors enrolled in the program.⁸⁴ Perhaps most importantly, community college graduates were able to increase their earnings on average 27 percent, contributing that much more to Oklahoma's economy.⁸⁵

Other vital community service functions that Oklahoma's public community colleges provide are student, faculty, and staff volunteering in cooperation with local communities, aging services, veterans services, and community job fairs in response to plant or other business closings, company expansions, or other situations where numerous employment opportunities are available.

⁸³ OSRHE UDS Degrees Granted, December 2011.

⁸⁴ OSRHE: Annual Report, 2011.

⁸⁵ OSRHE: Regents Employment Report, 2008.

APPENDIX B: PUBLIC UNDERGRADUATE EDUCATION IN OKLAHOMA

Undergraduate education

By far the largest enterprise in the Oklahoma State System of Higher Education is undergraduate education. During 2009-10, public institutions granted 30,669 degrees. Of those, 8,419 were associate degrees, and 15,671 were bachelor's degrees. Graduate master's and doctoral degrees totaled 4,836.⁸⁶ Undergraduate education encompasses basic science, arts, and humanities education, first-degree professional education, research opportunities, and opportunities for civic engagement and volunteering. A total of 193,552 students had enrolled in the 2009-2010 school year, of which roughly half are undergraduate four-year students.

In addition to preparing students for careers in Oklahoma's economy, the Regents are responding to changes in demographics and global conditions to ensure that State System institutions adapt to them.

Sixty-two new degree programs were added during 2010–11. These include the expansion of existing programs to other universities within the State System, but also completely new programs responding to changes in the economic, environmental, and global environment such as Bio-energy, Environmental Sustainability, Global Studies, and Organizational Leadership. An additional 23 programs that are considered important to Oklahoma's future are under review.

In 2009 the Oklahoma legislature established the *Endowed Chairs Program* by issuing a \$100 million bond to match institutional investments in order to attract high-profile, highly accomplished faculty enabling an emphasis on teaching due to the endowment support.

The *Brain Gain 2010 Initiative*, instituted by the Regents, includes renewable financial incentives and rewards to institutions that increase the retention of students in college, their graduation rates, and the conferral of degrees at the associate and baccalaureate levels. Essential to the program's success, Brain Gain Improvement Grants have helped campuses implement intervention and support strategies to improve student retention, graduation and degree completion, both campus-wide and among targeted populations.

Programs of Excellence Grants within the Brain Gain Initiative support State System institutions in building high-quality, innovative academic programs that better prepare students to compete successfully in today's knowledge-based, technology-driven global society. The intent is to attract and graduate serious students with higher quality programs, who will then be more likely to stay in Oklahoma and contribute to the state's prosperity. Recent awards totaling \$2.2 million included grants to enhance programs in information technology, liberal arts, registered nursing with strong community-based training, and agriculture education and an applied research center.

Undergraduate research opportunities such as the University of Oklahoma's *Freshman Research Program* invite undergraduates to participate in basic research, in guided research with sponsoring faculty, and undergraduate research grants to stimulate early-career research interest and accomplishments. Another such program is the OSU Honors First-Year Research Experience (FYRE) program consists of twelve research projects, each guided by a professor from the Department of Chemistry and Biochemistry. The projects include topics such as RNA folding, cell transporters and the

⁸⁶ OSRHE UDS Degrees Granted, December 2011.

tuberculosis bacterium, mycobacterium tuberculosis. 15 students and six faculty members participate and it has been expanded to the OSU School of Engineering beginning in the 2012–2013 school year. These research opportunities are closely aligned with emerging industrial opportunities in the Oklahoma technology economy.

A memorable and essential component of undergraduate education is volunteering and civic participation, which supports student learning, integration of their knowledge, and contributions to the institution's community. Two examples of this are *Campus Compact Service Learning* and the *Making Place Matter* program. Campus Compact Service Learning is a national program adopted by the Oklahoma Regents in place throughout the OK higher education system. The program develops campus outreach into local communities and facilitates the identification and execution of service projects—from literacy training to conflict resolution efforts—by Oklahoma higher education students.

The Making Place Matter program, developed by the American Association of College Administrators, has taken root in SW Oklahoma. The program deploys faculty and students to explore ways university assets and resources can be utilized to enhance their host communities. MPM participants also assist in the development of viable plans for community transformation. At Northeastern State University volunteer program participants are involved in community education programs aimed at involving the Choctaw Nation more in higher education, tribal members' own community planning, and long term economic development planning.

At the research universities, the retention of freshman to graduation from the 2001–2 through the 2009–10 school year increased slightly, from 89.7 to 90.1 percent, and graduation rates from the same period increased significantly, rising from 56 percent to 69 percent.⁸⁷

At the regional universities, the retention of freshman to graduation from the 2001–2 through the 2009–10 school year decreased slightly, from 78.9 percent to 76.6 percent, and graduation rates from the same period decreased slightly as well, from 38.2 percent to 37.1 percent, underscoring the need for the student support programs.

The OSRHE system is a good investment for Oklahoma, its economy, and its communities. 89 percent of the 2005–06 graduates remained in the state after one year and 69 percent of the 2001–02 graduates after five years remained in Oklahoma. Additionally, significant numbers of Oklahoma State System bachelor's degree recipients who were not originally Oklahoma residents remained after graduation: 54 percent after one year and 25 percent after five years.⁸⁸

⁸⁷ OSRHE: Annual Report, 2011.

⁸⁸ OSRHE: Employment Outcomes Report, 2008.

APPENDIX C: PUBLIC HIGHER EDUCATION AND THE MANDATES OF THE GLOBAL ECONOMY

The increasingly global nature of the economy requires Oklahoma institutions to prepare their graduates to work smarter, understand international business, and learn to adapt to changes in the global business environment. As recognized by the Oklahoma Regents and the Legislature, the world has become increasingly interconnected through advances in technology and transportation, and a global perspective is critical in facing the challenges of the 21st century. It is essential to provide the future leaders of Oklahoma with the broadest possible education to strengthen Oklahoma's economic competitiveness, diversify sources of economic revenue, and expand Oklahoma's capacity to collaborate with distant social systems.⁸⁹ International education—foreign language curricula and academic programs that address global issues and examine other cultures—contribute more than ever to the development of new knowledge and technological breakthroughs. All of these require international collaboration. The Regents' resolution to encourage students in all majors at all Oklahoma universities and colleges to engage with other cultures, foreign languages, and global issues and to help its institutions provide opportunities to study abroad to enrich students' perspectives and personal development will strengthen its international competitiveness strengthening global understanding and its engagement in the global economy.

Oklahoma's study abroad program introduces approximately 1,500 students to study and life in 54 other countries each year, preparing them for greater international interaction. There are approximately 8,500 international students enrolled at Oklahoma universities and colleges in any academic year. Qualified students and faculty from other countries are encouraged to study in Oklahoma to further the innovation and to facilitate an appreciation of different cultures around the world.

These global mandates, combined with demographic changes in the 18–24-year-old cohort, have required the Regents to respond not only to more broadly engage globally but also with under-represented segments of Oklahoma's population to ensure that the public higher education system develops the best students and graduates possible. The Georgetown University Center for Education and the Workforce has projected that 57 percent of Oklahoma's jobs will require post-secondary educational attainment by 2018. This is lower than the national average of 63 percent but still a nearly 10 percent increase in the number of Oklahoma jobs—from 978,000 to 1,064,000—that will require post-secondary education in the near future.⁹⁰

The mission the Oklahoma State Regents for Higher Education gives its constituent institutions is to “build a nationally competitive system of higher education that will provide educational programs and services universally recognized for excellence, expand frontiers of knowledge, and enhance the quality of life.” Looking forward, the system anticipates demographic challenges to maintaining its current trend of increasing the numbers of enrollment and certificates and degrees conferred. Specifically, the 18–24-year-old cohort typically populating student bodies at State System institutions is projected to be 10% lower than present, while the Regents plan to increase the number of graduates nearly 70%. The state's goal is to increase the number of degrees and certificates earned annually in Oklahoma from 30,500 to 50,900 by 2023. This is necessary to meet the projected need of 313,073 additional college-educated

⁸⁹ Oklahoma Concurrent Resolution 1040, 2007; Regents' Study Abroad Clearinghouse.

⁹⁰ The Georgetown University, Center on Education and the Workforce: *Projections of Jobs and Education Requirements Through 2018*, 2010.

workers to keep Oklahoma competitive in a global economy.⁹¹ OSRHE is therefore taking several well-coordinated measures to maximize the potential of Oklahoma citizens to enroll and succeed in Oklahoma public higher education by increasing the quantity and quality of two-and-four-year enrollment, improving high school students' college preparedness, and increase degree completion rates throughout the system.

Several programs have been instituted that address the various challenges to access and success in Oklahoma's public higher education:

- *Gaining Early Awareness and Readiness for Undergraduate Programs—GEAR UP*—is a federally funded program that gives middle and high school students academic preparation programming and scholarships, leadership training to parents, professional development activities to educators, and college access information to students and parents.
- *OKCollegeStart.org*: The state's higher education information portal for students, parents, and high school counselors. Students can use the portal to create individual portfolios, access campus information, apply for federal and state financial aid, and apply to many of the state's colleges and universities.
- *Oklahoma's Promise*: a financial aid program that combines emphases on academic preparation and financial support for college.
- *College Access Challenge Grant Program*: a federal program focused on increasing the enrollment, retention, and graduation at State System institutions.
- *Complete College America*: State System institutions participate in this national program to help ensure that students in higher education complete their degrees.
- *Reach Higher*: Oklahoma's degree completion program, allows adults with previous college credit to earn a college degree. Students can choose between an Associate in Arts or Associate in Science in enterprise development or a Bachelor of Science in organizational leadership to reinforce their career goals and experience. Students receive the leadership training, communications skills and business knowledge they need to advance their careers and earnings potential.
- *Learning and Student Success Opportunity (LASSO) Center* at Oklahoma State and other such programs at other State System institutions include tutoring, time management, and assistance navigating an institution's many offices help students succeed in academic and college life.
- The *Teacher Shortage Employment Incentive Program (TSEIP)* is intended to recruit and retain mathematics and science teachers in Oklahoma and helps to ensure sufficient numbers of mathematics and science teachers and teacher continuity in public school systems. Successful candidate teachers are reimbursed eligible student loan expenses upon fulfillment of certification and tenure requirements.

Results and Outcomes in student support services – Nearly 200,000 *GEAR UP* student accounts have been created, and about 31,700 students have applied online for *Oklahoma's Promise*. Since 2001, *OK Promise* has grown from just over 2,000 qualifying students to more than 20,000 students receiving scholarships in FY 2012. From 2000–01 to 2009–10, retention rates for new freshmen increased from 89.7 percent to 90.1 percent at research universities, decreased slightly from 78.9 percent to 76.6 percent at regional universities, and increased from 66.4 percent to 69.4 percent at community colleges.⁹² Degrees conferred have increased from 24,980 in the 2001–2002 academic year to 30,669 in

⁹¹ OSRHE Annual Report, 2011.

⁹² OSRHE: UDS Degrees Granted, December 2011

2009–2010.⁹³ More than 600 applicants from 20 institutions of higher education in Oklahoma have enrolled in the *TSEIP* program. Since the first award in 2006, 188 (73 mathematics and 115 science) have received an average of \$11,700 from the program for teaching secondary mathematics or science for at least five consecutive years in Oklahoma public schools.

⁹³ OSRHE: Degrees Conferred in Oklahoma Higher Education 2009–10.

APPENDIX D: INDIVIDUAL COLLEGE AND UNIVERSITY IMPACTS

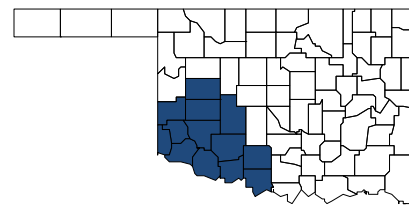
The following pages provide estimates of the FY 2011 economic impacts of the State of Oklahoma's public institutions of higher education (including colleges, universities, and constituent agencies) listed in alphabetical order.

These profiles include the operational expenditure inputs developed for the institution, the results of the impact analysis, and an assessment of the return on investment of state funds against the resulting total economic impacts.

These impacts were measured using the most appropriate Oklahoma regional model developed within IMPLAN by Battelle. Some of these profiles combine an institution's campus and constituent agencies when located in the same city. Beyond these regionally-defined models and impacts, combined profiles representing the full educational and programmatic activities of the University of Oklahoma and Oklahoma State University are also provided.

CAMERON UNIVERSITY

EXPENDITURE-BASED ECONOMIC IMPACTS



Cameron University generated operational expenditures of \$118 million in FY 2011, with \$46 million of this coming from state funding. With a total regional economic (output) impact of \$158 million, the estimated return on investment is \$3.41 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Cameron University. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$46.2
Research Expenditures	\$1.8
Intercollegiate Athletics	\$0.9
Other Auxiliary Enterprises and Related Expenditures	\$37.3
Building New Construction and Repair	\$0.1
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$25.4
Total Expenditures	\$111.7

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Southwest Oklahoma region through the operations and functions of Cameron University.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	923	\$42.5	\$54.5	\$108.9	\$4.1	\$7.5
Indirect Effect	195	\$6.1	\$13.9	\$25.1	\$1.2	\$1.5
Induced Effect	244	\$6.6	\$13.9	\$23.7	\$1.5	\$1.6
Total Impacts	1,362	\$55.2	\$82.3	\$157.7	\$6.8	\$10.6
Impact Multiplier	1.5	1.3	1.5	1.4		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

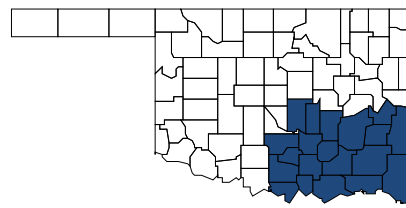
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

CARL ALBERT STATE COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Carl Albert State College generated operational expenditures of \$47 million in FY 2011, with \$11 million of this coming from state funding. With a total regional economic (output) impact of \$64 million, the estimated return on investment is \$6.10 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Carl Albert State College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$10.5
Research Expenditures	\$2.7
Intercollegiate Athletics	\$0.2
Other Auxiliary Enterprises and Related Expenditures	\$16.2
Building New Construction and Repair	\$0.2
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$17.5
Total Expenditures	\$47.4

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Southeast Oklahoma region through the operations and functions of Carl Albert State College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	450	\$15.4	\$22.6	\$44.8	\$1.8	\$3.2
Indirect Effect	83	\$2.6	\$5.4	\$10.1	\$0.4	\$0.7
Induced Effect	96	\$2.6	\$5.4	\$9.3	\$0.6	\$0.7
Total Impacts	629	\$20.6	\$33.4	\$64.2	\$2.9	\$4.6
Impact Multiplier	1.4	1.3	1.5	1.4		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

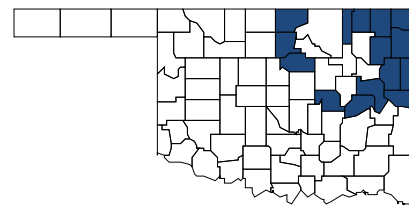
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

CONNORS STATE COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Connors State College generated operational expenditures of \$49 million in FY 2011, with \$11 million of this coming from state funding. With a total regional economic (output) impact of \$66 million, the estimated return on investment is \$5.82 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Connors State College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$11.4
Research Expenditures	\$2.0
Intercollegiate Athletics	\$1.0
Other Auxiliary Enterprises and Related Expenditures	\$14.2
Building New Construction and Repair	\$1.6
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$18.6
Total Expenditures	\$48.9

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Northeast Oklahoma region through the operations and functions of Connors State College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	477	\$14.2	\$22.4	\$46.3	\$1.8	\$3.1
Indirect Effect	93	\$2.8	\$6.0	\$10.8	\$0.5	\$0.7
Induced Effect	94	\$2.6	\$5.3	\$9.1	\$0.6	\$0.7
Total Impacts	664	\$19.6	\$33.8	\$66.2	\$2.9	\$4.5
Impact Multiplier	1.4	1.4	1.5	1.4		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

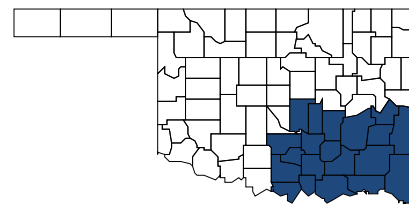
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

EAST CENTRAL UNIVERSITY

EXPENDITURE-BASED ECONOMIC IMPACTS



East Central University generated operational expenditures of \$102 million in FY 2011, with \$35 million of this coming from state funding. With a total regional economic (output) impact of \$139 million, the estimated return on investment is \$3.91 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of East Central University. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$35.2
Research Expenditures	\$11.2
Intercollegiate Athletics	\$1.3
Other Auxiliary Enterprises and Related Expenditures	\$19.1
Building New Construction and Repair	\$0.7
Capital Equipment	\$0.2
Estimated Additional Student Spending	\$34.4
Total Expenditures	\$102.1

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Southeast Oklahoma region through the operations and functions of East Central University.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	994	\$33.5	\$46.4	\$96.0	\$3.9	\$6.9
Indirect Effect	189	\$5.8	\$11.9	\$22.3	\$1.0	\$1.5
Induced Effect	211	\$5.8	\$11.8	\$20.2	\$1.3	\$1.5
Total Impacts	1,393	\$45.1	\$70.1	\$138.6	\$6.1	\$9.8
Impact Multiplier	1.4	1.3	1.5	1.4		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

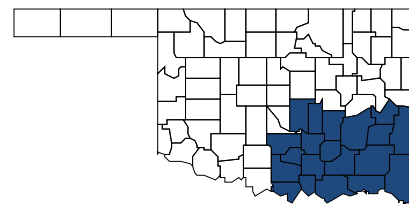
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

EASTERN OKLAHOMA STATE COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Eastern Oklahoma State College generated operational expenditures of \$41 million in FY 2011, with \$11 million of this coming from state funding. With a total regional economic (output) impact of \$57 million, the estimated return on investment is \$5.21 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Eastern Oklahoma State College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$10.9
Research Expenditures	\$3.0
Intercollegiate Athletics	\$0.2
Other Auxiliary Enterprises and Related Expenditures	\$13.7
Building New Construction and Repair	\$0.1
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$13.5
Total Expenditures	\$41.3

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Southeast Oklahoma region through the operations and functions of Eastern Oklahoma State College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	373	\$13.7	\$19.5	\$39.4	\$1.6	\$2.9
Indirect Effect	74	\$2.3	\$4.9	\$9.1	\$0.4	\$0.6
Induced Effect	86	\$2.4	\$4.8	\$8.2	\$0.5	\$0.6
Total Impacts	533	\$18.4	\$29.1	\$56.8	\$2.5	\$4.1
Impact Multiplier	1.4	1.3	1.5	1.4		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

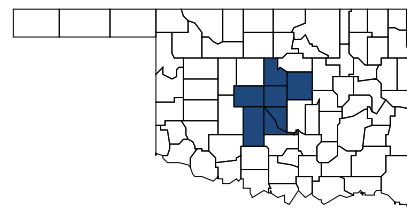
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

LANGSTON UNIVERSITY

EXPENDITURE-BASED ECONOMIC IMPACTS



Langston University generated operational expenditures of \$89 million in FY 2011, with \$30 million of this coming from state funding. With a total regional economic (output) impact of \$154 million, the estimated return on investment is \$5.09 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Langston University. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$28.8
Research Expenditures	\$21.8
Intercollegiate Athletics	\$1.3
Other Auxiliary Enterprises and Related Expenditures	\$16.2
Building New Construction and Repair	\$4.5
Capital Equipment	\$0.6
Estimated Additional Student Spending	\$16.1
Total Expenditures	\$89.2

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Oklahoma City MSA region through the operations and functions of Langston University.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	706	\$30.9	\$38.2	\$87.8	\$2.6	\$5.8
Indirect Effect	275	\$10.9	\$20.4	\$33.4	\$1.6	\$2.5
Induced Effect	303	\$11.4	\$20.5	\$32.8	\$2.0	\$2.6
Total Impacts	1,284	\$53.2	\$79.1	\$153.9	\$6.1	\$10.9
Impact Multiplier	1.8	1.7	2.1	1.8		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

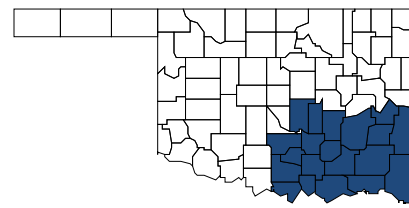
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

MURRAY STATE COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Murray State College generated operational expenditures of \$43 million in FY 2011, with \$12 million of this coming from state funding. With a total regional economic (output) impact of \$57 million, the estimated return on investment is \$4.87 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Murray State College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$11.8
Research Expenditures	\$1.0
Intercollegiate Athletics	\$0.2
Other Auxiliary Enterprises and Related Expenditures	\$12.9
Building New Construction and Repair	\$0.3
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$16.4
Total Expenditures	\$42.6

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Southeast Oklahoma region through the operations and functions of Murray State College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	350	\$13.8	\$20.6	\$40.1	\$1.7	\$2.9
Indirect Effect	72	\$2.3	\$4.8	\$9.0	\$0.4	\$0.6
Induced Effect	86	\$2.4	\$4.8	\$8.3	\$0.5	\$0.6
Total Impacts	509	\$18.5	\$30.2	\$57.4	\$2.6	\$4.1
Impact Multiplier	1.5	1.3	1.5	1.4		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

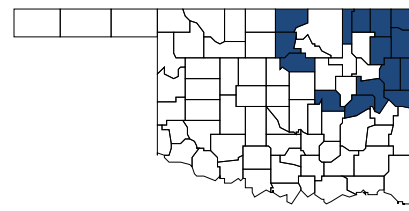
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

NORTHEASTERN OKLAHOMA A&M COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Northeastern Oklahoma A&M College generated operational expenditures of \$57 million in FY 2011, with \$15 million of this coming from state funding. With a total regional economic (output) impact of \$77 million, the estimated return on investment is \$5.08 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Northeastern Oklahoma A&M College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$15.1
Research Expenditures	\$1.0
Intercollegiate Athletics	\$0.8
Other Auxiliary Enterprises and Related Expenditures	\$12.8
Building New Construction and Repair	\$10.4
Capital Equipment	\$0.9
Estimated Additional Student Spending	\$15.7
Total Expenditures	\$56.7

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Northeast Oklahoma region through the operations and functions of Northeastern Oklahoma A&M College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	546	\$16.6	\$23.7	\$53.4	\$1.6	\$3.4
Indirect Effect	110	\$3.4	\$7.1	\$12.7	\$0.6	\$0.9
Induced Effect	111	\$3.1	\$6.3	\$10.7	\$0.7	\$0.8
Total Impacts	766	\$23.1	\$37.1	\$76.8	\$2.9	\$5.0
Impact Multiplier	1.4	1.4	1.6	1.4		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

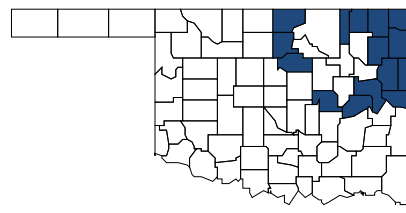
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

NORTHEASTERN STATE UNIVERSITY

EXPENDITURE-BASED ECONOMIC IMPACTS



Northeastern State University generated operational expenditures of \$186 million in FY 2011, with \$73 million of this coming from state funding. With a total regional economic (output) impact of \$260 million, the estimated return on investment is \$3.56 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Northeastern State University. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$72.2
Research Expenditures	\$6.3
Intercollegiate Athletics	\$1.7
Other Auxiliary Enterprises and Related Expenditures	\$48.7
Building New Construction and Repair	\$7.7
Capital Equipment	\$1.1
Estimated Additional Student Spending	\$48.2
Total Expenditures	\$186.0

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Northeast Oklahoma region through the operations and functions of Northeastern State University.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	1,828	\$56.0	\$79.8	\$179.1	\$6.5	\$11.7
Indirect Effect	376	\$11.5	\$25.1	\$44.9	\$2.1	\$3.0
Induced Effect	372	\$10.4	\$21.2	\$36.0	\$2.3	\$2.7
Total Impacts	2,576	\$77.8	\$126.0	\$260.0	\$10.9	\$17.4
Impact Multiplier	1.4	1.4	1.6	1.5		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

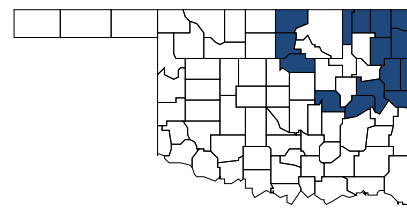
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

NORTHERN OKLAHOMA COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Northern Oklahoma College generated operational expenditures of \$67 million in FY 2011, with \$23 million of this coming from state funding. With a total regional economic (output) impact of \$87 million, the estimated return on investment is \$3.83 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Northern Oklahoma College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$22.6
Research Expenditures	\$0.3
Intercollegiate Athletics	\$0.3
Other Auxiliary Enterprises and Related Expenditures	\$6.1
Building New Construction and Repair	\$1.7
Capital Equipment	\$0.2
Estimated Additional Student Spending	\$36.0
Total Expenditures	\$67.2

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Northeast Oklahoma region through the operations and functions of Northern Oklahoma College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	817	\$18.1	\$33.7	\$62.1	\$2.4	\$4.2
Indirect Effect	112	\$3.4	\$7.3	\$13.1	\$0.6	\$0.9
Induced Effect	119	\$3.3	\$6.8	\$11.5	\$0.8	\$0.9
Total Impacts	1,048	\$24.9	\$47.8	\$86.7	\$3.7	\$5.9
Impact Multiplier	1.3	1.4	1.4	1.4		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

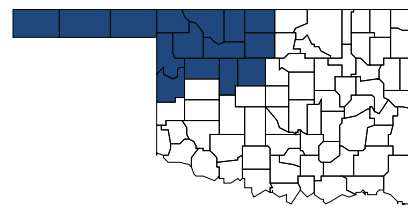
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

NORTHWESTERN OKLAHOMA STATE UNIVERSITY

EXPENDITURE-BASED ECONOMIC IMPACTS



Northwestern Oklahoma State University generated operational expenditures of \$51 million in FY 2011, with \$23 million of this coming from state funding. With a total regional economic (output) impact of \$68 million, the estimated return on investment is \$3.00 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Northwestern Oklahoma State University. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$22.5
Research Expenditures	\$1.2
Intercollegiate Athletics	\$0.6
Other Auxiliary Enterprises and Related Expenditures	\$12.2
Building New Construction and Repair	\$0.4
Capital Equipment	\$0.2
Estimated Additional Student Spending	\$13.8
Total Expenditures	\$50.9

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Northwest Oklahoma region through the operations and functions of Northwestern Oklahoma State University.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	449	\$21.4	\$25.2	\$46.0	\$1.9	\$4.1
Indirect Effect	77	\$2.4	\$5.0	\$9.4	\$0.4	\$0.6
Induced Effect	128	\$3.6	\$7.4	\$12.6	\$0.8	\$1.0
Total Impacts	654	\$27.4	\$37.6	\$67.9	\$3.1	\$5.7
Impact Multiplier	1.5	1.3	1.5	1.5		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

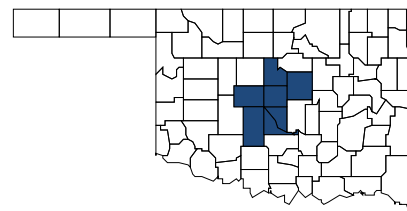
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

OKLAHOMA CITY COMMUNITY COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Oklahoma City Community College generated operational expenditures of \$204 million in FY 2011, with \$57 million of this coming from state funding. With a total regional economic (output) impact of \$322 million, the estimated return on investment is \$5.63 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Oklahoma City Community College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$57.2
Research Expenditures	\$4.6
Intercollegiate Athletics	\$0.0
Other Auxiliary Enterprises and Related Expenditures	\$31.7
Building New Construction and Repair	\$1.5
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$108.5
Total Expenditures	\$203.5

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Oklahoma City MSA region through the operations and functions of Oklahoma City Community College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	2,295	\$63.0	\$110.3	\$197.0	\$7.1	\$13.6
Indirect Effect	475	\$18.8	\$37.4	\$60.8	\$3.1	\$4.6
Induced Effect	594	\$22.3	\$40.1	\$64.3	\$3.8	\$5.1
Total Impacts	3,364	\$104.1	\$187.9	\$322.0	\$14.0	\$23.3
Impact Multiplier	1.5	1.7	1.7	1.6		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

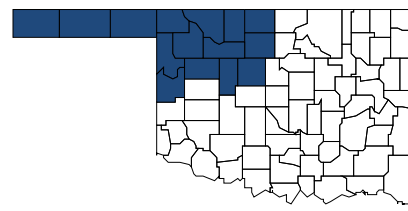
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

OKLAHOMA PANHANDLE STATE UNIVERSITY

EXPENDITURE-BASED ECONOMIC IMPACTS



Oklahoma Panhandle State University generated operational expenditures of \$36 million in FY 2011, with \$17 million of this coming from state funding. With a total regional economic (output) impact of \$50 million, the estimated return on investment is \$2.88 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Oklahoma Panhandle State University. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$17.4
Research Expenditures	\$0.5
Intercollegiate Athletics	\$0.9
Other Auxiliary Enterprises and Related Expenditures	\$8.1
Building New Construction and Repair	\$2.3
Capital Equipment	\$0.1
Estimated Additional Student Spending	\$7.0
Total Expenditures	\$36.3

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Northwest Oklahoma region through the operations and functions of Oklahoma Panhandle State University.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	225	\$15.8	\$17.9	\$33.8	\$1.2	\$2.9
Indirect Effect	58	\$1.8	\$3.7	\$7.0	\$0.3	\$0.5
Induced Effect	95	\$2.7	\$5.4	\$9.3	\$0.6	\$0.7
Total Impacts	377	\$20.3	\$27.0	\$50.1	\$2.2	\$4.1
Impact Multiplier	1.7	1.3	1.5	1.5		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

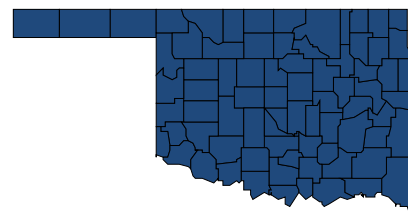
Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

OKLAHOMA STATE UNIVERSITY

– All Campuses and Programs

EXPENDITURE-BASED ECONOMIC IMPACTS



Oklahoma State University generated operational expenditures of \$1.32 billion in FY 2011, with \$548 million of this coming from state funding. With a total regional economic (output) impact of \$2.21 billion, the estimated return on investment is \$4.04 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Oklahoma State University. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$478.7
Research Expenditures	\$158.7
Intercollegiate Athletics	\$49.4
Other Auxiliary Enterprises and Related Expenditures	\$240.0
Building New Construction and Repair	\$70.8
Capital Equipment	\$7.5
Estimated Additional Student Spending	\$310.1
Total Expenditures	\$1,315.2

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated throughout the State through the operations and functions of Oklahoma State University.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	12,224	\$488.3	\$622.5	\$1,284.1	\$42.7	\$93.7
Indirect Effect	3,616	\$136.5	\$258.6	\$447.3	\$20.6	\$32.1
Induced Effect	4,484	\$155.4	\$288.2	\$480.3	\$28.3	\$37.0
Total Impacts	20,325	\$780.2	\$1,169.3	\$2,211.7	\$91.6	\$162.8
Impact Multiplier	1.7	1.6	1.9	1.7		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

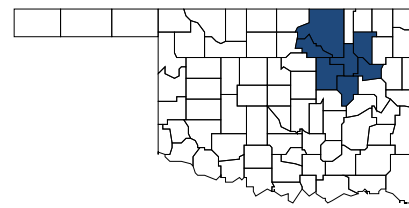
Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

OKLAHOMA STATE UNIVERSITY

- Center for Health Sciences

EXPENDITURE-BASED ECONOMIC IMPACTS



The Oklahoma State University – Center for Health Sciences generated operational expenditures of \$146 million in FY 2011, with \$50 million of this coming from state funding. With a total regional economic (output) impact of \$276 million, the estimated return on investment is \$5.47 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of the Oklahoma State University – Center for Health Sciences. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$48.2
Research Expenditures	\$10.1
Intercollegiate Athletics	\$-
Other Auxiliary Enterprises and Related Expenditures	\$73.2
Building New Construction and Repair	\$6.8
Capital Equipment	\$0.2
Estimated Additional Student Spending	\$7.1
Total Expenditures	\$145.6

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Tulsa MSA region through the operations and functions of the Oklahoma State University – Center for Health Sciences.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	581	\$69.0	\$73.5	\$145.0	\$3.9	\$12.5
Indirect Effect	392	\$16.9	\$32.6	\$54.5	\$2.5	\$4.0
Induced Effect	670	\$25.8	\$46.1	\$76.1	\$4.2	\$6.1
Total Impacts	1,643	\$111.8	\$152.2	\$275.6	\$10.6	\$22.6
Impact Multiplier	2.8	1.6	2.1	1.9		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

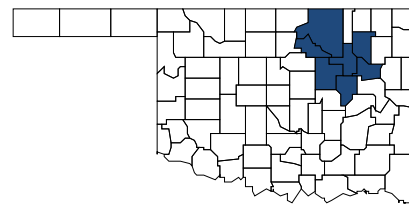
Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

OKLAHOMA STATE UNIVERSITY

- Institute of Technology

EXPENDITURE-BASED ECONOMIC IMPACTS



The Oklahoma State University – Institute of Technology generated operational expenditures of \$81 million in FY 2011, with \$26 million of this coming from state funding. With a total regional economic (output) impact of \$138 million, the estimated return on investment is \$5.41 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Oklahoma State University – Institute of Technology. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$25.6
Research Expenditures	\$1.7
Intercollegiate Athletics	\$0.0
Other Auxiliary Enterprises and Related Expenditures	\$17.5
Building New Construction and Repair	\$0.3
Capital Equipment	\$0.1
Estimated Additional Student Spending	\$35.4
Total Expenditures	\$80.7

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Tulsa MSA region through the operations and functions of Oklahoma State University – Institute of Technology.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	775	\$32.6	\$47.1	\$78.2	\$3.4	\$6.7
Indirect Effect	181	\$7.8	\$14.8	\$24.6	\$1.1	\$1.8
Induced Effect	315	\$12.1	\$21.6	\$35.7	\$2.0	\$2.8
Total Impacts	1,271	\$52.6	\$83.5	\$138.5	\$6.5	\$11.4
Impact Multiplier	1.6	1.6	1.8	1.8		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

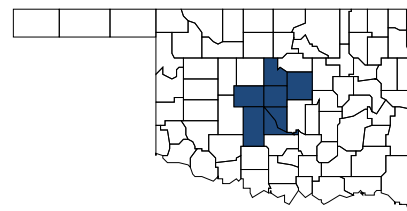
Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

OKLAHOMA STATE UNIVERSITY

- Oklahoma City Technical Branch

EXPENDITURE-BASED ECONOMIC IMPACTS



The Oklahoma State University – Oklahoma City Technical Branch generated operational expenditures of \$109 million in FY 2011, with \$29 million of this coming from state funding. With a total regional economic (output) impact of \$175 million, the estimated return on investment is \$6.05 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Oklahoma State University – Oklahoma City Technical Branch. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$28.9
Research Expenditures	\$3.5
Intercollegiate Athletics	\$0.0
Other Auxiliary Enterprises and Related Expenditures	\$16.5
Building New Construction and Repair	\$3.5
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$56.8
Total Expenditures	\$109.1

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Oklahoma City MSA region through the operations and functions of the OSU – Oklahoma City Technical Branch.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	1,154	\$34.9	\$57.7	\$105.4	\$3.7	\$7.3
Indirect Effect	264	\$10.5	\$20.6	\$33.4	\$1.7	\$2.5
Induced Effect	330	\$12.4	\$22.3	\$35.7	\$2.1	\$2.9
Total Impacts	1,747	\$57.8	\$100.6	\$174.5	\$7.5	\$12.6
Impact Multiplier	1.5	1.7	1.7	1.7		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

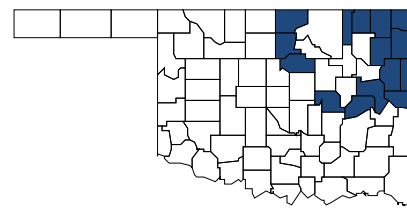
Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

OKLAHOMA STATE UNIVERSITY

– Stillwater Campus

EXPENDITURE-BASED ECONOMIC IMPACTS



The Oklahoma State University – Stillwater Campus generated operational expenditures of \$835 million in FY 2011, with \$347 million of this coming from state funding. With a total regional economic (output) impact of \$1.16 billion, the estimated return on investment is \$3.36 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Oklahoma State University – Stillwater Campus (including Main Campus and the Center for Veterinary Health Sciences). The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$316.2
Research Expenditures	\$88.0
Intercollegiate Athletics	\$49.4
Other Auxiliary Enterprises and Related Expenditures	\$129.8
Building New Construction and Repair	\$51.7
Capital Equipment	\$6.4
Estimated Additional Student Spending	\$193.6
Total Expenditures	\$835.1

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Northeast Oklahoma region through the operations and functions of Oklahoma State University – Stillwater Campus.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	8,108	\$255.6	\$339.1	\$799.1	\$27.4	\$51.5
Indirect Effect	1,785	\$53.4	\$111.4	\$200.5	\$9.0	\$13.5
Induced Effect	1,705	\$47.6	\$97.0	\$164.9	\$10.7	\$12.2
Total Impacts	11,598	\$356.6	\$547.5	\$1,164.5	\$47.2	\$77.1
Impact Multiplier	1.4	1.4	1.6	1.5		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

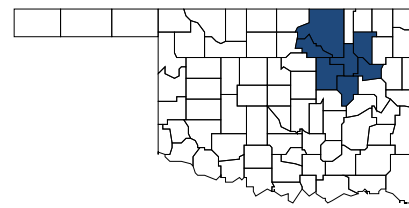
Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

OKLAHOMA STATE UNIVERSITY

- Tulsa Branch Campus

EXPENDITURE-BASED ECONOMIC IMPACTS



The Oklahoma State University – Tulsa Branch Campus generated operational expenditures of \$40 million in FY 2011, with \$21 million of this coming from state funding. With a total regional economic (output) impact of \$69 million, the estimated return on investment is \$3.22 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Oklahoma State University – Tulsa Branch Campus. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$21.1
Research Expenditures	\$0.4
Intercollegiate Athletics	\$0.0
Other Auxiliary Enterprises and Related Expenditures	\$1.1
Building New Construction and Repair	\$0.0
Capital Equipment	\$0.6
Estimated Additional Student Spending	\$17.2
Total Expenditures	\$40.5

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Tulsa MSA region through the operations and functions of Oklahoma State University – Tulsa Branch Campus.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	323	\$16.3	\$23.3	\$38.8	\$1.5	\$3.3
Indirect Effect	90	\$3.9	\$7.4	\$12.2	\$0.6	\$0.9
Induced Effect	157	\$6.0	\$10.8	\$17.8	\$1.0	\$1.4
Total Impacts	570	\$26.2	\$41.5	\$68.8	\$3.0	\$5.6
Impact Multiplier	1.8	1.6	1.8	1.8		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

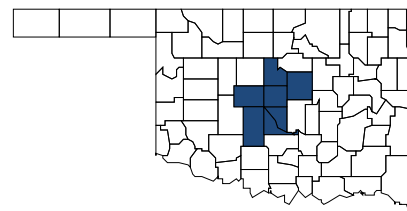
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

REDLANDS COMMUNITY COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Redlands Community College generated operational expenditures of \$42 million in FY 2011, with \$12 million of this coming from state funding. With a total regional economic (output) impact of \$69 million, the estimated return on investment is \$5.91 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Redlands Community College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$11.7
Research Expenditures	\$2.1
Intercollegiate Athletics	\$0.1
Other Auxiliary Enterprises and Related Expenditures	\$10.8
Building New Construction and Repair	\$0.6
Capital Equipment	\$0.1
Estimated Additional Student Spending	\$16.6
Total Expenditures	\$42.1

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Oklahoma City MSA region through the operations and functions of Redlands Community College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	409	\$13.6	\$20.9	\$41.0	\$1.5	\$2.8
Indirect Effect	109	\$4.3	\$8.6	\$14.0	\$0.7	\$1.0
Induced Effect	130	\$4.9	\$8.8	\$14.1	\$0.8	\$1.1
Total Impacts	648	\$22.8	\$38.3	\$69.1	\$3.1	\$5.0
Impact Multiplier	1.6	1.7	1.8	1.7		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

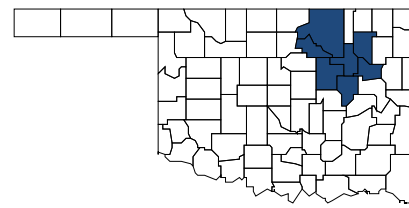
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

ROGERS STATE UNIVERSITY

EXPENDITURE-BASED ECONOMIC IMPACTS



Rogers State University generated operational expenditures of \$94 million in FY 2011, with \$30 million of this coming from state funding. With a total regional economic (output) impact of \$160 million, the estimated return on investment is \$5.33 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Rogers State University. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$30.0
Research Expenditures	\$4.1
Intercollegiate Athletics	\$0.1
Other Auxiliary Enterprises and Related Expenditures	\$16.1
Building New Construction and Repair	\$0.3
Capital Equipment	\$0.4
Estimated Additional Student Spending	\$43.3
Total Expenditures	\$94.4

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Tulsa MSA region through the operations and functions of Rogers State University.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	906	\$36.8	\$55.2	\$91.3	\$3.3	\$7.6
Indirect Effect	211	\$9.1	\$17.0	\$28.2	\$1.3	\$2.1
Induced Effect	357	\$13.8	\$24.6	\$40.5	\$2.2	\$3.2
Total Impacts	1,474	\$59.7	\$96.7	\$160.0	\$6.9	\$13.0
Impact Multiplier	1.6	1.6	1.8	1.8		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

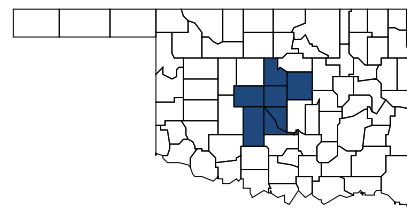
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

ROSE STATE COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Rose State College generated operational expenditures of \$63 million in FY 2011, with \$35 million of this coming from state funding. With a total regional economic (output) impact of \$179 million, the estimated return on investment is \$5.17 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Rose State College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$34.7
Research Expenditures	\$2.0
Intercollegiate Athletics	\$0.2
Other Auxiliary Enterprises and Related Expenditures	\$13.1
Building New Construction and Repair	\$1.1
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$62.9
Total Expenditures	\$114.0

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Oklahoma City MSA region through the operations and functions of Rose State College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	1,299	\$35.1	\$62.5	\$110.2	\$3.9	\$7.6
Indirect Effect	262	\$10.4	\$20.6	\$33.5	\$1.7	\$2.5
Induced Effect	330	\$12.4	\$22.3	\$35.8	\$2.1	\$2.9
Total Impacts	1,892	\$57.9	\$105.5	\$179.5	\$7.7	\$13.0
Impact Multiplier	1.5	1.7	1.7	1.6		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

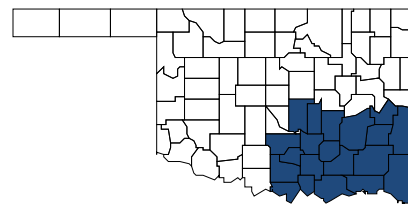
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

SEMINOLE STATE COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Seminole State College generated operational expenditures of \$41 million in FY 2011, with \$11 million of this coming from state funding. With a total regional economic (output) impact of \$56 million, the estimated return on investment is \$5.15 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Seminole State College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$11.0
Research Expenditures	\$2.8
Intercollegiate Athletics	\$0.7
Other Auxiliary Enterprises and Related Expenditures	\$13.7
Building New Construction and Repair	\$0.4
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$12.3
Total Expenditures	\$41.0

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Southeast Oklahoma region through the operations and functions of Seminole State College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	326	\$13.6	\$18.8	\$39.0	\$1.5	\$2.8
Indirect Effect	76	\$2.3	\$4.9	\$9.2	\$0.4	\$0.6
Induced Effect	86	\$2.3	\$4.8	\$8.2	\$0.5	\$0.6
Total Impacts	487	\$18.3	\$28.5	\$56.5	\$2.5	\$4.0
Impact Multiplier	1.5	1.3	1.5	1.4		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

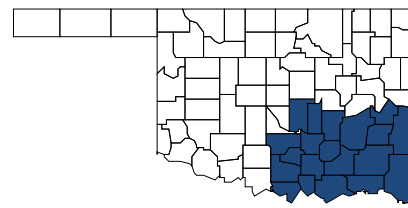
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

SOUTHEASTERN OKLAHOMA STATE UNIVERSITY

EXPENDITURE-BASED ECONOMIC IMPACTS



Southeastern Oklahoma State University generated operational expenditures of \$89 million in FY 2011, with \$43 million of this coming from state funding. With a total regional economic (output) impact of \$124 million, the estimated return on investment is \$2.90 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Southeastern Oklahoma State University. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$42.9
Research Expenditures	\$5.8
Intercollegiate Athletics	\$0.4
Other Auxiliary Enterprises and Related Expenditures	\$15.5
Building New Construction and Repair	\$0.0
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$24.6
Total Expenditures	\$89.1

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Southeast Oklahoma region through the operations and functions of Southeastern Oklahoma State University.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	801	\$30.2	\$41.1	\$85.6	\$3.3	\$6.2
Indirect Effect	164	\$5.2	\$10.9	\$20.5	\$0.9	\$1.3
Induced Effect	189	\$5.2	\$10.6	\$18.2	\$1.1	\$1.3
Total Impacts	1,154	\$40.6	\$62.6	\$124.3	\$5.4	\$8.9
Impact Multiplier	1.4	1.3	1.5	1.5		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

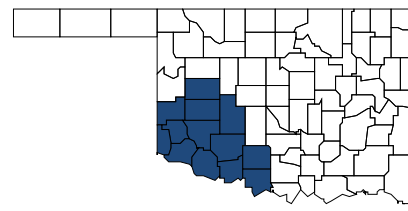
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

SOUTHWESTERN OKLAHOMA STATE UNIVERSITY

EXPENDITURE-BASED ECONOMIC IMPACTS



Southwestern Oklahoma State University generated operational expenditures of \$101 million in FY 2011, with \$45 million of this coming from state funding. With a total regional economic (output) impact of \$126 million, the estimated return on investment is \$2.80 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Southwestern Oklahoma State University. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$45.0
Research Expenditures	\$7.8
Intercollegiate Athletics	\$0.0
Other Auxiliary Enterprises and Related Expenditures	\$19.6
Building New Construction and Repair	\$0.0
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$28.2
Total Expenditures	\$100.6

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Southwest Oklahoma region through the operations and functions of Southwestern Oklahoma State University.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	1,110	\$9.6	\$21.9	\$97.2	\$3.1	\$2.4
Indirect Effect	171	\$5.4	\$12.0	\$21.7	\$1.0	\$1.3
Induced Effect	77	\$2.1	\$4.4	\$7.5	\$0.5	\$0.5
Total Impacts	1,357	\$17.1	\$38.3	\$126.4	\$4.6	\$4.2
Impact Multiplier	1.2	1.8	1.7	1.3		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

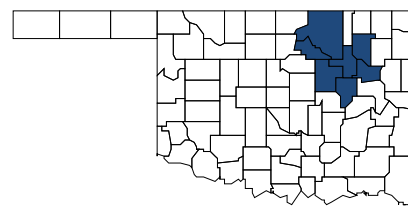
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

TULSA COMMUNITY COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Tulsa Community College generated operational expenditures of \$301 million in FY 2011, with \$114 million of this coming from state funding. With a total regional economic (output) impact of \$511 million, the estimated return on investment is \$4.50 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Tulsa Community College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$113.5
Research Expenditures	\$6.0
Intercollegiate Athletics	\$0.0
Other Auxiliary Enterprises and Related Expenditures	\$37.5
Building New Construction and Repair	\$3.6
Capital Equipment	\$0.4
Estimated Additional Student Spending	\$139.9
Total Expenditures	\$300.8

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Tulsa MSA region through the operations and functions of Tulsa Community College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	3,385	\$118.1	\$178.0	\$291.6	\$10.6	\$24.5
Indirect Effect	661	\$28.8	\$54.0	\$89.6	\$4.2	\$6.7
Induced Effect	1,143	\$44.1	\$78.6	\$129.8	\$7.2	\$10.3
Total Impacts	5,189	\$191.0	\$310.7	\$511.0	\$21.9	\$41.6
Impact Multiplier	1.5	1.6	1.7	1.8		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

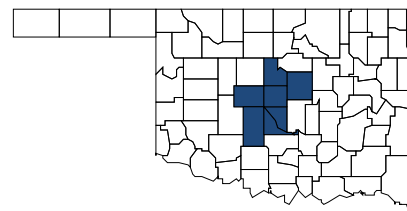
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

UNIVERSITY of CENTRAL OKLAHOMA

EXPENDITURE-BASED ECONOMIC IMPACTS



The University of Central Oklahoma generated operational expenditures of \$304 million in FY 2011, with \$124 million of this coming from state funding. With a total regional economic (output) impact of \$497 million, the estimated return on investment is \$4.01 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of the University of Central Oklahoma. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$123.3
Research Expenditures	\$9.0
Intercollegiate Athletics	\$0.0
Other Auxiliary Enterprises and Related Expenditures	\$44.1
Building New Construction and Repair	\$5.2
Capital Equipment	\$1.1
Estimated Additional Student Spending	\$121.3
Total Expenditures	\$304.0

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Oklahoma City MSA region through the operations and functions of the University of Central Oklahoma.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	2,959	\$97.8	\$150.8	\$295.7	\$10.9	\$20.1
Indirect Effect	776	\$30.6	\$61.9	\$100.6	\$5.2	\$7.5
Induced Effect	932	\$35.0	\$63.0	\$100.9	\$6.0	\$8.1
Total Impacts	4,666	\$163.4	\$275.6	\$497.2	\$22.1	\$35.6
Impact Multiplier	1.6	1.7	1.8	1.7		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

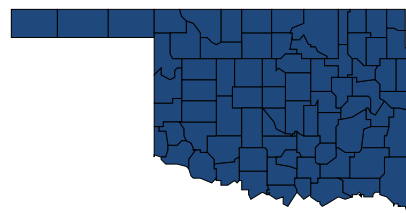
Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

UNIVERSITY of OKLAHOMA

– All Campuses & Programs

EXPENDITURE-BASED ECONOMIC IMPACTS



The University of Oklahoma generated operational expenditures of \$1.96 billion in FY 2011, with \$601 million of this coming from state funding. With a total regional economic (output) impact of \$3.38 billion, the estimated return on investment is \$5.63 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of the University of Oklahoma. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$580.5
Research Expenditures	\$332.1
Intercollegiate Athletics	\$85.1
Other Auxiliary Enterprises and Related Expenditures	\$590.3
Building New Construction and Repair	\$83.7
Capital Equipment	\$0.9
Estimated Additional Student Spending	\$283.1
Total Expenditures	\$1,955.8

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated throughout the State through the operations and functions of the University of Oklahoma.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	17,179	\$750.4	\$885.2	\$1,934.4	\$59.3	\$139.9
Indirect Effect	5,735	\$214.6	\$406.3	\$703.8	\$32.1	\$50.5
Induced Effect	6,927	\$240.0	\$445.3	\$742.0	\$43.7	\$57.2
Total Impacts	29,840	\$1,205.0	\$1,736.7	\$3,380.2	\$135.1	\$247.6
Impact Multiplier	1.7	1.6	2.0	1.7		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

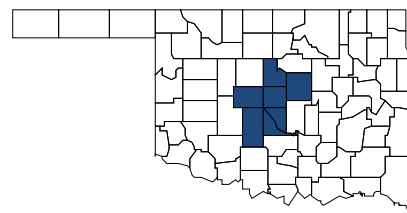
Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

UNIVERSITY of OKLAHOMA

- Health Sciences Center

EXPENDITURE-BASED ECONOMIC IMPACTS



The University of Oklahoma – Health Sciences Center generated operational expenditures of \$815 million in FY 2011, with \$157 million of this coming from state funding. With a total regional economic (output) impact of \$1.45 billion, the estimated return on investment is \$9.23 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of the University of Oklahoma - Health Sciences Center. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$153.9
Research Expenditures	\$163.9
Intercollegiate Athletics	\$-
Other Auxiliary Enterprises and Related Expenditures	\$420.6
Building New Construction and Repair	\$25.2
Capital Equipment	\$0.6
Estimated Additional Student Spending	\$51.3
Total Expenditures	\$815.4

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Oklahoma City MSA region through the operations and functions of the University of Oklahoma - Health Sciences Center.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	6,990	\$290.1	\$320.4	\$811.8	\$22.4	\$51.8
Indirect Effect	2,625	\$102.8	\$203.5	\$332.2	\$16.5	\$24.8
Induced Effect	2,848	\$107.0	\$192.5	\$308.4	\$18.4	\$24.6
Total Impacts	12,463	\$499.9	\$716.4	\$1,452.4	\$57.3	\$101.2
Impact Multiplier	1.8	1.7	2.2	1.8		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

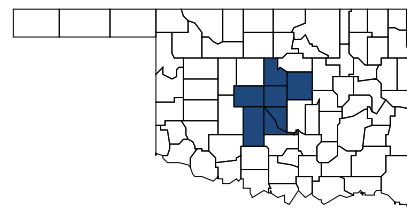
Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

UNIVERSITY of OKLAHOMA

- Norman Campus

EXPENDITURE-BASED ECONOMIC IMPACTS



The University of Oklahoma – Norman Campus generated operational expenditures of \$1.11 billion in FY 2011, with \$430 million of this coming from state funding. With a total regional economic (output) impact of \$1.93 billion, the estimated return on investment is \$4.49 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of the University of Oklahoma – Norman Campus (including Main Campus and the Law Center). The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$413.8
Research Expenditures	\$168.0
Intercollegiate Athletics	\$85.1
Other Auxiliary Enterprises and Related Expenditures	\$169.8
Building New Construction and Repair	\$58.5
Capital Equipment	\$0.3
Estimated Additional Student Spending	\$215.8
Total Expenditures	\$1,111.3

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Oklahoma City MSA region through the operations and functions of the University of Oklahoma – Norman Campus.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	9,953	\$397.9	\$494.4	\$1,097.4	\$33.5	\$74.0
Indirect Effect	3,497	\$136.6	\$255.4	\$416.9	\$20.4	\$31.7
Induced Effect	3,876	\$145.6	\$262.0	\$419.7	\$25.1	\$33.5
Total Impacts	17,326	\$680.2	\$1,011.8	\$1,934.0	\$79.0	\$139.2
Impact Multiplier	1.7	1.7	2.0	1.8		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

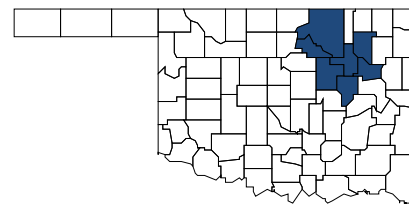
Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

UNIVERSITY of OKLAHOMA

- Tulsa Campus

EXPENDITURE-BASED ECONOMIC IMPACTS



The University of Oklahoma – Tulsa Campus generated operational expenditures of \$29 million in FY 2011, with \$13 million of this coming from state funding. With a total regional economic (output) impact of \$48 million, the estimated return on investment is \$3.70 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of the University of Oklahoma – Tulsa Campus. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$12.8
Research Expenditures	\$0.3
Intercollegiate Athletics	\$0.0
Other Auxiliary Enterprises and Related Expenditures	\$0.0
Building New Construction and Repair	\$0.0
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$16.0
Total Expenditures	\$29.1

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Tulsa MSA region through the operations and functions of the University of Oklahoma – Tulsa Campus.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	332	\$11.0	\$17.8	\$28.1	\$1.0	\$2.3
Indirect Effect	61	\$2.7	\$5.0	\$8.2	\$0.4	\$0.6
Induced Effect	106	\$4.1	\$7.3	\$12.0	\$0.7	\$1.0
Total Impacts	499	\$17.7	\$30.0	\$48.3	\$2.0	\$3.9
Impact Multiplier	1.5	1.6	1.7	1.7		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

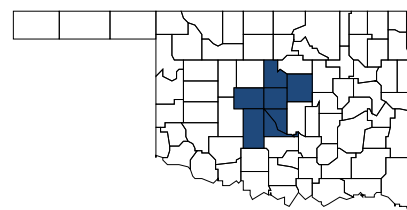
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

UNIVERSITY of SCIENCE and ARTS of OKLAHOMA

EXPENDITURE-BASED ECONOMIC IMPACTS



The University of Science and Arts of Oklahoma generated operational expenditures of \$25 million in FY 2011, with \$12 million of this coming from state funding. With a total regional economic (output) impact of \$43 million, the estimated return on investment is \$3.63 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of the University of Science and Arts of Oklahoma. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$11.8
Research Expenditures	\$0.4
Intercollegiate Athletics	\$0.1
Other Auxiliary Enterprises and Related Expenditures	\$6.1
Building New Construction and Repair	\$0.0
Capital Equipment	\$0.0
Estimated Additional Student Spending	\$7.0
Total Expenditures	\$25.4

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Oklahoma City MSA region through the operations and functions of the University of Science and Arts of Oklahoma.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	282	\$8.7	\$11.3	\$24.9	\$0.9	\$1.7
Indirect Effect	72	\$2.8	\$5.8	\$9.5	\$0.5	\$0.7
Induced Effect	84	\$3.1	\$5.6	\$9.0	\$0.5	\$0.7
Total Impacts	437	\$14.6	\$22.8	\$43.3	\$2.0	\$3.1
Impact Multiplier	1.6	1.7	2.0	1.7		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

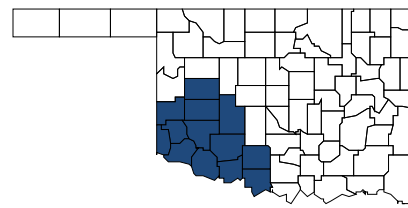
Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

WESTERN OKLAHOMA STATE COLLEGE

EXPENDITURE-BASED ECONOMIC IMPACTS



Western Oklahoma State College generated operational expenditures of \$36 million in FY 2011, with \$13 million of this coming from state funding. With a total regional economic (output) impact of \$48 million, the estimated return on investment is \$3.54 for every \$1.00 of state funding.

There are direct, indirect, and induced economic benefits generated in the state and regional economies through the operational expenditures of the faculty, staff and students of Western Oklahoma State College. The following table details the FY 2011 expenditures used to calculate the institution's regional economic impacts.

Operational Expenditures, FY 2011 (\$ in Millions)

Expenditure Category	\$ Expenditures
Instruction, Service, Administration, and Other Operational Expenditures	\$13.4
Research Expenditures	\$1.2
Intercollegiate Athletics	\$0.1
Other Auxiliary Enterprises and Related Expenditures	\$6.4
Building New Construction and Repair	\$0.0
Capital Equipment	\$0.1
Estimated Additional Student Spending	\$14.3
Total Expenditures	\$35.6

Source: Institutional expenditure data provided by OSRHE; additional student spending estimated by Battelle.

The following table quantifies the broad economic impacts generated within the Southwest Oklahoma region through the operations and functions of Western Oklahoma State College.

Operational Impacts (\$ in Millions)

Impact Type	Employment	Labor Income	Value Added	Output	State & Local Tax Revenue	Federal Tax Revenue
Direct Effect	344	\$12.0	\$18.3	\$33.7	\$1.4	\$2.3
Indirect Effect	56	\$1.8	\$3.9	\$7.0	\$0.3	\$0.4
Induced Effect	70	\$1.9	\$4.0	\$6.8	\$0.4	\$0.5
Total Impacts	469	\$15.7	\$26.1	\$47.5	\$2.1	\$3.2
Impact Multiplier	1.4	1.3	1.4	1.4		

Source: Input data from OSRHE; Battelle calculations and analysis; IMPLAN 2010 regional model. Direct effect output = total expenditures minus direct purchases from outside of the region.

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—taken together, are considered the **total impacts**. The **Impact Multiplier** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of individuals (full or part-time works) whose employment is due, totally (direct employment) or in part (indirect or induced employment) to the economic effects of the higher education-related expenditures.

Labor Income: Measures cash, benefits and non-cash payments received by individuals in the economy.

Value Added: The difference between an institution's total output and the cost of its intermediate inputs.

Output: The dollar value of production (i.e., expenditures for non-profit organizations).

Tax Revenue: The dollar value of taxes generated (including social security).

