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Public Research Universities:
Why They Matter

A Publication of The Lincoln Project: Excellence and Access in Public Higher Education

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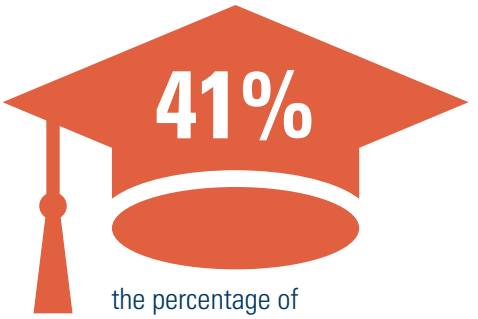
Cover: The lights on the map represent the locations of Carnegie-classified Very High Research Activity and High Research Activity public universities in the United States as of April 2015.

Public Research Universities: Why They Matter

Introduction

In an interconnected and rapidly changing world, the United States requires an educated citizenry to support a constant flow of research and innovation and to sustain its international competitiveness. Public research universities are a foundational piece of the U.S. educational infrastructure that meets this need. A 2012 report to the president and to Congress defines public research universities as "research intensive, doctorate-granting institutions that receive a share of funding from state and local appropriations and serve as a critical component of the overall higher education landscape."[1] In 2013, public research universities enrolled approximately four



the percentage of all baccalaureate or graduate level degrees/ certificates awarded by public research universities in areas of national need (as defined by the federal government)

million students nationwide—an average of about eighty thousand students in each state.[2] These institutions provide high-quality educational opportunities to students at all income levels. Further, public research universities enroll the best and brightest students in every state: 87 percent of entering freshmen are from the top half of their graduating high school class.[3]

Nearly 75 percent of all students enrolled in postsecondary programs in the United States attend public institutions, ranging from two-year community colleges to comprehensive four-year baccalaureate- and master's-conferring state schools to doctoral degree–granting research universities.[4] Public research universities serve a distinct and indispensable role in this educational landscape. In addition to producing research and scholarship, public research universities provide economic development and technical assistance to their communities, states, and nation, as well as opportunities for anchor-institution collaborations. While other institutions may address these needs individually, public research universities are charged with addressing them together as effectively, efficiently, and affordably as possible.

4 million

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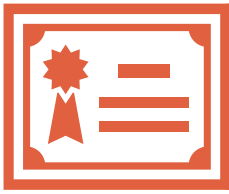
The number of students educated annually at public research universities

There is at least one public research university in every state, providing geographically accessible educational opportunities to Americans across the country. Public research universities initiate the fundamental research that drives scientific and technological discovery. They educate and train the skilled workforce of tomorrow. They prepare schoolteachers and faculty for the classroom. They equip the next generation of leaders with the knowledge, skills, and empathy to lead a twenty-first-century democracy. Most important, public research universities are stewards and repositories of human knowledge.



60% = the percentage of all doctoral degrees awarded by public research universities[5]

Today, confronted with reduced state investment, public research universities are forced to make difficult choices about institutional priorities. In this climate, the American Academy of Arts & Sciences created the Lincoln Project: Excellence and Access in Public Higher Education to urge support for public research universities and recommend new strategies to sustain these critical institutions. This report begins the discussion by demonstrating the many ways in which public research universities are a vital public good.

Section 1: Public Research Universities Serve the National Interest

Public research universities play a significant role in regional and national economic development. With the demise of many private research laboratories, our nation's universities have become the primary sources of U.S. research, discovery, and innovation.[6] The biotech industry originated almost entirely from research universities. Countless start-ups and patent grants in a number of industries have sprung from the research clusters that have formed, in conjunction with private counterparts, around the University of California, Berkeley; University of California, San Diego; University of Michigan; University of Texas at Austin; and University of Illinois at Urbana-Champaign.[7] Further, public research universities regularly engage with community and state governments, providing academic expertise, technical assistance, and critical education and workforce development. They are also major employers: in 2012–2013, public research universities employed over 1.1 million faculty and staff nationwide, and were among the top-five largest employers in twenty-four states.[8]

Every day we benefit from discoveries made or knowledge advanced in public research universities. Public research universities have contributed to the development of antibiotics, the Internet, ATMs, bar codes, computing devices and smartphones, LEDs, laser eye surgery, sonic toothbrushes, and even wet suits.[9] From malaria treatments in development at the University of California, Berkeley to the Ohio State University's work on the mitigation of environmental risks in agriculture, public research universities continue to produce research that improves our health, grows our economy, and enhances our day-to-day lives in profound ways.

Public research universities advance the cultural vitality of their states and regions. They serve as vibrant cultural centers, producing strong communities whose diverse interests and activities enrich their region.[10] They provide health care through academic medical centers, and 18 percent of all public research universities have hospitals.[11] They also partner with public school systems to enhance educational opportunities at the K–12 level: 86 percent of public research universities have teacher certification programs approved by the state for initial certification or licensure of teachers.[12]

What are some examples of public research universities' contributions?

As one of the top agricultural universities in the world, **the University of California, Davis established the World Food Center** to tackle the major challenges in feeding and nourishing a growing planet in an environmentally sustainable way.

The School of Freshwater Sciences at the University of Wisconsin–Milwaukee is the first graduate school in the nation dedicated to freshwater research, and is one of three such schools in the world.

The multitouch screen technology essential to smartphones, tablets, and other devices was developed at the **University of Delaware**.

The University of Arkansas Cooperative Extension Service reaches more than 166,000 children aged five to eighteen and serves as Arkansas' largest youth education organization.

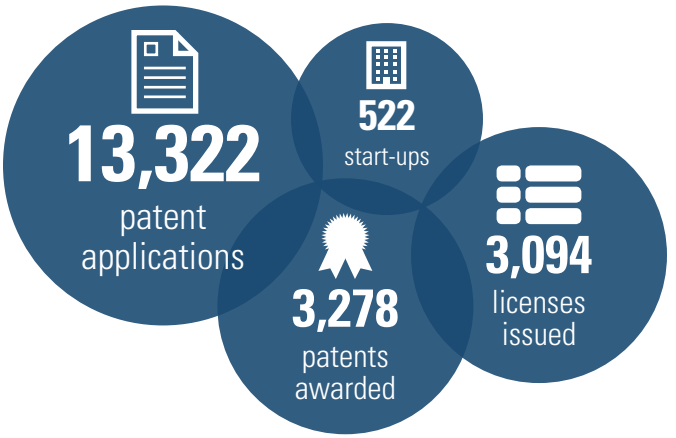
Through its **Biosecurity Research Institute and the forthcoming National Bio and Agro-Defense Facility, Kansas State University** has become a national leader in animal health and food safety.

In collaboration with partners across the university and the world, researchers at **North Carolina State University** have designed the first interactive virtual representation of poet John Donne's Gunpowder Day sermon at Paul's Cross, London.

Section 2: Public Research Universities Contribute to the Innovation Economy

As research and education centers, public research universities fuel state and national economic development. For example, in 2012–2013, the University of North Carolina system and its affiliated medical institutions added $27.9 billion in income to the state economy.[13] In FY 2012, the University of Hawaii generated $3.61 billion in local business sales, $1.10 billion in employee earnings, $194 million in state tax revenues, and over 28,500 jobs in the state.[15] In Florida, nearly 8 percent of the state's total workforce and 7 percent of the state's gross domestic product (GDP) is related in some way to the state university system.[16]

Between 2012 and 2013, research at public universities resulted in more than[14]



Universities foster research- and innovation-based relationships with business, industry, the nonprofit sector, and government. The University of Cincinnati Research Institute, VT KnowledgeWorks at Virginia Tech, and Innovate ABQ at the University of New Mexico all connect academic experts to industry partners and serve as hubs of innovation and engines of growth. Many universities have created innovation accelerators that encourage a culture of entrepreneurship by sponsoring start-up competitions, providing seed funding, or offering catalyst grants, while also serving as magnets to business and industry. The top innovation clusters in the country are affiliated with and geographically near research universities, both public and private.

Universities manage their intellectual property for the public good. While technology transfer and intellectual property can result in new revenue for public research universities, the primary purpose of these policies is to serve the public interest. Universities stimulate economic growth through responsible management of intellectual property and its transfer.

20/50 Among the **fifty** higher education institutions worldwide most successful in creating venture capital–supported entrepreneurs, **twenty** are U.S. public research universities.[17]

Section 3: Public Research Universities Provide Quality Educational Opportunities and Programs at an Efficient Cost

Public research universities experiment with innovations in teaching and learning, including "flipped" and "hybrid" classrooms (in which lectures take place online and class time is devoted to discussion), and other alternative teaching methodologies that take advantage of information technology and online education.[18] Projects such as the Global Classrooms Initiative at the University of Maryland provide financial support to faculty who develop innovative project-based courses that use digital technology to bring together students from partner universities around the world. The University of Memphis Finish Line Program targets students who come close to graduating but have to stop-out and matches them with online, self-paced courses to help them complete their degrees. And through extension centers and lifelong learning institutes, public research universities are able to educate tens of thousands of citizens who would otherwise be beyond the reach of their campuses.

At public research universities:

18:1 The average student-to-faculty ratio[19]

38% of courses have fewer than 20 students

83% of freshmen return for their sophomore year[20]

Institutional leaders align academic initiatives with the strengths and needs of the region and the nation. In 2013, public research universities awarded 41 percent of all baccalaureate or graduate level degrees/certificates in areas of national need (as defined by the federal government).[21] Through these universities, students also gain access to internships and co-op experiences in local and regional companies, in some cases earning pay for their work. More than one in every four students at public research universities held an internship in 2012–2013, and one in ten interned under the direction of a university faculty member over that same period.[22] Public research universities provide the platform and incentive for companies and students to engage with each other.

The average median midcareer salary for graduates of public research universities is

$82,161

Undergraduates at public research universities benefit from faculty and graduate-student mentoring. Students learn from cutting-edge researchers, in all disciplines, who share new knowledge and the excitement of discovery through their teaching.The many available opportunities for undergraduates to participate

in research provide invaluable hands-on application of classroom learning and skills training for the future.[23]

For graduates of public research universities, a college education (including tuition, living expenses, and foregone income) typically pays for itself within five to seven years of post-graduate employment.[24] Public research universities hold the second highest graduation rate among all Carnegie-classified public colleges and universities (trailing only public art, music, and design schools),[25] and job opportunities for college graduates are far better than for the general population and unemployment rates are lower.[26] The average median midcareer salary for graduates of public research universities is $82,161.[27] Over the last fifty years, the percentage of underpaid college graduates (defined as making less than the median pay of high school graduates) has decreased by one-third.[28] Although there are differences in earning potential across majors, especially early in a graduate's professional life, college graduates in all majors earn at least 60 percent more than high school graduates over the course of a career.[29]

Undergraduate Research on Campus and Beyond

Over **1,800 undergraduate students** participate in the Undergraduate Research Apprentice Program at the **University of California, Berkeley.** Students have the choice between working on semester- or year-long faculty-led projects across all academic departments.

At **Miami University** in Ohio, **more than 2,000 undergraduate students** work with professors on funded research each year. In the annual spring Undergraduate Research Forum, undergraduates have the unique opportunity to publish and present to the university community on topics ranging from eye tracking and face processing to wine-drinking behavior in millenials.

University of Nebraska's Undergraduate Creative Activities and Research Experience program is complemented by skill-building seminars in topics such as ethics, data management, networking and presentations, and preparing for graduate school. In FY 2014–2015, hundreds of students completed faculty-sponsored projects in areas ranging from agriculture and natural resources to nursing.

The **University of Connecticut** has ten different funding programs for its undergraduate student researchers. The **UConn IDEA Grant** provides up to $4,000 for student-designed projects targeting the arts, community service, entrepreneurship, and academic research.

Changing Gears, part of the Undergraduate Research Opportunity Program at the **University of Michigan**, is designed for community college transfer students to become a part of an ongoing research project in their field of interest and work alongside University of Michigan faculty and scholars on groundbreaking research.

Undergraduates at **Pennsylvania State University** publish, perform, exhibit, and present their research projects at Penn State's annual **Undergraduate Exhibition**, while also sharing their work at national conferences and meetings. Conference travel funding helps students attend events, giving them critical opportunities for networking and professional development.

Posters at the Capitol celebrates the research and scholarly achievements of undergraduates from across the state of Tennessee. Students from the **University of Tennessee** and other state universities travel to Nashville to have lunch with legislators, meet the governor, and explain their various projects.

Section 4: Public Research Universities are Working to Maintain and Improve Access and Affordability

Financial Aid and Access for Undergraduates, 2012–2013

Of first-year students

83% receive some form of financial aid

71% receive federal, state, local, or institutional grant aid

31% receive Pell Grants

Of graduating students

54% graduate with student loan debt (federal and nonfederal)

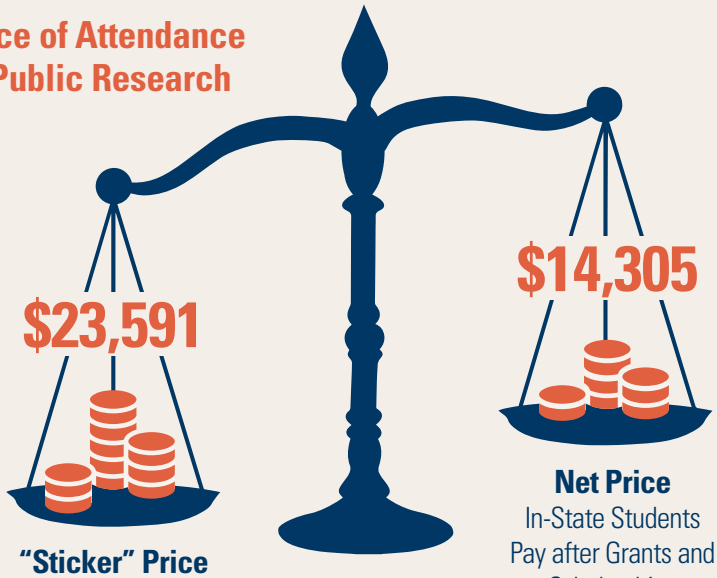
19% graduate with debt over $25,000

Source: National Center for Education Statistics, IPEDS [Integrated Postsecondary Education Data System] (U.S. Department of Education, Institute of Education Sciences), https://nces.ed.gov/ipeds/; The Institute for College Access & Success, College InSight, http://www.college-insight.org; and National Center for Education Statistics, 2011–12 National Postsecondary Student Aid Study (NPSAS:12) (U.S. Department of Education, Institute of Education Sciences).

The average price of tuition, room and board, and other on-campus fees at public research universities for in-state students is about $24,000 per year. With financial aid, that amount is reduced on average to about $14,000 per year.[30]

The number of students at public research universities who receive federal Pell Grants, an indicator of the volume of students from low-income families, has increased by 8 percent over the past five years.[31] Many states, university systems, and individual institutions have created their own affordability initiatives that target low- and middle-income students. In California, the UC Blue and Gold Opportunity Plan lowers the cost of tuition to $0 for students from families with household incomes at $80,000 or below.[32] The University of Delaware's Commitment to Delawareans guarantees to meet the full demonstrated financial need of all qualified residents who submit a FAFSA (Free Application for Federal Student Aid); Delaware hopes to ensure that no student will graduate with loans in excess of 25 percent of the cost of a four-year education. Moreover, low-income students at public research universities typically graduate at higher rates than their peers at other public colleges and universities and private for-profit institutions.[33]

Average Price of Attendance per Year at Public Research Universities



"Sticker" Price
for In-State Students
(including tuition, fees, room and board)

Net Price
In-State Students
Pay after Grants and
Scholarships

Source: National Center for Education Statistics, IPEDS [Integrated Postsecondary Education Data System] (U.S. Department of Education, Institute of Education Sciences), https://nces.ed.gov/ipeds/.

Recognizing that there are different paths to four-year degrees, many institutions also work closely with high school and community colleges to develop dual enrollment, joint admission, automatic admission, and transfer articulation policies (such as 2NAU at Northern Arizona University) that provide students with lower-cost options for transfer and graduation. The Garden State Louis Stokes Alliance for Minority Participation and the Northern New Jersey Bridges to the Baccalaureate programs, for example, are pioneering the development of a streamlined model for community college students to complete their degrees and continue to obtain bachelor's degrees and beyond.

Tuition at public research universities often covers only one-third of the actual cost of a student's education.[34] Grants, state appropriations, endowment earnings and contributions, and philanthropy subsidize the remaining costs. Thus, as states have reduced higher education appropriations and enrollments have increased, universities have been forced to raise tuition. There has been a direct correlation between the reductions in state support and tuition increases even while taking into account the many cost-cutting measures individual institutions have employed.[35]

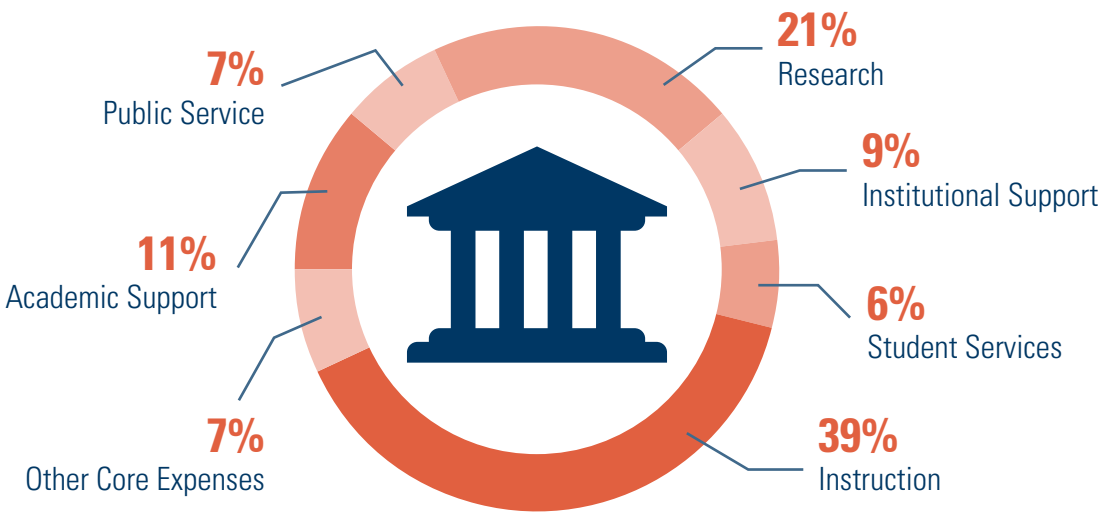
About half (54 percent) of all undergraduates at public research universities take out loans to pay for their bachelor's degrees.[36] Among them, the average debt at graduation is about $25,000, or $6,300 for each year of a four-year degree. Of those students who take out loans, 33 percent borrow less than $10,000 and 70 percent owe less than $25,000 at the time of graduation.[37]

Section 5: Public Research Universities Value Responsible Spending

The education of graduate students is essential to the research mission and to the production of future faculty members, and therefore to the health of the entirety of higher education. As doctoral degree–granting institutions, public research universities have less flexibility to absorb budget reductions than do large comprehensive universities. Public research universities must maintain high faculty levels because graduate training requires intense faculty-student interaction. But public research universities have suffered massive budget cuts; state cuts have reduced total funding for public research universities by 20 percent per enrolled student over the past decade.[38] Forty-six of the fifty states cut support for higher education from 2008 to 2013, some by more than one-third.

The main driver of tuition increases has been the loss of state appropriations, which have reduced per-student support by as much as 40 percent.[39] Tuition increases alone cannot make up the difference. It is a widely held public belief that the state provides the majority of support for public universities. But with state appropriations in many cases making up less than 20 percent of public research university budgets, and in some cases even less than 10 percent,[40] this is clearly a myth; new funding models are needed to increase resources.

Major Operating Expenditures at Public Research Universities by Function, 2012–2013



Source: National Center for Education Statistics, IPEDS [Integrated Postsecondary Education Data System] (U.S. Department of Education, Institute of Education Sciences), https://nces.ed.gov/ipeds/.

Public research universities have cut costs in recent years by:

- Reprioritizing investment around areas of excellence
- Adopting shared services strategies that consolidate human resources, purchasing, and other administrative functions to take advantage of economies of scale
- Engaging in strategic partnerships with other public research universities, research and industry leaders, and local and state government
- Redesigning benefits programs to increase eligibility requirements, higher deductibles, and extended vesting periods
- Discontinuing or realigning activities, programs, and practices that don't align with the most critical needs of the state and nation
- Reallocating resources to match changing enrollment patterns
- Conserving energy and cutting utility costs through the use of solar voltaic systems
- Restructuring administration to better match resources with academic needs
- Promoting entrepreneurial strategies for revenue generation
- Adopting Responsibility Centered Management (RCM) budgeting, in which academic schools and colleges are responsible for managing their own direct revenue and expenses.

Many public research universities have lowered administrative and operational expenses by finding new efficiencies. For example, between 2006 and 2009, the Arizona Board of Regents gained a cost savings of 38 percent for the state's public universities by redesigning its course offerings.[41] Collaborations and shared services also reduce costs: the Library Service Center, a joint venture between the Georgia Institute of Technology and Emory University, will house materials available to students, faculty, and staff at both universities.[42] These findings are supported by the *U.S. News & World Report*'s rankings of the most efficient colleges and universities, which are dominated by public research universities.[43]

Conclusion

Public research universities have experienced a greater decline in state appropriations (as a percentage of operating revenue) than either community colleges or master's colleges or universities, threatening both the educational and research missions of these fundamental U.S. institutions. Most universities have instituted new programs to reduce costs, but years of dramatic budget cuts have left little room for austerity: public research universities increasingly are expected to serve more Americans with less funding. In response to this need, the Lincoln Project is developing new strategies for ensuring that public research universities continue to serve the nation as engines of innovation, growth, and opportunity for Americans of all backgrounds.

This is the first in a series of five publications that will examine the importance of our public research universities. Subsequent publications will include detailed overviews of challenges facing higher education funding at the state level; the current financial models of public research universities and how they are changing; and the myriad impacts of the research conducted at these institutions on people, the economy, and the nation. Ultimately, the Lincoln Project will offer substantive policy recommendations for sustaining public research universities and will call on all funding partners—states, the federal government, philanthropies, business, and the public—to maintain and enhance their investment in them.

Endnotes

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3 Additionally, 61 percent of first-time, full-time freshmen come from the top quarter of their graduating high school class, and 35 percent come from the top fifth of their graduating high school class. See *U.S. News & World Report*, U.S. News College Compass (2015).

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