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HIGHER EDUCATION

APPLIED WORK-BASED LEARNING AT THE STATE UNIVERSITY OF NEW YORK

Situating SUNY Works and Studying Effects

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Contents

Executive Summary	v
Introduction	1
Part I: Study Approach and Design	4
Part II: Situating SUNY Works	5
Part III: Pilot Study	40
Part IV: Conclusion	52
Appendix A. Campus Survey	56
Appendix B. Procedures and Detailed Results of Retention and Graduation Effects Using Propensity Score Matching	63
Appendix C. Tables for Pilot Study	65
Endnotes	76
References	82

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Executive Summary

State University of New York (SUNY) Chancellor Nancy Zimpher's goal is to ensure every SUNY student has the opportunity to engage in at least one form of applied learning before they graduate. Applied learning, or developing skills and knowledge from direct experiences outside the classroom, varies widely across university systems, within campuses, and between programs. SUNY's applied learning initiatives include work-based activities, e.g., co-ops, internships, work study, and clinical placement (SUNY Works); community-based activities, e.g., service learning, community service, and civic engagement (SUNY Serves); and discovery-based activities, e.g., research, entrepreneurship, field study, and study abroad (SUNY Discovers). Our report focuses on the work-based activities of SUNY Works.

With funds from the Carnegie Corporation of New York, SUNY asked the Rockefeller Institute of Government to examine applied work-based experiences of SUNY Works along two key dimensions. First, situate SUNY Works relative to other applied learning initiatives by asking: *What do other states, systems, and countries do? What can SUNY learn from the experiences elsewhere that is relevant for extending work-based applied learning opportunities more widely?* Second, because expanding work-based applied learning experiences includes the implicit goal of expanding worthwhile opportunities for students, *how can SUNY understand the effects of such experiences on the retention and graduation of SUNY students and employment of SUNY graduates?* The report addresses these two dimensions in depth.

Situating SUNY Works

This report describes relevant experiences of campuses and systems elsewhere, identifying what SUNY Works should consider to extend work-based applied learning to more students on each SUNY campus and across the system as a whole. However, *none of the campuses or systems we examine is a direct comparison to SUNY because SUNY Works is unique: there is no other state or system in the US that has advanced a work-based learning experience initiative on a scale and across the breadth of types of study programs and institutions encompassed by SUNY.* SUNY's uniqueness is due, in part, to its reach – across campuses that encompass all types of institutions, levels of degree program, and fields.

Although there is no domestic system initiative quite like SUNY's, drawing on field experts and selected literature, *we identify key features of other system-wide and campus-level initiatives and suggest that these are the relevant features for SUNY to consider as it expands SUNY Works.* These features are important components of seemingly successful or recent initiatives and may be used as a basis of comparison. In particular, we suggest that successful work-based applied learning opportunities:

- are well-structured. There are clear expectations for students and stakeholders as well as sufficient administrative support. Organized workshops and/or seminars are provided on campus for participating students to introduce them to the basic language, skills, and expectations in the field in which they are working.
- foster opportunities for applied learning experiences throughout the degree program. Students can draw from and relate to such experiences throughout the academic curriculum, building knowledge and capacities over time.
- are credit bearing to recognize the time and effort that students and faculty dedicate to the experience and to allow administrative tracking and oversight of applied learning experiences.
- incorporate alternative assessments of student learning as part of the experience (e.g., noncognitive, prior-learning assessment (PLA), portfolio).

To show how work-based experiences can be scaled up across a campus and through a system we highlight points of leverage to engage students, faculty, and employers in applied learning initiatives. Drawing from the same knowledge base, we identify as points of leverage, operating at system or campus levels:

- mandates that require campuses to allow for, or students to engage in, learning outside the classroom;
- financing to support faculty, students, and/or employers engaged in work-based learning experiences;
- supportive arrangements and infrastructure, to facilitate participation of faculty, students, and/or employers.

We illustrate how the features of initiatives are manifested and points of leverage work by examining in detail five cases of initiatives that extend (or intend to extend) opportunities for work-based applied learning broadly, including three system-wide initiatives (Australia's learning and teaching policy initiatives; the Dual System in Germany; and the Universities of Applied Sciences in Switzerland) and two campus-wide initiatives (Northeastern University's co-op experience and the University of Michigan's Undergraduate Research Opportunity program). These five illustrative cases show not every initiative includes every feature, and the particular points of leverage adopted address the needs of academic programs, students, faculty, and community stakeholders (prominently, employers) concerned.

The cases are supplemented by more than two dozen examples of relevant applied learning initiatives or broad-based strategies. We show how systems and campuses have used mandates to encourage student engagement outside the classroom (University System of Maryland, Youth Guarantee Finland); financial incentives to encourage employer-partnerships (Trade Adjustment Assistance Community College and Career Training) and to facilitate

expansion of work-based learning opportunities at campuses (BrownConnect, Engaged Cornell); and infrastructure support to generate buy-in from faculty (Michigan's Urop), students (Cal Poly), and employers (South Dakota School of Mines). Deep commitment to work-based applied learning at places like Northeastern, Berry, or Berea means that work is fully integrated into the core educational curriculum and mission of these institutions, making these models of integrated work-based applied learning. Although useful, such models may be difficult to introduce elsewhere without substantial infrastructure support and deeper changes in mission and reward systems. Implementing meaningful work-based applied learning experiences across a campus or system is hard to do, requiring agreements and engagements that span conventional arrangements. Yet, these and other identified experiences provide examples of the kinds of features and points of leverage that could figure in strategies developed by SUNY Works.

Understanding Effects

Taking initiatives to scale requires a basic understanding of what works. *We conduct a feasibility study to evaluate the use of administrative data to measure effects of work-based applied learning experiences.* With support from the vice provost for institutional research and officials at one campus in the SUNY system, our pilot study explores the possibility of using campus academic unit records to generate estimates of the effects of internships — one form of work-based applied learning — on retention and graduation. The pilot study also explores the use of linked academic — NYS Department of Labor Unemployment Insurance (UI) wage records to generate estimates of the effects of internships on employment outcomes. *We find that the effects of internships on retention and graduation can be estimated with academic unit records. In our pilot study, we identify limitations and considerations that apply to such efforts, noting that student records may lack information on internships needed to permit detailed and comprehensive analyses.* The initial and tentative findings suggest positive effects: internships are associated with better retention and graduation rates. The link with wage records, at present, requires steps to address certain restrictions imposed by the NYS Department of Labor. While we describe the design, measures (their limitations and interpretation), and implementation of data transfer and linkage to date, analysis of these data is provided in the supplemental appendix to this report

Conclusion

There are no work-based applied learning initiatives in the US on par with SUNY's. Nevertheless, we examine relevant initiatives and strategies adopted by other systems and campuses to identify and illustrate the key features of work-based initiatives and the main strategies for scaling up relevant to SUNY.

SUNY, on some campuses and for some fields, incorporates the features and uses points of leverage discussed above: work-based applied learning initiatives on SUNY campuses often are well-structured and include organized workshops. But other features appear to be largely absent: work-based applied learning opportunities tend not to be offered early in the student's academic career, are not uniformly well-integrated into the curriculum, and do not include alternative assessments. Further, participation in work-based applied learning varies across many campuses, often by field of study. Of course, experience elsewhere shows that not all of the identified features are present in work-based applied learning initiatives that have been extended, or are being extended, to all students. Moreover, depending on the field and student interests, the benefits of applied learning experiences may come from service learning and discovery learning as much as from work-based learning. The effects on retention, graduation, and employment of differences in the types and features of applied learning, field of study, and student background warrant closer study using administrative academic and wage records or other methods (e.g., experimentation).

We suggest, however, that the experience elsewhere shows successful and promising work-based applied learning initiatives that reach large proportions of students. The features of those initiatives and the means used to leverage and support applied learning experiences within those initiatives reveal possible options for consideration by SUNY Works as it seeks to bring work-based applied learning to scale — on campuses and across the system.



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Situating SUNY Works and Studying Effects

Introduction

Applied learning is the application of previously learned theory whereby students develop skills and knowledge from direct experiences outside a traditional classroom setting.¹ In practice, applied learning includes initiatives from internships and co-ops to civic engagement and service learning.² It can benefit students by bridging the gap between theoretical knowledge and its practical application, increasing self-confidence, and developing critical thinking and career goals.³

Applied learning at the State University of New York (SUNY) covers a wide range of experiential learning. SUNY's own taxonomy refers to three main categories: work-based activities, like co-ops, internships, work study, and clinical placements, under SUNY Works; community-based activities, such as service learning, community service, and civic engagement, under SUNY Serves; and discovery-based activities, like research, entrepreneurship, field study, and study abroad, under SUNY Discovers. This report examines work-based initiatives coming under SUNY Works. Even here, the types of work-based experiences differ in nature and structure.

In 2012, with support from Lumina Foundation as well as the Carnegie Corporation of New York, SUNY launched "SUNY

Works.” The overarching goal of the initiative was to develop a model internship and cooperative education infrastructure to help bring higher education in line with labor market needs. The initiative’s initial objective in 2012 was to use cooperative education to decrease the time to graduation for adult learners.⁴ Funds from the Carnegie Corporation of New York were earmarked for scale-up of the initiative.

Through new and expanded internships and cooperative learning experiences across eighteen SUNY campuses, SUNY Works aims to increase student retention and degree completion and to improve graduate employment outcomes.⁵ By providing both paid and unpaid work experiences to students, SUNY Works helps make “academics more relevant by connecting students to work and integrating work experience with curriculum.”⁶ Paid experiences in particular can also help to offset the financial pressures many students face.

Lumina monies were used to assess SUNY Works over the short and medium term. A first evaluation, carried out by the Rockefeller Institute of Government, assessed experiences at nine SUNY campuses, collectively referred to as Phase I pilot sites.⁷ This report found that while Phase I schools were developing model co-op and internship initiatives consistent with the values and commitments of their respective institutions, the success of these campus-level initiatives was contingent on SUNY’s ability to better integrate applied learning into the curriculum and to help increase participation among students, faculty, and employers alike. The report concluded with a recommendation to evaluate the effects of SUNY Works and other forms of applied learning, with a particular focus on student graduation, retention, and employment rates. As part of a Carnegie Corporation of New York grant, the present study builds on the earlier report in two ways.

First, this report situates SUNY Works against relevant features of applied learning and strategies used to extend such learning experiences more widely (points of leverage) in other states and systems. *We identify those initiative features and points of leverage where the experience has particular relevance for campus-wide, region-wide, or SUNY-wide expansion of SUNY Works.* We intentionally focused on the system and campus levels (as opposed to academic program level) because these levels reflect the reach of the vision for applied learning at SUNY. The results of this comparison suggest that, although SUNY Works is unique in the United States (we found no other state or system that has advanced a work-based learning experience initiative on a scale and across the breadth of types of study program and institution encompassed by SUNY Works), we can provide useful comparisons with other initiatives by focusing on components of these endeavors, particularly *features* of existing initiatives and the *points of leverage* used to support or bring these initiatives to scale. We generated these features and leverage points through discussions with experts and reference to selected literature.

Second, because the explicit goal of expanding SUNY Works includes an implicit goal of providing worthwhile opportunities for students, we carried out a feasibility study to evaluate the use of administrative data to measure effects of work-based applied learning experiences on one campus in the SUNY system. The pilot study explores the possibility of using campus academic unit records to generate estimates of the effects of internships on retention and graduation. The pilot study also explores the use of linked academic-NYS Department of Labor Unemployment Insurance (UI) wage records to generate estimates of the effects of internships on employment outcomes, an information base for analysis of higher education performance now used in many states. *For campuses that collect and maintain data on internships, administrative data can uncover effects on retention and graduation. The analysis using wage record information is provided in the supplemental appendix to this report.* The report discusses both the opportunities and limitations when it comes to design, measurement, implementation of data transfer and linkages, and analysis and interpretation of results.

These two dimensions are accomplished in a report with four parts. Part I contains a brief description of the approach adopted in this study. In Part II, we identify relevant approaches and experiences elsewhere to help situate applied learning coming under SUNY Works. Part III includes the account of the pilot study of the use of administrative data to estimate the effects of work-based applied learning at one SUNY campus. A short summary with conclusions is presented in Part IV. The report has additional details in the appendices, which can be consulted for more information.

Part I: Study Approach and Design

Given study and time constraints, we adopted an approach for the project judged to be most promising. The inquiry followed three strands.

First, to gain a deeper understanding of the history, directions, and decision-making for applied learning on SUNY campuses, we designed a survey instrument to collect information from the pool of campus representatives interested or involved in applied learning. The instrument is provided in Appendix A. Participants attending the September 18-19, 2014, SUNY Applied Learning Workshop in Syracuse, New York, comprised the target population; all participants were invited by Elise Newkirk-Kotfila to complete the survey. Although relatively few participated in the survey, their responses along with information available from other campus-level surveys carried out by SUNY enable a description of features and coverage of learning experiences coming under applied learning initiatives at SUNY campuses.

Second, to uncover relevant experience elsewhere, we engaged both current field experts and contemporary literature. We consulted experts knowledgeable in the field of campus-wide and system initiatives for work-based applied learning, other applied learning, or curriculum development and implementation more generally.⁸ Project staff participated in three conferences featuring presentations on current initiatives and experiences relevant to this study.⁹ Project staff also conducted a review of extant research, documents, or other materials on approaches to and experiences with applied learning or curriculum change, again at system or campus level. From this examination, we employed a framework developed for this project that identifies key features of applied learning initiatives and the points of leverage which can be used to support or bring about opportunities for students across campuses and the system.¹⁰ The features and points of leverage help to situate SUNY Works against experience elsewhere. They also point to approaches in use that might be considered in the development and refinement of strategies in SUNY Works. The examples provided here are generated from the best information available to us, within the timeframe and constraints of the project.

Third, to understand in more detail if it is possible for SUNY or SUNY campuses to use administrative data to evaluate their initiatives we carried out a pilot study of the effects of work-based applied learning. Undertaken with advice from officials at one SUNY campus and the SUNY vice provost for institutional research, the pilot study seeks to evaluate a method for using available campus academic unit records linked to NYS Department of Labor UI wage records to gauge the effects on retention, graduation, and employment rates associated with participation in internships. The pilot allowed for a test of the feasibility of such a method in terms of the analysis and metrics, timeliness, implementation requirements, and usefulness of findings.

Part II. Situating SUNY Works

A: Grounds for Comparison

SUNY Works promotes work-based learning designed to impart career readiness in students and improve college retention and completion rates. Initially, the aim of the initiative was to facilitate paid, credit-bearing experiences in fields with high employment needs such as science, technology, engineering, and math (STEM) fields.¹¹ As the initiative has continued to grow, however, the emphasis on particular fields and learners has given way to an expansion to all SUNY students. Consistent with the goal of providing opportunities for every student to have an applied learning experience, SUNY Chancellor Nancy Zimpher, alongside a newly comprised task force of business leaders, pledged to engage the CEOs of Fortune 500 companies throughout New York, as well as other large employers, to secure their participation and involvement in the initiative. Already, some of the state's largest companies including GLOBALFOUNDRIES, General Electric, and IBM have agreed to partner with SUNY schools, alongside local companies like Welch Allyn, Inc., a medical device manufacturer with unique employment needs.¹²

The scope of work-based learning initiatives of SUNY Works has no equivalent. We have not found a counterpart, under state-wide initiative, that envisions broad participation for students across such a range of campuses and fields. Not surprisingly, the work-based applied learning experiences themselves vary. They may be paid or unpaid, credit bearing or noncredit bearing,¹³ completed during the school year or the summer, with or without faculty supervision.

Our approach is to situate SUNY Works against a range of experience elsewhere relevant to SUNY's goal of extending work-based applied learning opportunities to all students, across fields of study or across campuses. Because SUNY is a sixty-four-campus system that includes community colleges, technical programs, four year colleges, and research universities, our range of institutional initiatives is similarly broad. We look at experiences in *systems*, like Australia, which recently has sought to extend work-based applied learning in both universities and Technical and Further Education (TAFE) institutes; *community college sector* initiatives, like the Trade Adjustment Assistance Community College and Career Training (TAACCCT) Grants, which employ external funding to bring about multicampus/multiemployer partnerships for skill training; *four-year sector* initiatives, like the University System of Maryland, which mandates students to earn 10 percent of credits outside of the classroom, including internships; private *four-year campuses* like Northeastern, which has well-integrated work-based experiences; and *public universities*, like the University of Michigan, which through its faculty-led Undergraduate Research Opportunity Program, engages students from all fields in applied learning experiences. In total,

we present relevant approaches and experiences of more than two dozen systems, sectors, campuses, and other levels or programs of learning, both domestic and international. We refer to these examples throughout the report. Table 1 lists the initiatives by level (system through campus) and type of provider (e.g., public four-year) that we examined.

**Table 1: Level of Initiative and Type of Provider
(in Place or Under Discussion for Eventual Implementation)**

<p>Systems</p> <ul style="list-style-type: none"> Australia (System-wide strategies) Finland (Youth Guarantee) United States (Federal Work Study) Massachusetts (civic learning policy) North Dakota (in-state internship) Washington (State Work Study) Indiana (State Work Study) Illinois (State Work Study) 	<p>Public Four-Year Campuses</p> <ul style="list-style-type: none"> California Polytechnic State University (Learn by Doing) California State University, Monterey Bay (service learning) University of Michigan (UROP) University of Texas (applied research) South Dakota School of Mines (work experience) Royal Melbourne Institute, Australia (work integrated learning; pathways)
<p>Sector Two-Year</p> <ul style="list-style-type: none"> Trade Adjustment Assistance Community College and Career Training (TAACCCT) Technical College System of Georgia (workforce development) Connecticut (integrated, paid internship) 	<p>Other Worked Based</p> <ul style="list-style-type: none"> Council for the Assessment of Experiential Learning (Learning Assessments) Educational Testing Service (“Fitness for Work” Assessment) Tennessee Board of Regents (High Impact Practices) Photovoltaic Manufacturing Consortium (with SUNY Poly) Dual System, Germany (Apprenticeship) South Carolina (Apprenticeship)
<p>Sector Four-Year</p> <ul style="list-style-type: none"> University System Maryland (Effectiveness and Efficiency initiative) Universities of Applied Sciences, Switzerland 	
<p>Private Four-Year Campuses</p> <ul style="list-style-type: none"> Berea, KY (Learning, Labor & Service) Berry, GA (Work Experience) Brown (Brown Connect) Cornell (Engaged Cornell) Drake Duke Northeastern (Cooperative Education) 	

While we illustrate a range of systems, sectors, campuses, and other settings for work-based applied learning, these venues, likewise, offer a variety of applied learning experiences. First, we mapped the initiatives (outlined in Table 1) against type of experience (e.g., internship, coop) and for whom (all fields, targeted) they are offered. Table 2 provides a bird’s eye view of more than two dozen applied learning initiatives identified and examined. It situates SUNY Applied Learning and SUNY Works against these

Table 2. Initiative Characteristics

	Type of Experience						Fields		Students	
	Internship	Coop	Research & Entrepreneur	Service Learning	Apprenticeship	Workforce Training	All	Some	All	Targeted
SUNY Applied Learning Initiative	X	X	X	X			X		X	
SUNY Works	X	X					X		X	
System Level										
Australia	X	X					X		X	
Finland	X			X	X		X			X
United States	X	X	X	X			X			X
Massachusetts				X			X		X	
North Dakota	X							X	X	
Washington	X						X			X
Indiana	X						X			X
Illinois	X						X			X
Sector Two-Year										
TAAACCT						X		X		X
Technical College System, GA						X		X		X
Connecticut	X							X		
Sector Four-Year										
University System of Maryland	X				X			X		
Universities of Applied Sciences, Switzerland	X							X		X
Campus, Private Four-Year										
Berea, KY	X	X		X			X		X	
Berry, GA	X	X		X			X		X	
Brown	X		X	X			X		X	
Cornell	X		X	X			X		X	
Drake	X	X		X			X		X	
Duke	X		X	X			X		X	
Northeastern	X	X	X	X			X		X	

Table 2. Initiative Characteristics (Continued)

Campus, Public Four-Year									
California State Polytechnic Institute	X		X	X				X	X
California State University, Monterey Bay			X					X	X
South Dakota School of Mines	X	X	X					X	X
Royal Melbourne Institute of Technology, Australia	X	X	X	X				X	X
University of Michigan			X					X	X
University of Texas			X	X				X	X
Other Work Based									
Council for the Assessment of Experiential Learning (CAEL)	X	X	X	X	X			X	X
ETS, "Fitness for Work"					X			X	X
Tennessee Board of Regents (high impact practices)	X	X	X	X				X	X
Dual System, Germany					X			X	X
South Carolina					X			X	X
Photovoltaic Manufacturing Consortium (with SUNY Poly)	X					X		X	X

Note: "x" indicates the presence of a particular initiative characteristic, feature and/or point of leverage as indicated by the column header. Cells not marked with an "x" indicate the initiative feature either does not apply or fell outside the purview of our analysis.

initiatives. Some initiatives, like Australia's policy on teaching and learning, suggest a good comparison with SUNY Works: both are systems, both are comprised of internships and co-ops, both are not restricted by field or targeted to a particular group of students. Indeed, we offer an extensive description of the relevant Australian strategies. Other initiatives, like University of Michigan's Undergraduate Research Opportunity program, have key differences from SUNY Works: Urop is research- not work-based. However, the initiative features and scale-up have been innovative and demonstrated results, allowing SUNY the opportunity to draw from the experience lessons applicable to its own work-based applied learning initiatives.

Second, we mapped the initiatives against initiative features that we have identified as "good" or "effective" or "relevant" learning in the literature and among experts.¹⁴ Such features include experiences that:

- are well-structured. There are clear expectations for students and stakeholders as well as sufficient administrative support.
- foster opportunities for applied learning experiences throughout the degree program. Students can draw from and relate to such experiences throughout the academic curriculum, building knowledge and capacities over time.
- include organized workshops and/or seminars on campus for participating students to introduce them to the basic language, skills, and expectations in the field in which they are working.
- are credit bearing to recognize the time and effort that students and faculty dedicate to the experience and to allow administrative tracking and oversight of applied learning experiences.
- incorporate alternative assessments of student learning as part of the experience (e.g., noncognitive, prior-learning assessment (PLA), portfolio).

The list here is intended to be illustrative rather than a check list for an ideal type. Successful initiatives, detailed below, use some combination of these key features, often in very different ways. Even limiting the effects of interest to retention, graduation and eventual employment, work-based applied learning experiences coming under SUNY Works are likely to be more effective when they are well-designed; supported by site supervisors and faculty; and assessed in ways that serve student, employer, and academic interests.

Table 3 situates SUNY and SUNY Works with respect to features that are judged to foster "good" or "effective" or "relevant" learning. Yet SUNY's applied learning initiatives, in general, and SUNY Works, in particular, are not *single system-wide initiatives*. Instead, they encompass a collection of practices across a range of campuses. Because SUNY does not mandate particular features

Table 3. Effective Initiative Features

	Fully Integrated/ Well Structured	Early/ Sustained Applied learning	Workshops/ Seminars	Credit Bearing	Alternative Assessments
SUNY Applied Learning Initiative			x	x	x
SUNY Works			x	x	x
System Level					
Australia	x		x	x	
Finland					
United States	x				
Massachusetts					x
North Dakota	x				
Washington	x				
Indiana	x				
Illinois	x				
Sector Two-Year					
TAACCCT	x		x	x	x
Technical College System, GA					
Connecticut	x				
Sector Four-Year					
University System of Maryland	x			x	x
Universities of Applied Sciences, Switzerland	x	x	x	x	x
Campus, Private Four-Year					
Berea, KY	x	x	x	x	x
Berry, GA	x	x	x	x	x
Brown					
Cornell	x	x	x	x	
Drake	x	x		x	
Duke					
Northeastern	x	x	x	x	x
Campus, Public Four-Year					
California State Polytechnic Institute	x	x	x	x	x
California State University, Monterey Bay	x	x		x	
South Dakota School of Mines	x	x		x	x
Royal Melbourne Institute of Technology, Australia	x	x	x	x	
University of Michigan	x	x	x	x	x
University of Texas			x		
Other Work Based					
Council for the Assessment of Experiential Learning (CAEL)					x
ETS, "Fitness for Work"					x
Tennessee Board of Regents					x
Dual System, Germany	x	x	x	x	x
South Carolina				x	
Photovoltaic Manufacturing Consortium (with SUNY Poly)	x				x
Note: "x" indicates the presence of a particular initiative characteristic, feature and/or point of leverage as indicated by the column header. Cells not marked with an "x" indicate the initiative feature either does not apply or fell outside the purview of our analysis.					

and because, even if it did, there would still be variation in what happens in practice, the rows for SUNY and SUNY Works reflect general trends observed at some pilot campuses for some fields of study rather than a strategy SUNY has put in place to foster the implementation of such features system-wide. For example, some Phase I and Phase II schools routinely conduct “workshops” while others do not.

Third, the approaches and experiences reviewed reveal *strategies and approaches used to bring about change in learning and teaching*, some specifically with reference to applied learning experiences. Although change, whether building on existing provision or introducing new provisions, may naturally follow the interests of those most directly involved – including students, faculty, or employers – systems or campuses, through incentives, information, or mandates may also help to bring it about.¹⁵

For scaling up across a campus and throughout a system, strategies may use points of leverage to engage students, employers, and faculty in work-based applied learning. Summarized in brief, leverage points include:

With respect to students:

- workshops/seminars that introduce students to the idea of applied learning and support them when they are participating in it;
- an attractive opportunity for work-based learning that prepares students for employment;
- incorporation of work-based application for self-assessment and reflection;
- academic credit for work-based learning experiences and/or a stipend/wage.

With respect to employers

- subsidies to share cost of stipends (e.g., through Federal Work Study);
- support for employer effort (design of internship, job profiles, informational support like a 1-800 number for interested employers);
- a true “hiring” process that permits employers to select students;
- enabling employers to work through groups, e.g., consortia, associations (especially for small and medium size enterprises); also strengthening overall community engagement, to develop good will and to make case for “win-win” for work-based applied learning;
- a means to track and approach employers of current students and graduates, to establish and sustain campus-employer relationship.

With respect to faculty:

- directed funding for work-based applied learning;

- allocation of effort to internship or co-op learning, such as heading a student workshop;
- recognition for faculty effort, ranging from selective named awards and salary supplements to weight in promotion and pay systems;
- mandating applied learning experience special targeting of work-based applied learning opportunities to improve student success (responds to a disposition of faculty for underrepresented students to succeed).

We discuss and illustrate many of these leverage points in Part II below. As noted there, a number of these points of leverage already are in place across SUNY. However, information is limited on the number of campuses using any one (or more) of these means and, if used, the present coverage by field or type of student. More generally, the list invites consideration of additional points of leverage that might be well-suited to extend work-based learning experiences more widely, at campus or system levels.

Table 4 locates each identified approach or experience with respect to its points of leverage as they relate to students (4a), employers (4b), and faculty (4c). Again, rows for SUNY and SUNY Works represent trends at the pilot campuses. For example, many pilot campuses have “useful assessments” in place (Table 4a), but some are still struggling to develop measurement tools.

Although, for analytical purposes, we separate features and points of leverage, in practice they go hand-in-hand in creating successful initiatives: Worthwhile work-based applied learning experiences are developed, improved, and sustained through support and requirements.

In the next two sections, we describe both key features and leverage points found in five illustrative cases and more than a dozen examples. The cases put the system- or campus-level experiences with work-based applied learning in context. The examples that follow aim primarily to direct attention to concrete means – points of leverage – used to bring about or sustain widely provided opportunities for applied learning at system and campus levels.

B. Illustrative Cases

While not an exact match to SUNY, the five cases offer important takeaways for SUNY as it seeks to expand work-based applied learning experiences. As mentioned above, Australia’s Commonwealth higher education policy comes closest to a systemic approach that incorporates both universities and technical programs. In addition to Australia, we illustrate Germany’s dual system and Switzerland’s Universities of Applied Sciences, which covers a sub-set of the levels or sectors coming under SUNY Works. Because SUNY’s approach is often manifested in bottom-up initiatives, we also feature campus-wide initiatives: Northeastern University’s co-op experience, an initiative built into

Table 4a. Points of Leverage for Student Participation

	Workshops /Seminars	Good and Relevant placements	Useful Assessments	Stipend and/or Credit
SUNY Applied Learning Initiative	x	x	x	x
SUNY Works	x	x	x	x
System Level				
Australia	x	x	x	x
Finland	x			
United States		x		x
Massachusetts				
North Dakota		x		x
Washington		x		x
India		x		x
Illinois		x		x
Sector Two-Year				
TAACCTT	x	x	x	x
Technical College System, GA		x	x	
Connecticut		x		x
Sector Four-Year				
University System of Maryland				x
Universities of Applied Sciences, Switzerland	x	x	x	x
Campus, Private Four-Year				
Berea, KY	x	x	x	x
Berry, GA	x	x	x	x
Brown		x		x
Cornell	x	x	x	x
Drake	x	x		x
Duke				x
Northeastern	x	x	x	x
Campus, Public Four-Year				
California State Polytechnic Institute	x	x	x	x
California State University, Monterey Bay		x		x
South Dakota School of Mines	x	x		x
Royal Melbourne Institute of Technology, Australia	x	x	x	x
University of Michigan	x	x	x	x
University of Texas			x	x
Other Work Based				
Council for the Assessment of Experiential Learning (CAEL)			x	
ETS, "Fitness for Work"			x	
Tennessee Board of Regents				
Dual System, Germany	x	x	x	x
South Carolina		x		x
Photovoltaic Manufacturing Consortium (with SUNY Poly)	x	x	x	

Note: "x" indicates the presence of a particular initiative characteristic, feature and/or point of leverage as indicated by the column header. Cells not marked with an "x" indicate the initiative feature either does not apply or fell outside the purview of our analysis.

Table 4b. Points of Leverage for Employer Participation

	Cost share	Support to Implement	"Hiring" process	Work through Employer Groups	Assess students
SUNY Applied Learning Initiative		x		x	
SUNY Works		x		x	
System Level					
Australia	x	x	x	x	x
Finland					
United States	x	x	x		
Massachusetts					
North Dakota		x	x	x	
Washington	x	x	x		
India	x	x	x		
Illinois	x	x	x		
Sector Two-Year					
TAACCT	x	x		x	x
Technical College System, GA	x	x		x	x
Connecticut	x	x	x	x	
Sector Four-Year					
University System of Maryland					
Universities of Applied Sciences, Switzerland		x	x	x	x
Campus, Private Four-Year					
Berea, KY	x	x	x	x	x
Berry, GA	x	x	x	x	x
Brown	x	x	x	x	
Cornell	x	x	x	x	
Drake	x	x	x	x	
Duke	x	x	x	x	
Northeastern	x	x	x	x	x
Campus, Public Four-Year					
California State Polytechnic Institute		x	x	x	x
California State University, Monterey Bay		x			
South Dakota School of Mines	x	x	x	x	x
Royal Melbourne Institute of Technology, Australia	x	x	x	x	x
University of Michigan	x	x	x		x
University of Texas		x	x		
Other Work Based					
Council for the Assessment of Experiential Learning (CAEL)					x
ETS, "Fitness for Work"					x
Tennessee Board of Regents					x
Dual System, Germany	x	x	x	x	x
South Carolina		x	x	x	
Photovoltaic Manufacturing Consortium (with SUNY Poly)	x	x		x	
Note: "x" indicates the presence of a particular initiative characteristic, feature and/or point of leverage as indicated by the column header. Cells not marked with an "x" indicate the initiative feature either does not apply or fell outside the purview of our analysis.					

Table 4c. Points of Leverage for Faculty Participation

	Directed funding	Faculty time allocated to applied learning	Recognition, reward	Mandate	Targeted to improve student learning
SUNY Applied Learning Initiative		x			
SUNY Works		x			
System Level					
Australia	x	x	x		x
Finland					x
United States					
Massachusetts					
North Dakota				x	
Washington					
India					
Illinois					
Sector Two-Year					
TAACCTT	x	x			x
Technical College System, GA	x	x			x
Connecticut					
Sector Four-Year					
University System of Maryland				x	
Universities of Applied Sciences, Switzerland	x	x		x	
Campus, Private Four-Year					
Berea, KY	x	x			
Berry, GA	x	x			
Brown	x	x			
Cornell	x	x	x		
Drake	x	x			
Duke	x	x			
Northeastern	x	x			
Campus, Public Four-Year					
California State Polytechnic Institute		x			
California State University, Monterey Bay		x			
South Dakota School of Mines		x			
Royal Melbourne Institute of Technology, Australia		x	x		
University of Michigan	x				x
University of Texas	x				
Other Work Based					
Council for the Assessment of Experiential Learning (CAEL)					x
ETS, "Fitness for Work"					x
Tennessee Board of Regents	x				x
Dual System, Germany	x	x		x	x
South Carolina		x			
Photovoltaic Manufacturing Consortium (with SUNY Poly)	x	x			

Note: "x" indicates the presence of a particular initiative characteristic, feature and/or point of leverage as indicated by the column header. Cells not marked with an "x" indicate the initiative feature either does not apply or fell outside the purview of our analysis.

the fabric of the educational experience, and the University of Michigan's University Research Opportunity Program (Urop), an initiative built from the ground-up with broad coverage. These five cases are illustrative, but not unique in every respect (we note similar approaches in other settings or campuses).

1. System-Wide

Higher education systems abroad have struggled with how to encourage work-based learning across institutions that may be very different. The three cases we examine illustrate the different system approaches to targeting and coordinating initiatives. Australia aims to encourage wider use of work-based learning, in part, by using funding and recognition to attract and support faculty involvement in curriculum change. Germany's Dual System, an apprenticeship approach, builds relationships with employers, encourages employer-education provider partnerships, and provides a pathway to employment for students. The Universities of Applied Sciences in Switzerland, which provides practical training and fully integrated experiences, shows how systems coordinate (at first weakly, then better with more funding) across different establishments.

A. Higher Education Policy, Australia

Australia's higher education system is comprised of thirty-seven public and two private full first-degree institutions that, although autonomous in operations and decision-making, come under national control for funding and regulation. Reforms dating to the late 1990s have led to consolidation in the sector, bringing smaller colleges of advanced education into a larger unitary system of universities.¹⁶ A separate segment of vocationally oriented institutions of Technical and Further Education (TAFE) provides for shorter post-high school studies. It is within this broad structure that complementary national initiatives have formed a base for system-level extension of work-based applied learning experiences.

Interest in work-based applied learning grew out of evidence of uneven student performance – more than one-quarter of students failed to complete their studies – and concerns about the adequacy of a highly educated and well-prepared workforce.¹⁷ The recommendations of the government-appointed Bradley Review of Higher Education ushered in new conditions for extending “work integrated learning” (the term used in Australia) more widely to institutions and across study programs. The main recommendations – to expand participation in higher education substantially, with additional resources allocated under a dramatic shift to a demand-led funding system and performance monitored by a new standards and quality assurance agency (Tertiary Education Quality and Standards Agency) – continue to be rolled out.¹⁸ For the purposes of this report, attention is given to recommendations relevant to work-based applied learning within

the broad reforms and to the means adopted within the system in response.

The expansion of participation anticipated in the Bradley Review was understood to extend to students who previously would not have entered higher education, especially students of low socioeconomic status (SES), a target group of long-standing interest in government policy. Partly to address the needs of such new students as well as improve what had been weak performance to date, the Bradley Review stressed student engagement as an essential condition for learning. As part of a broader effort to gather information on teaching, learning, and performance, one of its forty-six recommendations stated:

That the Australian Government require all accredited higher education providers to administer the Graduate Destination Survey, Course Experience Questionnaire, and the Australian Survey of Student Engagement from 2009 onwards and report annually on findings.¹⁹

The recommendation has been partly advanced by the government. It is of particular relevance owing to the concepts of engagement incorporated in the Australasian Survey of Student Engagement (AUSSE). Modeled substantially on the National Survey of Student Engagement (NSSE), which is used by a number of US colleges and universities, *AUSSE includes an additional engagement scale on work integrated learning*. Administered by the Australian Council for Educational Research (ACER, similar to the Educational Testing Service), AUSSE was first used in 2007. Through 2012, more than 300 institutional administrations (some duplicates) of AUSSE have been carried out in Australia and New Zealand. As in the Bradley Review, findings with reference to work-integrated learning have been widely cited by higher education institutions and in public policy discussions.²⁰

The Department for Education and Training has also made provision for targeted *funding* for quality improvements in teaching and learning in higher education. Through the Office for Learning and Teaching (and its predecessor), funds are allocated to support projects (with support for collaborative projects), secondments of faculty to the Department for Education and Training, and *recognition* of exemplary and innovative initiatives (and staff) in the institutions.²¹

Evidence of the wider impact of government strategies can be found in the activities of the nonprofit Australian Collaborative Education Network, (ACEN), the professional association of academic and administrative staff, as well as representatives of employers participating in work-integrated learning. Membership includes institutional, individual, and affiliate memberships. ACEN provides a venue for sharing experiences with work-integrated learning as well as approaches to implement and improve such experiences. Importantly, membership includes TAFE institutes as well as higher education establishments (and members of their teaching and administrative staffs), indirectly

supporting a growth point set out in the Bradley Review to foster new pathways to higher education. Through an annual conference that brings these various parties together, work-integrated learning is given visibility as experiences are shared and made subject to discussion.

ACEN itself has standing. It provides endorsement and indirect nonfinancial support for project proposals under consideration for government or third-party funding, under criteria that anticipate application for the wider membership (and beyond). In commentary on National Career Development Strategy Green Paper, for example, ACEN provided support for inclusion of work-integrated learning in all study programs, noting also that such inclusion would require resources and incentives.²²

Key Features:

- Campuses purposefully introduce well designed “work integrated learning” into study programs;
- “Work integrated learning” counts toward the degree.

Points of Leverage:

- Gathering and monitoring information are important ways to draw attention to forms of applied learning (AUSSE);
- Targeted funding for projects and recognition encourage and support faculty engagement in work-based applied learning (Office of Learning and Teaching, Department for Education and Training);
- Teachers, staff, employers, and interested parties, organized apart from government, have a venue to promote work-based learning by sharing experiences and collaborating (Australian Collaborative Education Network).

B. Apprenticeship, Dual System (Germany)²³

The “dual system” refers to a form of highly structured, strongly site-based apprenticeship offered in close partnership between education providers and employers. In Germany (and some other continental European countries, most notably Switzerland and Austria), entry into the dual system begins in upper secondary education. About three-fifths of young people enter vocational education at this stage, and of them, nearly three-fourths opt for the dual system. Dual system preparation is offered for well over 300 trades. The dual system is of interest for program features and points of leverage that engage employers and support the delivery of the education and training in partnership.

Apprentices participate in practical training for most of the week, with the contents, duration, and assessments set by guidelines that have been developed and are reviewed by employers and are overseen by the Federal Ministry for Research (which has responsibility for vocational education). Alongside the practical training are classes provided in vocational and education training

schools (VET), of about twelve hours per week. Contents cover both general education and instruction specific to the trade, and come under guidelines established by the Conference of State Ministers of Education, the pre-eminent body overseeing education in Germany.

More than is common for vocationally oriented education and training at this stage, the dual system provides for an extended period of training and experience under supervision in real work. Apprentices receive wages, beginning at less than half of what a skilled worker is paid to start. Over the three-to-four-year apprenticeship, apprenticeship wages increase. The structured and anticipated engagement in work and the expenditures obliged under the system accompany *strong involvement of employers*. Beyond assuming major responsibilities for the design of the apprenticeships within fields (including curricula), employers supervise apprenticeships on site. *Consortia formed around trades allow small companies to participate* in training, and industry groups provide advice on guidelines.

For students entering the dual system, the option is attractive. *Costs are minimal, the education and training are well-structured and involves hands-on, actual work experience, and stipends are paid*. The dual system is a path to a good job. Completion of the apprenticeship leads to recognized qualifications that provide for employment in skilled positions in any firm. While skilled workers are more likely to stay with the firms in which they have undertaken training, not all do. For example, Volkswagen's Chattanooga plant, following the dual system approach in cooperation with the Tennessee Technology Center at Chattanooga State Community College, has found that trained workers are more likely to leave for employment elsewhere than is the case in Germany.

Expenditures are shared. State and local authorities pay for the instruction provided in VET schools, while training firms bear the costs of on-site training. The larger share of expenses is borne by firms in the industries concerned, even taking into account the contribution of apprentices to production. However, some of the firm's expenses for the dual system might be incurred through company-based training, if the dual system did not exist. Firms generally have been satisfied with the quality of the workforce, and have had a hand in developing an understanding in apprentices of the culture of work in the company. Further, firms use the dual system as means of recruitment, and so avoid costs in that area both for hiring and for replacements of recruits who are ill suited.

The dual system has encountered some difficulties, as companies are less willing to take on apprentices. Some attribute companies' reluctance to very tight regulations, costs, and education and training that is insufficiently broad enough to enable skilled workers to adapt to evolving needs in the industry.

Key Features:

- Work experiences are well structured, allowing for cumulative learning;

- Students participate in ongoing workshops and seminars, alongside work experiences.

Points of Leverage:

- The dual system has very extensive employer engagement and investment, with arrangements for small- and medium-sized enterprises;
- It is a true partnership among ministries, employers, and education providers;
- It is attractive to students because it offers structured learning, wages, and a clear pathway to employment;
- However, it is a delicate balancing act. The problem is not so much the cost, but the profile of knowledge, skills and attitude. If apprentices are too narrowly trained, employers will invest less.

C. Universities of Applied Sciences, Switzerland

In Switzerland, as in several continental European countries (Netherlands and Germany, for example), degree studies beyond secondary education are provided in two types of higher education – universities (to which Swiss Federal Institutes of Technology may be included) and universities of applied sciences (UAS). The UAS came out of a 1990s reform to consolidate, strengthen, and upgrade mostly applied technical and professional programs to accommodate growing demand. The UAS regard themselves as “equivalent but different” than universities. The fields covered in the UAS study programs initially came under national legislation (excepting teacher education). UAS students may come from any prior educational stream (under set admissions guidelines), although a smaller share of students entering UAS programs have followed academic paths through upper secondary school. Provisions are in place for students who have followed a vocational path through and beyond upper secondary education to qualify for entry into either universities or UAS, and a growing number of students coming out of the vocational streams are pursuing both routes.²⁴ About one-third of students in higher education at this level are enrolled in UAS. The Swiss experience under UAS features the use of practical training and experience fully integrated within the study programs.

In the UAS, students follow *well-structured study programs* that combine academic coursework with workshops in individual courses. For a bachelor’s program in conservation and restoration, for example, students may participate in regular course modules for the first three days of the week and workshops with instruction in application from professionals for the remainder of the week. During a seventeen-week term, students may spend six weeks in an external practice module, supervised and evaluated by a qualified professional. Two such six-week blocks may be combined into an internship.²⁵

Through the UAS reform, more than seventy-five specialized institutions were merged into seven regionally based UAS (five in German-speaking regions, one in French-speaking regions, and one in the Italian-speaking canton).²⁶ The Swiss experience is also of interest in how initiatives with work-based experiences are co-ordinated across different establishments. Although coming under a single system, each UAS operates differently. Moreover, early experiences showed differences in the efforts made in the early years to establish more co-ordination among the initiatives brought under the oversight of each UAS. Indeed, those UAS that introduced weak co-ordination and centralized management aimed for less ambitious reforms.²⁷ With *funding* and other supports, co-ordination has increased such that study programs may be offered jointly, affording students work experiences aligned more closely with their interests. In the case of the UAS bachelor's program in conservation and restoration, for example, four UAS cooperate, offering the same "core" coursework but affording students work experiences that vary by location.

Key Features:

- The UAS has full integration, preserving a feature of advanced level vocational studies as the UAS were established at a level equivalent to universities.

Points of Leverage:

- The UAS is able to coordinate among establishments under directives and funding, some from the national level.

2. Campus-Wide

Individual campuses, too, have tried to extend work-based learning opportunities to all students. We provide two cases. Northeastern, which has a strong, well-supported cooperative learning experience, is known for the integration of work and education. This experience, however, is expensive to replicate. The University of Michigan's Undergraduate Research Opportunity Program is a ground-up faculty initiative to provide research opportunities to undergraduates that has been scaled up. It operates with a more modest infrastructure than Northeastern's, and benefits from strong faculty and student buy-in (otherwise referred to as a "win-win").

A. Northeastern University Co-ops

Northeastern offers study programs oriented toward employment. Among its various applied learning experiences, Northeastern is recognized for co-op learning. The "co-op experience" includes as many as three six-month periods of structured assignments with an employer in the course of a bachelor's or master's degree program. Although students are not required to undertake the co-op experience, many do: in 2013-14, 9,823 students were engaged in such experiences, against a total undergraduate enrollment of 17,101 (as of fall 2013). Although a large proportion of

students in the co-op experience are in their second or third structured assignment, some 92 percent of students participate in at least one co-op experience and 75 percent do two or more. With respect to its reach across all programs, co-op learning at Northeastern is an illustrative example of scaled up work-based applied learning.

Northeastern's co-op experience utilizes key initiative features of work-based applied learning.

Co-op experiences are well-structured and fully integrated in the curriculum. Learning outcomes associated with experiential learning (i.e., service learning, applied research activities, internships, and co-op learning) are clearly set out, as are templates of the study program with possible sequencing of coursework and co-op experiences. Faculty engagement is extensive and substantive, in the light of the obligation to devise, implement, and refine integrated study programs and the very large share of students who participate in co-op learning.

The first co-op experience begins no earlier than the second semester of the sophomore year. Students may participate in two sixth-month co-op experiences (in a four-year program) or three co-op experiences (for a five-year program). Each student returning from a co-op experience is expected to produce a reflective account of the experience and, in particular, how the experience related to what has been learned in courses. The program allows for different ways to develop that account, e.g., "participating in company seminars, faculty conferences, one-on-one meetings with the co-op coordinator, writing assignments/or presentations."²⁸

Support for students on co-op is provided through the academic advisor and a co-op coordinator, both located in the student's college. *In most colleges, a co-op coordinator teaches a required one-credit course as preparation for the co-op experience, and works with students to help them develop and use job search strategies and techniques, such as securing job referrals and/or references from their own networks, attending job fairs, participating in student information sessions on opportunities, participating in mock interviews, and undertaking research on companies in the field of interest.* More than fifty co-op coordinators support students and the academic programs in which they are enrolled, with some colleges having more than one.

The University reports placements with 2,200 employers on six continents.²⁹ For employers, co-op "student-employees" join the staff and work alongside regular employees. Like the job market more generally, *employers make the decisions on hiring.* Those hired take up structured assignments, and are paid a wage (but not company benefits, e.g., health insurance). The period of the co-op experience, at six months, is long enough to permit the co-op student-employee to "get real work done." At the same time, employers can evaluate co-op student employees for potential recruitment. The university works with employers, both supporting the process of placement — and eventual potential

recruitment – and involving employers in activities to support co-op arrangements and the study programs in the fields concerned. An employer handbook lays out clearly what is provided by the university (and so not needed by the employer), as well the responsibilities of all parties. *The aim is sustained engagement.*

Employers are welcomed to campus for a variety of activities including student workshops, career fairs, and meetings with staff. In addition, “employers in residence” are provided with an office for single or recurring visits to meet with students regarding career development.

The co-op experience is credited with very strong employment outcomes. The university reports 90 percent of graduates are employed within nine months of graduation, half are employed with their co-op employer, and 85 percent are working in their field of study.³⁰ For Northeastern, the profile of graduates is strongly oriented toward the professions. For 2012-13, 20.49 percent of bachelor’s degrees were conferred in business; 12.5 percent in health professions; 12.47 percent in engineering, 11.07 percent in construction trades, and 7.6 percent in communications/journalism. By comparison, social sciences, biology and psychology accounted, respectively, for 11.7, 7.3, and 5.52 percent of bachelor’s graduates in that year. As indicated, students in all fields participate in co-op experiences.

Takeaways: Northeastern’s co-ops offer instructive lessons for a scaled up work-based learning initiative on a campus.

Key Features:

- The emphasis on integrated curriculum means that work and learning are not two-separate spheres. Students think about how learning applies to work and vice versa;
- Applied learning experiences are undertaken throughout the study program, allowing for cumulative learning.

Points of Leverage:

- Co-op and applied learning figure strongly in the mission and work of the campus as a whole;
- University resources are directed to support the work-based applied learning experiences;
- Academic and work-experience supports are both located within each of the colleges, reducing the barriers for students and employers to participate;
- The co-op experience offers sustained engagement with employers, which gives students a richer and more meaningful experience at the same time that employers are more willing to invest in the program and individuals in it. It has clear expectations, laid out in an employer handbook, and a dedicated staff to foster and sustain the engagements;
- Employers pay wages, but do not provide benefits. Employers have student-employees for at least six months

and can bring back them back for another six months if it works, essentially acting as prerecruitment.

B. University of Michigan: Undergraduate Research Opportunity Program (Urop)

Michigan has offered undergraduates the opportunity to participate in faculty-mentored research since 1989. The program originated with faculty in a single department who wanted to encourage and engage under-represented and less prepared students, with the aim of improving retention. Although under-represented students remain a target population (see below), eligibility was broadened to include all students and campus funds support the program. Currently, students from all colleges participate in applied research opportunities and Urop posts 1,300 job opportunities. Urop is an example of a scaled-up applied learning initiative at the campus level. Michigan's Urop program has ambitions and specificities broadly similar to other campus-wide initiatives elsewhere, such as Brown Connect and Engaged Cornell.

Urop utilizes key features of applied learning and benefits from several points of leverage to support and sustain the campus-wide initiative.

Those associated with Urop say the applied research experiences are attractive to both faculty and students: It is *well-structured to meet the needs of both*.³¹ Although submitted on a standard format, the applied research experiences offered by faculty follow no set model as long as activities are appropriately defined and situated within the wider research project of the faculty member. The only expectation is that students have a substantive learning experience. In this way, the student experience is well-structured and, at the same time, aligned with methods and nature of the faculty research project.

A key component of Urop is *a set of workshops that develop basic research skills*. The workshops partly aim to build and reinforce dispositions for structured research activities. They also introduce basic understandings about the process of inquiry/research and how one goes about gathering information and working with it. Urop gradually has come to rely on students with experience in Urop to "tutor" those entering their first applied research experience. There is a fair amount of peer involvement, even peer control. While not strictly speaking an applied research experience, peer teaching/mentoring requires understanding of what is being taught (and learned) and organizing sessions to convey information and receive feedback. Faculty members appreciate the workshops because the students who work on their projects come with basic knowledge, dispositions, and skills. In that sense, the demands on faculty are reduced. For Urop, the workshops have very modest resource requirements.

Students interview for Urop positions. The interviews are taken seriously by both sides, and neither the faculty member nor the

student is assured of a “first choice” in the process. Like job interviews more generally, interviewing for this applied learning initiative means it is possible that a position will go unfilled or a student will not be placed. Urop staff oversees the process, thereby facilitating the matching and helping both students and faculty.

Students apply for Urop positions early in their studies. Students may continue in Urop or other research experiences. Some students continue on with Honors thesis projects while others may participate in faculty research projects outside of Urop. Faculty members have come to value students who begin Urop early, appreciating that their contributions to faculty research increase with experience. Less training is needed, and for the student, there is greater potential for recognition in publications (some with secondary authorship) or presentations. Doctoral candidates and post-docs also work with Urop students, gaining experience in return for more intensive one-on-one supervision.

In most instances, participation in Urop is credit bearing (see below). Assessments of student performance are based on assignments that vary among projects (from writing an extensive literature review or running an experiment to administering a survey and making a presentation). Urop “alumni” value both the research experience itself and the range of activities and supports provided through Urop, with under-represented students more likely to value each of these aspects than other students.³²

Urop has a small staff, drawing financial support from the college in which it is formally located (the largest on campus). The program successfully attracted donor support to cover student stipends for a summer program. Some Urop students receive work-study support as well. For these students, Urop assignments may be viewed as more interesting and meaningful than a routine assignment to an office or unit on campus. Work-study students do not receive academic credit for the Urop experience, but they do register for one credit for the workshops and academic supervision of their work. Urop staff handle all of the paperwork, relieving the faculty of the responsibility for reporting requirements.

Most Urop projects are located on-campus, but there has been some experience with work-based and service-based learning under the project. Urop has provided community-based research experiences for students working with community organizations that come under a broader university engagement effort in Detroit. The research experiences are supervised by university staff, not staff of the community organization.

Under-represented students and those with weak preparation continue to participate in, and benefit from, Urop. Beyond arrangements for work-study students (who receive support based on financial need) discussed above, Urop attracts community college students to a summer program, increasing the flow of such students to the university and helping with their academic transition. This is a stand-alone program to raise the share of talented low income/under-represented students into leading colleges and

universities who otherwise might not apply.³³ This Urop-connected project has been successful: 85 percent of students in the program have enrolled at the university, though there is no alternative with which to compare them.

Urop has been the subject of rigorous and varied evaluation to estimate the effects of participation in the research experience. The findings, *focusing primarily on under-represented students and those with weak preparation, show that participation in Urop is associated with higher rates of retention, a greater likelihood of entering post-graduate study, and behaviors judged to be more proactive, when compared to an appropriate control group.*³⁴

Takeaways: There are many unique elements of the Urop program. But particular design features make the program successful and are important takeaways for scaling-up initiatives at SUNY.

Key Features:

- Urop learning experiences are broadly structured and recognized for credit;
- Urop offers opportunities aligned with student interests, with projects in every college.

Points of Leverage:

- Urop is a “win-win” program: students get credit for participation, they engage in a new form of learning, and some are able to be paid through work study while faculty have support for their research projects and do not have extra effort for administrative matters. A similar approach may be effective when applied to employers (rather than faculty);
- Like employers in the dual-system or co-op placements at Northeastern, the timeframe – which starts early and extends over a number of years – is an attractive opportunity both for students to grow and learn in the position and for their faculty supervisors to have better trained and more expert student assistance as the years progress;
- Peers play an important role in the Urop program, which suggests important extensions for other types of applied learning initiatives. More generally, applied learning initiatives might benefit from working with student organizations and campus departments to raise the visibility and relevance of opportunities;
- Urop was able to generate resources for summer support outside the university, through the generosity of donors. A similar principle may be accomplished in work-based applied learning, for example, through named internships with visibility across departments.

C. How SUNY Addresses Key Design Features

Although these five cases provide important illustrations of seemingly successful or very recent applied learning initiatives,

SUNY initiatives already in place at some campuses manifest some key design features.

Stony Brook has launched a co-op initiative *that is well structured with clear expectations for students and stakeholders*. Stony Brook devised specific evaluation requirements “to avoid potential problems early in the process and to make the initiative successful.”³⁵ They are as follows:

- Students should be continually informed by the employer of what is expected of them and how they perform;
- Site supervisors must communicate regularly with students, know when work is done well, and give the opportunity to improve/correct problems before the end of the assignment;
- All co-op students will evaluate the program internally, including evaluation of supervision. This enables them to identify strengths and potential problem areas in the program;
- Mid-semester and final evaluations must be completed;
- Learning objectives are set by students with supervisor’s guidance;
- ePortfolio became a mandatory piece of the process to assist students with better articulation of skills and qualifications learned through experience.

Likewise, several schools have updated and revised their internship manuals to provide clear guidelines as to the structure of initiatives. Monroe Community College, for instance, “updated the employer guide for co-ops and internships making it more professional in appearance”³⁶ while SUNY Orange created separate internship manuals for students and employers. The latter now “includes a section on paid vs. unpaid internships and explains the Department of Labor (DOL) regulations governing unpaid internships.”³⁷

Stony Brook, Fashion Institute of Technology (FIT), Broome County Community College and Buffalo State include *organized workshops or seminars on campus to orient students toward their specific fields of study*. Stony Brook developed introductory sessions while scheduling mandatory orientations and co-op information sessions for students.³⁸ These sessions were deemed important by the Career Center because co-op placements had not previously been available on campus. Noting their success, representatives from the Career Center indicated that, “students started paying attention when we initiated information sessions. Students were coming to hear about these opportunities.... We would love to expand the program but we just don’t have the resources.”³⁹

At FIT, all students seeking an internship must complete one semester of required prep prior to placement. According to Andrew Cronan, director of FIT’s Career and Internship Program, “the prep process is designed to make sure students get professional training

so they represent us and themselves well.”⁴⁰ Through their involvement with SUNY Works, FIT developed a new set of learning outcomes for the required prep process so that students who complete multiple internships can test out of the requirement.

Broome Community College sponsored job readiness activities for students that included weekly, campus-wide student workshops led by local employers and placement specialists. Topics covered included careers in demand, resume writing, interviewing, effective networking, and job searching. To supplement these efforts, various disciplines conducted mock interview days throughout the 2014 spring semester in which employers interviewed students in twenty-minute intervals and completed evaluation sheets. Students were then presented with constructive feedback from these evaluations.⁴¹ Through collaboration with Geneseo, Broome has since identified “the need to develop a Professional Skills Preparatory Course.”

Buffalo State designed and is piloting a new Professional Skills Development Module (PSDM). The module consists of a hybrid curriculum, “comprised of four tracks with the overall goal to enhance the quality of the internship experience by equipping students with professional skills before they begin their internship placement. Eight faculty members, from a variety of majors [i.e., psychology, biology, sociology, theater, music, business, fashion and social work], were selected to develop and pilot the modules in their internship classes. Each pilot class will select the workshops/activities/online modules to be completed from among the tracks.”⁴² Buffalo has also developed a pre- and postsurvey to assess overall student satisfaction and confidence level.

Even though there are benefits from completing internships early, most SUNY students who complete internships do so later in their college career. SUNY may pursue the possibility of *fostering opportunities for applied learning experiences earlier in the degree program*. Andrew Freeman, director of academic services at Monroe Community College (MCC), summed it up this way: “When you talk about career services and planning upfront, what I was able to uncover was this idea that there’s a lot that MCC offers in a variety of offices but we haven’t done a good job giving a student a laundry list in inspiring them to pursue these opportunities. It’s just been if a student is able to stumble in the right office maybe they get the right information. Collecting what we do, seeing how it flows, and then being able to encourage students in a logical order will bring clarity to things at MCC.”⁴³ Monroe has since developed a Career Action Plan that lists activities a student should engage in to maximize their employability after graduation including internships.

Albany has reported a similar experience. Comments made by the Interim Associate Director of Career Service Noah Simon indicate that prior to implementation of SUNY Works, the Office of Career Services was unaware that many students were completing experiential opportunities in the School of Education

(primarily in the domain of field work) as well as in the Study Abroad program.⁴⁴

Unfortunately, many students remain unaware of opportunities that exist despite campus efforts to reach students through email marketing campaigns, online postings, informational flyers, and promotional videos. For example, Fulton-Montgomery Community College developed two television commercials detailing opportunities for experiential learning on campus. According to a project report submitted to SUNY Central in October 2014, “the marketing and outreach materials ... allowed our campus to target local residents interested in degree programs that incorporate experiential ‘real world’ learning. Since unemployment rates in the area our campus serves are among the highest in the state, this opportunity to connect residents to programs designed to get them quickly into the workforce was sorely needed and very well received.”⁴⁵

Other campuses, including Onondaga Community College, Stony Brook, and the University at Albany, rely heavily on faculty to encourage students to participate in internships. According to one representative from Career Services at SUNY Albany, “SUNY Works has provided us with a way to engage faculty and other staff in the increasing value of internships and applied learning experiences. Through these conversations we have been able to speak in more classrooms and many faculty and staff have increased conversations and initiatives with students and employers about internship opportunities. These relationships led to an increase of over 17 percent in employers at our annual career fair and an increase of over 25 percent in student attendance at this event.”⁴⁶

Broome Community College has developed a good model. Specifically, freshman student orientation sessions feature applied learning presentations by the Career Readiness & Job Placement team in collaboration with the Service Learning and Civic Engagement Coordinators. An information table is also accessible throughout orientation sessions.⁴⁷

Marketing campaigns have also been utilized at places like Hudson Valley Community College, Monroe, SUNY Adirondack, and SUNY Orange to develop new *relationships with community partners and employers to inform students about the value and availability of co-ops and internships.*

Faculty and staff throughout SUNY have expressed concern over the potential for work-based experiences to interfere with degree completion. According to Statewide Co-Op Curriculum Coordinator Bill Ziegler, the question is, “How do you add six months work to that [the curriculum] and still get it done in four years or less?”⁴⁸ Campuses have responded in a number of ways *to promote sustained learning opportunities that are integrated through academic curriculum and help build cumulative knowledge over time.* At Stony Brook, for instance, faculty and staff are experimenting with a parallel co-op initiative that differs from Northeastern in that students work part-time while being enrolled full-time. This

approach was taken in large part because faculty were “not supportive of the idea of students leaving and working full time for a semester — it breaks the students’ academic sequence and can postpone graduation.”⁴⁹ Stony Brook has also engaged faculty and administrators to discuss incorporating the co-op initiative into the curriculum of peer education programs.⁵⁰

Ziegler has indicated that curriculum development requires faculty and staff to “think outside the box” when creating internships. “We tried to follow that model where even if you’re an art history major there’s an internship for you.... For example, I have an art gallery. We found public space to show student work and I have a student who is the curator.”⁵¹ Not surprisingly, some majors prove more difficult to develop internships than others. At Onondaga Community College, for example, Internship Coordinator Rose Martens expressed some difficulty developing internship courses in the humanities.⁵² By comparison, Onondaga established three new courses in the Interior Design program to give students more flexibility when seeking internship credit. Students may choose from courses that are one, two and three credits and require sixty, 120, and 108 hours, respectively.⁵³ New internships were also established for the new Nuclear Technology program.

While every SUNY Works pilot campus offers credit-bearing internships, the number of students completing noncredit bearing internships is unknown. That being said, some schools are adopting new policies designed to designate courses with an experiential component. For example, Cayuga Community College developed an EL Designation Policy which allows faculty to designate their courses as EL on course descriptions and transcripts.⁵⁴ This policy took two years to put in place and required feedback and buy-in from the faculty association.

Finally, successful initiatives offer alternative assessment. Although this occurs within SUNY, it does not appear to be very common. FIT recently developed a Transfer of Credit Policy for academic internships. This policy allows students who complete an academically equivalent internship within or outside of SUNY to transfer those credits to FIT. Despite the relatively low-cost of implementation, FIT anticipates “this will not be a highly used option for students” because FIT’s “internship program is valued and desirable for students.”⁵⁵

SUNY also has an expert in prior learning assessment. Nan Travers currently serves as the director of the Office of Collegewide Academic Review at Empire State College. Her work focuses mainly, “on the policies and practices of self-designed student degree programs and the assessment of prior college-level learning.”⁵⁶ As founding co-editor of *PLA Inside Out: An International Journal on the Theory, Research, and Practice in Prior Learning Assessment*, Travers’ knowledge and expertise lend themselves to future growth in this area. Nonetheless, widespread implementation of PLA’s remains uncommon throughout most of SUNY.

D. Points of Leverage

Universities and colleges perceive a great benefit in providing applied work-based experiences for their students. As Michael True, Washington Internship Institute board member, explains:

Colleges helping students find internships is a growing trend. Schools raising money to fund unpaid internships is a growing trend. Use of alumni in this way is a growing trend. All of this is on the upswing because it all makes it that much easier for students to transition to the workplace....⁵⁷

If applied learning offers benefits, how can opportunities be expanded or brought to scale? The answer, we suggest, can be found in key points of leverage to promote and expand applied learning opportunities. Points of leverage are ways to extend good or effective applied learning experiences, at system or campus levels. Although there is scant research testing these points of leverage, we draw on expert advice and examples of relevant approaches adopted at system or campus levels (beyond the five illustrative cases outlined above). We group the points of leverage under three major types: requirements, incentives, and buy-in. Situating points of leverage advanced by other systems and universities against policies, strategies, and experiences in SUNY Works, shows potential areas for policy development in SUNY Works.

1. Requirements

Systems have expanded applied learning initiatives by mandating or requiring participation of students and faculty. The University System of Maryland requires students to earn credits outside the classroom, including credits earned in internships. The Youth Guarantee in Finland goes much farther in supporting opportunities for work, including a guarantee that anyone under twenty-five will be offered employment if they are job seekers. Massachusetts' new "Civic Learning" policy is a directed, if broadly based, mandate that obliges all students in the system to acquire "applied competencies that citizens need" without reference to how students should acquire those competencies.⁵⁸

- *University System of Maryland.* Within a comprehensive Effectiveness and Efficiency (E&E) initiative rolled out in 2003-04, the University System of Maryland introduced a requirement that students must earn at least 10 percent of the 120 credits for the bachelor's degree outside the classroom. The requirement can be met through online courses, study-abroad programs, or Advanced Placement tests, but also through internships.⁵⁹
- *Youth Guarantee, Finland.* In setting out a new direction for policy, the Ministry of Education has advanced the view that "young people have the right to construct and the responsibility for constructing their own future."⁶⁰ That new direction has been manifested in policies that oblige the in-

volvement and engagement of young people through support and recognition of nonformal education, flexible pathways, and apprenticeships. Introduced in 2013, the Youth Guarantee ensures that anyone under age twenty-five (and graduates under age thirty) will be offered employment, trial employment, or tailored study if registered as a job seeker. More generally, about half of students in Finland report being employed while studying.⁶¹

2. Incentives

Rather than require student or faculty participation, systems can encourage it, most often through increased funding. Trade Adjustment Assistance Community College and Career Training (TAACCCT) grants, for example, encourage partnerships between campuses and employers by providing funds. Similar initiatives can be found, with state funds, within the Technical College System of Georgia and, with respect to targeted and grounded research, at the University of Texas.

Individual campuses have also incentivized greater participation, again through increased funding opportunities. Brown University launched BrownConnect, which develops and lists internships and other applied learning experiences. It also provides stipends for students who participate. Similarly, Cornell launched its own initiative, Engaged Cornell, to encourage community engagement. Cornell anticipates \$150 million over ten years to support community partnerships, curriculum change, and faculty development.

- *Trade Adjustment Assistance Community College and Career Training (TAACCCT) Grants.* Funding under TAACCCT is an example of external funding to bring about campus-employer partnerships for skill training. The most recent round of TAACCCT grants focus on regional employer-community college partnerships that engage small and medium enterprises (SMEs) as well as large employers.⁶²
- *BrownConnect.* Launched in November 2014, BrownConnect serves as infrastructure for Brown students in summer internships as well as other applied experiences. The opportunities are available to all students, regardless of financial need. Jointly provided by the careers and alumni offices and supported by campus resources, BrownConnect develops and lists internship and applied learning opportunities and generates and allocates funding. During a one-year pilot phase, 154 new internships were established. Through BrownConnect, students receive financial support if they undertake appropriate internships that offer no or low stipends. In the pilot year, some 254 students received such support. Funding comes through donors, department resources, and financial aid. While the internships or other forms of applied learning

are expected to provide appropriate learning experiences, the experiences appear to complement academic study.⁶³

- *Engaged Cornell.* In October 2014, Cornell introduced Engaged Cornell, an initiative to promote the participation of all students in “high-quality” community engagement. Participation is voluntary. The initiative was launched with a \$50 million donation from the Einhorn Family Charitable Trust, toward \$150 million in funding over ten years. Funds are intended to support a substantial growth in community partnerships, curriculum change in all fields and departments with aligned learning outcomes, and targeted faculty development. Engaged Cornell potentially will become a distinctive feature in the university’s profile, attractive to potential students and faculty. The initiative is housed in the office of the vice provost for land-grant affairs.⁶⁴

3. Buy-In

Systems may also encourage greater participation in work-based applied learning through federal and state policy development. Indiana and Illinois have created new work-study funds to support internships, including in the private sector. Systems have worked with state and regional governing bodies to promote funding or tax concessions for employers who make a commitment to create or promote jobs — a strategy that might be purposefully extended to include internships.

Campuses, likewise, encourage buy-in from employers. Experience with strategies and approaches elsewhere suggest that employer engagement is facilitated through arrangements that reduce administrative and other demands while affording benefits. Beyond those already identified in the illustrative cases, targeted approaches include working with employer consortia for workforce training, for example, the Photovoltaic Manufacturing Consortium.

Campuses can encourage faculty buy-in by growing and promoting internal initiatives, as in the University of Michigan’s Urop program (discussed above). Campus initiatives may encourage students to take internships and to complete work-based projects as part of their curriculum, like California State Polytechnic Institute (Cal Poly). Strong work-based initiatives may encourage students to participate simply because they get results. The South Dakota School of Mines, for example, has well-paid work-based opportunities with many different employers. Work is integrated as a value in the university. Drake and Duke, in less directed ways, provide opportunities that attract students to applied learning (including work-based applied learning).⁶⁵

Over time, work can become a core part of the education at a particular campus. These schools are able to get faculty and student buy-in through recruitment: individuals may choose them because of their work-based emphasis. Northeastern, described

above, is known for its co-op experience. Liberal arts schools, like Berry College and Berea College, integrate work fully into their curriculum and educational experience. California State University, Monterey Bay (CSUMB), provides support for service learning, a requirement for all students integral to the CSUMB mission.⁶⁶ The Royal Melbourne Institute of Technology (RMIT) has emphasized work since its origins. Unlike Northeastern, Berry, or Berea, the RMIT incorporates technical programs as well as traditional bachelor's, master's, and doctorates.

System-level:

- *Work Study in Illinois, Indiana, and Washington.* Work study is a key growth point in state and federal policy development. In *Illinois and Indiana*, state funds have been set aside to provide work study support for students undertaking internships to foster skills and knowledge for employment. In *Washington*, the initiative is state-funded and not restricted to private sector involvement. In the *Federal Work-Study* program, matching requirements and limitations on the share of funds that can be allocated to private-sector placements make these placements less attractive. However, proposals to facilitate the use of Federal Work-Study funds for private sector placements, and to focus work study placements much more on relevant work-based learning experiences, have been advanced for consideration in the re-authorization of the Higher Education Act as well as in states.⁶⁷ A further feature of interest: Under the Job Location and Development Program (JLD) in Federal Work Study, colleges and universities can support the development and visibility of off-campus job opportunities for all students, particularly those providing work-based applied learning experiences.
- Commitments in economic development grants or concessions. State and regional funding or tax concessions may include terms for commitments for jobs.⁶⁸ Where job commitments are expected or regarded favorably, terms might be purposefully extended to include as relevant and appropriate structured internships. Such an approach aligns with and expands such supply side (if job-driven) approaches as TAACCCT (above).
- Photovoltaic Manufacturing Consortium. Consortia used in workforce training, identified in some regions as “sector-based” (e.g., hospitals), permit enterprises of various sizes, capacities, and levels of recruitment to participate in the development and delivery of work-based applied learning experiences. The Photovoltaic Manufacturing Consortium is one example through which workforce training at all levels (including internships) is provided in partnership with SUNY Polytechnic and a range of public and private entities, with private and public funding.⁶⁹ The

approach might be applied (with or without funding) to engage groups of employers to work with colleges to develop work-based applied learning experiences for a wider range of students and purposes, as has been the case in North Dakota and Connecticut. Chambers of Commerce or economic development or workforce development entities might serve as the appropriate convening organization.

Campus-level

- *Learn by Doing at California State Polytechnic Institute.* Cal Poly provides degree programs in mostly professional and technical fields, and emphasizes in its academic approach “learn by doing.” One overarching manifestation of this applied orientation is a required senior capstone project in all fields. The project, in the form of a design or research study, presentation, or performance, can draw upon an internship or co-op experience (expected in some fields) as well as related to any other work or experience. Senior projects have visibility, with some noted as the origins of start-ups. The most recent survey of graduates, for 2012-13, shows that 75 percent were employed (69 percent full-time, 6 percent part-time) and 13 percent were in graduate school. Of those employed, 92 percent report jobs directly or somewhat related to the field of study.⁷⁰
- *South Dakota School of Mines.* In this long-standing initiative, all South Dakota School of Mines’ students are encouraged to have relevant work or research experience prior to graduation. More than three-fourths of graduates report such experiences. Co-ops are often six-eight months (semester + summer). In 2013, students interned with more than 165 employers in thirty-four states, Canada, and Germany. Many work-based experiences are paid: the average co-op/intern salary for 2012-13 was \$17.03/hour, not including housing allowances, bonuses, and relocation expenses for work experiences taken away from campus. The emphasis on applied learning carries through to a one-year project, required in the senior year.
- *Work Experience Program at Berry College.* At Berry College, a small private liberal arts college east of Atlanta drawing students mostly from Georgia and neighboring states, more than 90 percent of students participate in the Work Experience Program. The program comes under the dean of student work. Work is embedded in the philosophy of the college; all students are guaranteed a paid, on-campus work experience regardless of major or financial need. Additionally, the college lists 300 available positions, including off-campus jobs with schools, churches, and companies. A search of Berry’s own website reveals 105 currently open positions with twenty-five employers, a third of which are located off campus. The intent is for stu-

dents to take up jobs with tasks broadly related to the field of study. Jobs differ in responsibilities and pay, and it is expected that students will progress to more demanding positions as they move through their studies. Jobs are supervised by faculty and staff, who provide informal and formal evaluation of performance following a well-articulated set of guidelines. Criteria refer to work-place competencies. Berry has carried out an evaluation of student learning that tracks conventional metrics of retention, graduation rates, and activities of students who leave prior to graduation or after graduation (via the National Clearinghouse). The evaluation also considers other evidence of learning and development, including through work experience, via both supervisor evaluations and a more focused examination of resumes and portfolios of a small random sample of students.⁷¹

- *Learning, Labor, Service at Berea College.* A small private liberal arts college in Central Kentucky, Berea applies an approach that obliges all students to work while pursuing studies. “Learning, labor, and service” in practice means that every student contributes to the college and the wider community through structured work. Work is part of the student experience, with expectations for performance and development that are evaluated for the record. Work may contribute to the operations of the campus, and can be understood in context: Berea admits only students with demonstrated financial need, and students pay nothing out-of-pocket toward their studies and room and board. The combination of earnings from a substantial endowment, annual gifts, and financial aid from various sources – along with student-provided services – makes such an arrangement possible. The work assignments also include service learning, with agencies in the region. Students may take up work assignments within their program of study, or in related service opportunities (e.g., the Artifacts and Exhibit Studio at the Appalachian Center). The work experiences come under a designated program (headed by a dean), are supported by classroom instruction, and contribute to growing levels of competence and responsibility among student workers over the undergraduate years.
- *Royal Melbourne Institute of Technology, Australia.* From its origins, the Royal Melbourne Institute of Technology (RMIT) has been recognized for its emphasis on education for employment. In 2002, an estimated 7,000 RMIT students had work-based experiences in the course of their studies.⁷² RMIT is unique in that it incorporates within one institution, technical/vocational programs (coming under the Technical and Further Education (TAFE) division) and bachelor’s, master’s, and doctorates (under the higher education division). While some twenty-four schools (facul-

ties) come under these two divisions (twenty-one higher education; three TAFE), the schools are assigned to one of three main academic areas (organizationally called colleges): Business; Design and Social Context; and Science, Engineering and Health. The opportunity for students to move from TAFE programs into higher education degree studies is promoted.⁷³ Also in Australia, a fully integrated “dual-degree” is available in community health offered jointly by the University of New England and TAFE New England. Students in the program participate in mandatory work-based learning modules, and graduate with a vocational certificate, a vocational diploma, and a higher education degree.⁷⁴

4. Assessment

Although assessments are not a tool to expand opportunities, *they are a means to identify and expand good opportunities*. Simply measuring work-based experience (as in Australia) brings greater attention to the issue in policy debates. Tennessee uses funding directed to campuses, offering grants to support academic program development that incorporate research-backed “high impact practices,” including applied learning.⁷⁵ Because work-based learning across different campuses and initiatives has different goals, there is not necessarily a single standard for assessment. In fact, students and employers both may appreciate the value and use of alternative forms of assessment, which identify and refer to knowledge, skills, and attitudes not typically assessed in on-campus coursework. The Educational Testing Service is examining noncognitive qualities to judge the “fit” between a student and a potential employment opportunity. The Council for Assessment of Experiential Learning offers assessments based not only on tests but also review of portfolios and other means. More assessments, and more sophisticated assessments, have the potential to allow systems and campuses to provide better experiences for students and a better fit for employers.

- “Fitness for work” assessment, Educational Testing Service. Within a TAACCCT grant supporting training for displaced workers at a consortium of twenty-three SUNY community colleges, ETS is rolling out an assessment of work readiness. The assessment concerns noncognitive dispositions that can be used to judge fitness for work, and more specifically how closely the learner aligns with the work-style of enterprises that might wish to make a hire. The assessment is more nuanced than conventional understandings of generic behaviors (e.g., punctuality), and so offers a better picture of both what learners acquire inside and outside of the classroom, and also of the attributes employers seek when filling positions.
- Council for the Assessment of Experiential Learning (CAEL). CAEL offers assessments of learning, wherever acquired.

Such assessments rely on tests, review of portfolios or other means, and in some instances are intended to enable judgments for recognition of experiential learning for academic credit. Assessments of this type are not new, or unusual. CAEL itself has been active since 1974. States have developed and implemented initiatives to bring about wider use of prior learning assessments, through mandates, targeted funding, or articulation policies.⁷⁶ What distinguishes CAEL from Advanced Placement, College-Level Evaluation Program (CLEP), and Excelsior College Examinations is the portfolio assessment. CAEL works with colleges and universities to assess prior learning for academic credit, and also with employers to, in part, provide a profile of the knowledge, skills, and attitudes of employees.⁷⁷

5. Points of Leverage at SUNY

The examples of points of leverage just described suggest a broad range of strategies to extend and support work-based applied learning experiences. Some of these strategies SUNY has already adopted, others it has not. For starters, SUNY may be moving toward making applied learning a requirement for degree completion. New York Governor Andrew Cuomo wants to make experiential learning a requirement for SUNY students, a sentiment echoed in Chancellor Zimpher's 2015 State of the University address: "every SUNY degree will include an applied learning or internship opportunity as a prerequisite to graduation."⁷⁸ The challenge, then, is to identify and provide the kinds of supports and leverage that might best encourage expansion of such experiences.

In terms of incentives for students, the vast majority of placements throughout SUNY Works pilot campuses remain unpaid. Nonetheless, some schools have attempted to expand the total number of paid internships through their involvement with SUNY Works. Most notably, FIT used funds from Lumina Foundation to create nine \$1,000 summer internships. These opportunities were directed specifically at students unable to complete internships due to economic hardships. FIT is currently working with its development team to find grants to continue this program beyond the SUNY Works initiative.⁷⁹

With respect to employer buy-in, most Phase I and Phase II campuses are developing initiatives largely at the department level. At Brockport, Buffalo, Canton, Cortland, Erie, Niagara, and Stony Brook, for example, partners are identified by faculty, students, and career offices. Institutional outreach efforts such as career fairs (Albany) and alumni connections (Binghamton and Cornell) are also utilized. Contributing to these efforts, Chancellor Nancy Zimpher recently announced a plan to engage the CEOs of every Fortune 500 company with a presence in New York, as well as other large employers, to help promote the expansion of SUNY

Works.⁸⁰ Consistent with Governor Cuomo's START-UP NY economic development plan, the chancellor is also working to "establish a Co-Op Task Force comprised of business leaders from across the state with a focus on regional Chambers of Commerce and companies coming to New York."⁸¹

Although, to the best of our knowledge, SUNY has not leveraged work-study programs or state-funding, it has developed assessment tools. Building assessment into expansion, to see what works and therefore what ought to be furthered, is an important part of scaling up. A vast majority of Phase I and Phase II schools have developed a wide range of assessment tools to monitor student performance and learning outcomes. These typically include employer satisfaction surveys, reflective journal entries, and final papers. At Onondaga Community College, for example, employers are asked to rate each student's work-related skills (i.e., industry skills, organizational skills and work ethic) on a scale of one to five with one being the lowest performing indicator and five being the highest.⁸² Similarly, Stony Brook asks employers to rate each student's workplace etiquette, communication skills, and job performance on a scale of one to five with one being unacceptable and five being exceptional.⁸³ Several schools have also developed assessments to monitor the overall quality of placements. At FIT, for example, students evaluate the worksite experience as well as the curriculum. With respect to the former, students are presented with questions like:

- Was your orientation/initial training adequate?
- Did you have a clear understanding of what was expected of you?
- Did you use your storehouse of knowledge and skills related to your major?
- Did your sponsor organization hire you?⁸⁴

With respect to the latter, students are asked whether classroom instruction helped them to assess their own personal skills, talents, values and interests, identify career possibilities, and write effective resumes.⁸⁵ Despite the prevalence of student and employer satisfaction surveys and other forms of assessment, these practices vary from campus to campus.

Although there are many points of leverage that can be engaged to scale initiatives up, as we have mentioned in this report, it is crucial to understand what initiatives are effective to make good decisions about what should be scaled up. There are many ways to define effective: increasing student satisfaction, better assessments of student qualification for jobs, or better academic outcomes, to name a few. In the following section we report on a pilot study undertaken to evaluate the use of administrative data to estimate the effects of work-based applied learning. In particular, we look at whether work-based learning experience has an effect on student retention, graduation, and employment at a single SUNY campus.

Part III: Pilot Study

Campuses participating in Phase I of Lumina-supported SUNY Works initiative had little or weak evidence of the effects of student participation in work-based applied learning on retention, graduation and eventually employment outcomes.⁸⁶ The problem is a general one: campuses and their academic program units have only in recent years mounted more systematic and ongoing efforts to track student progress to graduation. Further, curriculum options (such as applied learning) tend to be examined in one-off studies. Until fairly recently with the emergence of digital records and reporting and internet-based survey options, campuses and systems have not routinely and systematically tracked graduates into the postgraduate period. Under these circumstances, *the use of extant administrative information to track students and graduates, with more finely grained analyses of differences in progress, completion, and employment according to curriculum options such as work-based applied learning, opens up potentially useful information that can be obtained easily, quickly, and routinely.* Recognizing both the lack of information and the potential, the Baseline Report included a recommendation to undertake an exploratory study to test the feasibility of using extant academic unit records, also linked to NYS Department of Labor UI wage records, to estimate such effects. Under the present project, we have carried forward this recommendation.

There are several advantages of an exploratory study. First, the design of the study obliges attention to methods and measures, and so can surface needed details on applied learning experiences that are not presently collected. Second, the design developed for the pilot serves as a method that might be adopted for use at campus and system level. Third, the pilot provides a first test of the use of information on graduates employed in New York State. Although not new in a number of states, the possibilities for linking SUNY academic unit records with NYS Department of Labor UI wage records opened up only this year. SUNY has undertaken a few studies using linked UI wage record information, and this pilot study has relied on SUNY's vice president for institutional research to pursue the linked data.

The pilot study aims to estimate the effects of participation in work-based applied learning at one SUNY campus, which was selected because of existing data resources. The Rockefeller Institute project team worked closely with two campus officials with very close knowledge of the types of applied learning experiences offered in particular degree programs and also with expertise and familiarity working with academic unit records and linked UI wage records. The project also secured advice from an expert with experience working with linked academic unit record-wage record data in other states as well as experts in the design of assessment of learning studies.⁸⁷

Researchers have used academic unit records to understand the effects of work-based experience on academic results, such as grades, credits earned, and retention to the second year.⁸⁸ While research using linked academic – wage record data bases has grown over recent years, these studies are more particular, examining differences by campus for degrees in a certain field and a particular levels. *This pilot study, by contrast, is distinctive in its aim to apply linked unit record data to estimate the more finely-grained academic and employment effects of work-based applied learning within and across degree programs.* For this reason, the considerations in the design, metrics, and implementation are presented in some detail along with the difficulties arising. The difficulties stand as important limitations. Given that academic unit records typically lack details on curriculum options such as applied learning experiences, substantive involvement of knowledgeable campus-level staff will be required to carry out such analyses in the near term.

A. Design, Metrics, and Implementation

The pilot sought to explore how far – and how – student unit records can be used to both track academic results and employment outcomes (the latter through matches with the NYSDOL UI wage records). The pilot had as its purpose to explore the feasibility of such an approach, to lay out the kinds of metrics that could be used, and to identify limitations and gaps. What is learned from a pilot advanced at campus level should reveal the potential – and limitations – of the approach for other campuses and SUNY Works.

1. Design

Isolating the impact of work-oriented learning experiences: The pilot study was conceived as a method to gauge the effects of work-oriented applied learning experiences on retention, graduation, and employment outcomes. To estimate effects, the academic and employment outcomes of participants in such experiences need to be compared to the outcomes of students who did not participate. Since the students in these two groups may differ in ways other than participation in work-based applied learning experiences, the method used ideally should take into account the extent to which other attributes are associated with retention, graduation, and employment outcomes.

With expert advice, we considered different options. The most appropriate for the pilot study is a “matched” students strategy. Under this approach, academic and socioeconomic information is used to “match” students, i.e., to identify students who we judge to have the same propensity to participate in a work-based applied learning experience. The academic and employment outcomes for those who participated in the applied learning experience are compared to those in the “matched” group of students to come up with an estimate of the effects. Several relevant

studies have used such a method to come up with estimates of the effects of applied learning.⁸⁹

Working with the participating SUNY campus, we explored the information available on the academic unit records and the UI wage records. For the analysis (and, subsequently, interpretation of results), several considerations and limitations were identified.

Work-based learning opportunities differ in structure and requirement, which presents challenges for overall assessment of impact.⁹⁰

- *Student records do not distinguish between different types of work-based learning experiences.* SUNY Works distinguishes among eight categories of work-based applied learning. For the SUNY campus participating in the pilot study, student academic records do not contain sufficient information to distinguish among these categories or, for the purposes of the pilot, on characteristics of the applied learning experiences that might be taken into account in assessing effects. That is, differences in the effects of work-based applied learning experiences may vary owing to characteristics of the particular experience. Clinical internships, for example, tend to be highly structured, closely monitored, and required in fields that lead to licensing. Those characteristics do not apply for all internships. In view of the absence of such information in student records, the Rockefeller Institute project team worked with colleagues at the participating SUNY campus to identify a set of fields of study for which opportunities for work-based applied learning experiences are offered as an option (not a requirement) and are likely to be more similar with respect to academic expectations and student interests. We introduce more detailed comparisons of effects by field in the analyses of employment outcomes. For the purposes of the pilot, the applied learning experiences are internships.
- *Many student experiences are not recorded.* An important limitation in the available data is uneven coverage, such that a good share of students undertake work-based learning experiences (e.g., internships) outside of those recognized through academic programs. The extent of such participation in such experiences at the pilot campus is not known. A recent survey of graduates suggest that the proportion with some work-based learning experience while in college is around 35 percent.⁹¹ One implication is that the use of available information in student academic records may lead to an underestimate of the effects of participation in work-based applied learning experiences, as some students in the “match” group may have such experiences and so manifest retention, graduation, and employment outcomes more similar to students with recorded work-based applied learning.⁹²

2. Metrics

The intended outcomes of participation in SUNY Works is increased retention, graduation, and employment. The academic unit records alone and linked to UI wage records are well-suited to examine these outcomes, but they are not perfect. The Rockefeller Institute project team consulted with experts and reviewed extant studies on the types and range of measures to be constructed.

Although we employed academic unit records from a single campus to generate estimates of the effects of work-based applied learning experiences on retention, graduation and employment outcomes, additional measures may better capture the complexity of academic pathways, student experiences, and wide range of potential effects.

- *Academic unit records at a single campus do not capture students who complete their studies at another institution, which may overstate the effects of work-based learning.* For the pilot study, information on retention through to graduation is limited to student registrations at the participating SUNY campus. Students who do not appear as registered in successive years (or appear as a graduate) may continue and complete their studies at another college or university. Prior research suggests that the frequency of such pathways is substantial.⁹³ Although beyond the scope of the pilot study, students who transfer out can be tracked through other data sources (SUNY, National Clearinghouse, and through multistate data sharing, e.g., the Western Interstate Commission for Higher Education, WICHE).⁹⁴ From the perspective of the system, the estimates produced in the pilot study may overstate the effects of work-based applied learning on retention, graduation, and employment outcomes (the latter, with the present design). Preliminary descriptive analyses of year-to-year retention reveal high and similar persistence before, during, and after any (or no) work-based applied learning experiences. A somewhat larger difference between those with an internship at any time and those without internships (simple descriptive statistics) is apparent in graduation rates.
- *Nonacademic effects, such as student engagement and student satisfaction, may be a significant outcome of work-based learning experiences.* Researchers consider measures of effects on students other than retention or graduation. A strong line of inquiry focuses on student engagement, and the extent to which differences in engagement are associated with both practices at colleges and academic results.⁹⁵ Two examples have been mentioned above: the Australasian Survey of Student Engagement (modeled on NSSE in the US) focuses specifically on the student experience in work-integrated learning; SUNY's TAACCT grant supporting stu-

dents and programming at twenty-three community colleges has incorporated an assessment of “job readiness” to identify noncognitive capacities that complement the content knowledge to be acquired through coursework. Such capacities may be developed also through work-based applied learning experiences, although evidence on the ways in which these and other noncognitive attributes figure into retention and graduation is limited.

While the UI wage records linked to academic unit records are an important way to measure employment (through wages) in New York State, here, too, there are considerations and limitations.

- *The wage records provide information on formal employment within New York State, and do not show self-employed, employed persons outside New York, or students who continue in graduate programs.* Employers are obliged to file, each quarter, a wage record for every employee. According to the NYS Department of Labor, more than 97 percent of those working in the state appear in these records; but self-employed individuals are excluded.⁹⁶ In comparison, for CUNY, more than 80 percent of associate and bachelor’s graduates were employed (and showed up on wage records) during the period 2003 to 2010.⁹⁷ The proportions in this pilot study may be lower and vary substantially, depending on the period covered, field of study, and region. Information from other states as well as for SUNY, suggest that as many as half of graduates may not appear on NYSDOL wage records within the first four to six quarters following graduation. The proportions coming up on the records are higher for community college graduates and lower for university graduates.⁹⁸ Some may enter graduate school, others may move out of state for employment. The destinations for those NOT appearing in wage records is not known (but see WICHE for a multistate tracking of academic and employment destinations). For the purposes of the pilot study, a measure of the proportion of graduates employed in New York State is relevant and appropriate for estimates of the effects of work-based applied learning experiences. Nonetheless, the extent to which such experiences make it more likely that a graduate will work as opposed to continue into graduate education is not known. The finding that students participating in applied research experiences as undergraduates appear more likely to pursue graduate study may suggest that participation in work-based experiences could make it more likely that graduates enter employment.⁹⁹
- *More reliable measures of employment occur within four to six quarters after graduation.* Quarterly wage records may pick up transitions into positions, especially in the early postgraduation period. For this reason, the measures of

employment outcomes refer to each matched graduate's wage records within six quarters following graduation. The three proposed measures of employment outcomes, specifically, are: *employed within New York State in any of the first six quarters following graduation; the highest wage recorded in any of the first six quarters following graduation; and the number of quarters until the first match (wage record) up to the first six quarters following graduation.*

- *Some researchers have used alternative measures of employment outcomes.* Purdue University's collaboration with Gallup to survey graduates has explored student assessments of the relevance of their studies for the jobs they hold, job satisfaction, and the extent to which internships and cooperative learning allowed them to apply what was learned in the classroom.¹⁰⁰ The previously mentioned assessments developed under the TAACCCT grant assesses "work readiness" on dimensions that align with what supervisors describe as ideal attributes in a hire.

3. Implementation

Work with academic unit records, and in particular linking these records to NYSDOL wage records, required a sequence of steps. The main considerations, as well as a key limitation, are identified here.

- In collaboration with experienced and knowledgeable staff at the participating SUNY campus, Rockefeller Institute project staff developed the field of inquiry to be entering cohorts for 2006, 2007, and 2008. The three cohorts, when first enrolled, had 2,708, 2,760, and 2,880 students, respectively, a total of 8,348 students, which yielded a pool of students of a size sufficient to yield the sample for the analysis. The enrollment and internship information for these students were provided up until the Fall term of their seventh academic year (2012, 2013, and 2014 for entering cohort 2006, 2007, and 2008 respectively) enrolled at the campus. Students may have graduated, transferred out, or dropped out before this last term. The demographic and socioeconomic characteristics of the sample are summarized in Appendix C, Table 3.1. Descriptive statistics on college preparedness indicators, including Student Aptitude Test (SAT) math score, SAT critical reading score, and high school grade point average (GPA) are shown in Appendix C, Table 3.2. Within the time available, the approach adopted was to work with these cohorts to examine retention, graduation, and employment outcomes. Estimates of effects on retention and graduation could have been made more current through use of more recent cohorts (entering, say, in 2010). Specific analyses of effects on employment outcomes required earlier cohorts.

- Given the limited information on work-based applied learning experience in the academic unit record, we relied on advice from colleagues at the participating SUNY campus concerning the types of internships and co-op learning (most particularly, requirements if any) across fields of study. Those exchanges led to decisions on the sub-set of students to include in the analysis.
- Analyses of retention and graduation was carried out by Rockefeller Institute staff.
- The transfer of campus-level records had two steps. In the first step, a file with student records identified with a random ID was provided to Rockefeller Institute staff. The random IDs for the subsample of graduates selected through analysis at RIG, with codes appended to designate groups for the comparisons – “interns” and “noninterns” for each of a set of combinations of background characteristics and fields of study – are sent back to the campus. In the second step, the campus attaches the student’s Social Security Number (SSN) to enable the link to NYSDOL wage records, and sends these records to SUNY System which has established the formal request for the transfer of the file to NYSDOL.
- Under implementation of the present Memorandum, NYSDOL does not provide linked individual wage records. Further, NYSDOL does not provide information (cell counts or means) for any cell with fewer than ten cases. With these considerations in mind and also adopting a conservative estimate that at least half of the SSN’s sent to NYSDOL will not be matched (graduate in graduate school, moved out of state, not employed in a covered position), we established groups, identified by codes on the file to be submitted to NYSDOL, of sufficient size to clear the cell count threshold minimum.
- NYSDOL will return tabled data to SUNY, subsequently conveyed to Rockefeller Institute for submission to SUNY Works.

B. Analysis and Findings

We use descriptive data, bivariate analyses, and multivariate regressions (more specifically, a series of logistic regressions) to reveal the relationships between participation in an internship and the demographic, socioeconomic, and academic backgrounds of students, and learning outcomes, including retention, graduation, and labor market outcomes.

As mentioned above, associations do not always reveal causal relationships: Even if participation in an internship is associated with a higher probability of retention, graduation, employment, and earnings, the associations may mask other causes for favorable outcomes. Among statistical approaches used to capture the

effects of participation in internships, propensity score matching (PSM) is a method that has been applied with respect to work-based or discovery experiences.¹⁰¹ The PSM approach takes two steps to identify the causal effects of interest. First, available observable attributes are used to calculate the propensity to participate in a treatment, which, in our analyses, is participation in the internship. An individual who took an internship is matched to another who did not take the internship (in the control group) but had the same “propensity” to take the internship based on other attributes. This step is an approximation to a randomized controlled trial (RCT). It addresses the problem of extrapolation that often exists in ordinary least square (OLS) regressions¹⁰² and guarantees that apples are only compared to apples. Second, the difference in outcomes between the treatments and controls – internship/no internship for each matched pair (or matched group) is calculated and then averaged among the matched pairs (matched groups) to get an estimate of the difference in the learning or labor market outcome of interest. However, the causal estimates using PSM are only valid to the extent that we capture the most important observable attributes of students. Available information on relevant attributes, such as parents’ education, family income, and so forth, is limited. Moreover, we do not have measures of important, but unobservable attributes, such as motivations.

These limitations raise a second area where further information will be needed to make full and appropriate use of such methods in the future (the first being program details on internships). Even with additional information, attention will need to be directed to group sizes sufficient to permit finely grained analyses under PSM. Put simply, interest in generating estimates of the effects of internships by feature and field for use at campus level directs attention to smaller groups while appropriately implemented PSM techniques require larger numbers. Strategies, such as those adopted for the project to draw from several years’ cohorts, will need to be identified and evaluated.

A further consideration is identification of the appropriate comparison groups. For estimation of the effects of internship on retention, full analyses are limited to the sub-sample of students retained to the prior year. For estimation of the effects of internship on graduation, full analyses are limited to the sub-sample of students retained to Spring semester of year four (for year four graduation).¹⁰³ For estimation of the effects of internships on employment outcomes, analyses are limited to the sub-population of graduates.

1. The Scale of Internship Participation

Academic records do not capture all internship experiences. Just over 17 percent (or 1,435 out of the 8,348) of entering students took at least one internship by the beginning of the Fall term of their seventh academic year, or the Fall term of the seventh year,

at the participating campus. As mentioned, this number is roughly half of the 35 percent of college graduates that Gallup reports.¹⁰⁴ However, Gallup counts all self-reported internships, while the academic records that we are working with capture only those internships that are credited within study programs.

Students who took advantage of internships most often completed them late in their academic career. The most common time to take an internship was the Spring and Fall terms of the third and fourth academic years (see Appendix C, Table 3.3 and Figure 3.1).

2. Participation in Internships — Background Characteristics and Participation

Females, African Americans, those whose tuition residency in first term was not foreign, and those with relatively lower SAT scores (both math and critical reading) were more likely to participate in at least one internship during their studies at the participating SUNY campus. These associations are statistically significant at .01 or .10 levels. However, although the differences are statistically significant, the magnitude of the differences in participation in internships among the groups is modest. Further, rough measures of resources (whether students were offered the Pell Grants) and ability (high school GPA) are not associated with internships taken (Appendix C, Tables 3.4 and 3.5). Two attributes show differences of some magnitude: gender and ethnicity. The proportion of internship taking for female students is almost 10 percentage points higher than that for male students. The proportions for Asian, African American, and Hispanic students are 4.7, 9.5, and 5.4 percentage points higher, respectively, than that for white students, while American Indian/Alaskan Native students almost 4 percentage points lower than white students.

We used logistic regression to further estimate how the probability of taking at least one internship recorded in the student's unit records is associated with background characteristics. The results reveal similar patterns of internship participation by gender and ethnicity, but show somewhat different patterns of internship participation by Pell and academic performance. Our baseline group consists of female white students who entered college in 2006, weren't offered Pell Grants, had average academic performance, and whose tuition residency in the first term was New York State. According to our estimation, 16.5 percent (the probability shown in the intercept row of Appendix C, Table 3.6) students of the baseline group would take at least one internship in college. Compared to the baseline group and when all other characteristics are unchanged, the estimated probability for male students to take at least one internship in college is 9.7 percent, or 6.8 percentage points less. The difference is statistically significant at the .01 level. The attributes that contribute to a difference in the likelihood of participation in at least one internship (all attributes taken into account) are racial/ethnic background (higher probability for Asian, Black, or Hispanic) and SAT scores (lower

probability for higher SAT scores). With respect to the latter, for example, students whose SAT Math score is one standard deviation above the mean score are about 2 percentage points less likely to participate in at least one internship significant at the .01 level).

Further, the logistic regression reveals relationships that are not apparent in the bivariate associations. Students with Pell grants were a little less than 2 percentage points (1.7%) less likely to take at least one internship, and students whose high school GPA is one standard deviation higher than the mean are about 1 percentage point less likely to participate in internships. The size of these differences are not substantial, suggesting at least on those attributes that we can observe, the profiles of students taking internships are not much different than those who do not.

We note, from descriptive statistics, that participation in internships varies substantially by field of study. This study program characteristic is taken into account in analyses of employment outcomes (below).

3. Participation in Internship and Retention

Internships are associated with greater retention. Those who took at least one internship were more likely to be retained than those who never took an internship (see Appendix C, Table 3.7).

It is difficult, however, to disentangle the effect of the internship on retention from other factors. Using logistic regression models, which provide estimates of the odds of being retained to the end of the third and fourth academic years, participation in at least one internship by the end of the third academic year was positively associated with retention at the end of the year even after controlling for gender, ethnicity, and academic performance before and after enrollment in college.

Students who took at least one internship by the end of the third year were 3 percentage points more likely to be retained at the beginning of the fourth academic year than those who never took an internship (statistically significant at the .01 level). What should be noted is that we only included in the analysis those students who were retained and not graduated at the beginning the third year to calculate the retention rate at the end of the third year. Thus, the retention rate for our baseline group is already as high as 96.8 percent. With this baseline in view, the 3 percentage point difference is quite impressive. Here the baseline group consists of those who didn't take any internship during their third year and who were female white students, entered college in 2006, weren't offered Pell Grants, had average academic performance, and whose tuition residency in the first term was New York State. However, the results are not as impressive for retention in the fourth year. Students who took at least one internship by the end of the fourth year were only 0.3 percentage points more likely to be retained at the end of the fourth academic year than those who never took internship had (not statistically significant. Please see Appendix C, Tables 3.8 and 3.9 for more details).

Using the method of propensity score matching (PSM) to estimate the effects of internship on retention to the end of year three, our results show that *students who took at least one internship by the end of the third year were 2.8 percentage points more likely to be retained at the end of the third academic year than similar students who never took an internship (statistically significant at the .01 level)*. *Students who took at least one internship by the end of the fourth year were only 0.4 percentage points more likely to be retained at the end of the fourth year than similar students who never took an internship (statistically insignificant at the .10 level)*. The results are shown in Table 3.11. The procedures and more detailed results of the statistical tests carried out are provided in the Appendix. These results are quite similar to those obtained in the logistic regressions already discussed.

4. Participation in Internships and Graduation

Students who take at least one internship have better graduation rates than those who do not take internships. To isolate the effect of internship on graduation only (i.e., removing the effects of internship on being retained to the year at which graduation is evaluated), we limited the analysis to students retained to the second half of the fourth year. Of note, about 60 percent of graduates from the three cohorts graduated in their fourth year (with most of the remainder graduating later).

For those students and fitting a logistic regression model to also control for other student characteristics that may be associated with differences in graduation rates, we find that students with internships were 13.6 percentage points more likely to graduate than those in the baseline group (results significant at .01 level; see Appendix C, Table 3.10). Again, the baseline groups consist of those who did not take any internship until the end of their fourth year and who were female white students, entered college in 2006, were not offered Pell Grants, had average academic performance, and whose tuition residency in the first term was New York State.

Applying the method of propensity score matching, we find that *students who took at least one internship by the end of the Spring semester of the fourth year were 9.5 percentage points more likely to graduate than similar students who never took any internship but were still enrolled in that semester (statistically significant at .01 level)*. The results are shown in Appendix C, Table 3.12. The procedures and more detailed statistical results are provided in the Appendix. These results are somewhat lower than those obtained in the logistic regressions already discussed.

Student program characteristics, such as field of study, are not included in the analyses leading to the estimates. Owing to differences in both requirements for and/or expectations within academic programs, the internship taking — and the effects of internship taking on graduation in a given year — may well differ by field. We take into account field of study in the detailed analyses of employment outcomes (below).

5. Participation in Internships and Labor Market Outcomes (to be Completed)

Please see supplemental appendix.

Part IV: Conclusion

Applied learning is a strategy now being more widely used to improve student learning, retention, graduation, and employment outcomes. The relevant experiences identified and described in this report demonstrate recent efforts at system and campus levels to extend opportunities. They generally show strong performance with learning results and employment outcomes in systems or on campuses with considerable experience. The initiatives we identified all aim to engage more — if not all — students in applied learning experiences, including work-based opportunities similar to those in SUNY Works. If nothing else, this much is clear: *Although SUNY Works (like SUNY) may be unique with respect to its reach across types of fields and institutions, it is not alone in seeking to provide applied learning opportunities, work-based learning, in particular, to all students.*

Yet, the very breadth of study programs and student learners in SUNY is also the main challenge in identifying and expanding work-based applied learning experiences. Still, the campus- or system-level initiatives that we reviewed have counterparts within SUNY. Efforts and success in providing applied learning opportunities for all students can be found elsewhere for each degree program, level of institution, and type of student within SUNY. The experience elsewhere is relevant, even if SUNY's aim is to do more by spanning all study programs, sectors, and students.

Our review and discussions with knowledgeable individuals at system and campus levels lead us to draw attention to an equal challenge. Implicit in the expansion of opportunities for work-based applied learning opportunities for all students is the requirement that the applied learning experience is worthwhile. Both long-standing *system* initiatives, such as the German dual system or the Swiss Universities of Applied Sciences, and *campus* initiatives, as those found at Northeastern, Berea, Berry, Cal Poly and South Dakota School of Mines, reflect common features that support learning through a student's work experiences and, in this way, allow such experiences to make their greatest contributions to academic results and employment outcomes.

We suggest a few key features are likely to be particularly important: structured learning integrated in the curriculum; workshops or seminars that complement and support the work-based learning experiences; sustained engagement in such experiences over the study program; relevant and useful assessments; and academic credit. These features do not come from a synthesis of the research literature on student learning, but rather from a much more selective consultation of that literature, the initiatives that we identified and reviewed, and the discussions with those knowledgeable at system and/or campus levels in this field. We offer them as suggestive of the kinds of features that will need to be incorporated and reflected in all work-based applied learning

opportunities as SUNY Works seeks to extend such opportunities to all students.

Worthwhile work-based applied learning extended within and across campuses requires specific attention in mission and changes in ways of working. Changes such as these are difficult to make and sustain. They take time, but over time they can pick up steam. Allocated resources and conditions on the ground can support such changes. These considerations, drawn from our review of experiences elsewhere and conversations with those knowledgeable about the changes of the type envisaged across SUNY, provide a basis for targets for action in SUNY Works.

To bring about expansion of worthwhile work-based learning opportunities, SUNY Works might focus efforts in three areas, where experience elsewhere provides examples of possible points of leverage.

- *Promote ways to better integrate applied work-based learning into study programs.* As just suggested, such integration might include early and sustained engagement with work-based applications, workshops that support students as they move between academics and work-based experiences, useful assessments, and/or credit for work-based experiences. Faculty engagement should be encouraged, through infrastructure (as in Michigan's Urop, which takes on administrative tasks that otherwise would fall on faculty), incentives (such as Tennessee's grants to support curriculum incorporating "high impact strategies," among which structured work-based learning), and support for and recognition of faculty (as advanced through the Office of Learning and Teaching in Australia's Department for Education and Training). While relevant experiences with mandates have been identified, these emphasize outcomes (Massachusetts' Civic Learning policy), provide flexibility (University System of Maryland's E&E policy), and are most specific when targeted on particular fields (Germany's dual system, Switzerland's UAS). An expansion of work-based applied learning can serve other SUNY-wide priorities put to campuses, whether access, retention, or graduation of students from under-represented groups (where Michigan's Urop and proposals for state and federal work-study support serve as relevant applied learning examples that would support such a priority) or "systemness" (where the Trade Adjustment Assistance Community College and Career Training – TAACCCT – is an example of a work-based learning effort that already engages a number of SUNY community colleges).
- *Support campuses, individually and within regions, to develop relationships and engagements with employers.* The initiatives identified reveal a wide range of means to do this, from building on relationships already established for economic development and workforce development (Photovoltaic

Manufacturing Consortium and TAACCCT, are examples) to broader cost sharing arrangements (as in purposeful state work-study or possible tax concessions). These means may oblige involvement of agencies outside SUNY and also open up new ways of working in partnership – spanning campuses, as in the chancellor’s appeal to Fortune 500 companies, but also to other companies or agencies with a presence throughout the state.

- *Help campuses make work-based applied learning attractive to students.* Worthwhile student work experiences support student learning: providing a work experience is not the same thing as providing a work-based learning experience. The long-standing initiatives we examined incorporate workshops, seminars, and teaching to support and complement work experiences and generally integrate work experiences within study programs. To strengthen work experiences falling outside of study programs, SUNY might help to develop a means for assessment of that experience, for campus credit or for more general value to the student to identify strengths and weaknesses. Such assessments (and/or recognition) might apply to work experiences for students working on campus or in part-time jobs locally that are not, at present, drawn into study programs (the approaches at Berea and Berry may be relevant). Further, student participation can be incentivized with stipends, most directly through a more purposeful use of work-study (as advanced in discussions in Washington state or proposal for Federal Work-Study coming forward for the reauthorization of the Higher Education Act).

Taking initiatives to scale requires information on what works. The needed information base extends beyond research studies in the field, which may provide powerful evidence but are less useful in evaluation at campus or system levels or in informing students and employers. The pilot study carried out for this project shows both the potential for, and limitations of, using administrative records also linked to UI wage records for these purposes. The gaps to be filled are several: bring work-based experiences presently not recorded onto student administrative records; add details that distinguish among work-based experiences (likely going beyond SUNY Works’ four categories of co-op, internship, work-study, and clinical); and develop means to assemble information on sufficient numbers of students by field and background. These gaps, and other limitations, can be addressed with the help of campus staff and faculty, and in so doing, help to make data generated from such analyses even more useful. Even so, information for use at the academic program and campus level may need to be generated in other ways (e.g., supported experimentation). Further, the effects of work-based applied learning reach into areas of skills and attitudes that are less commonly

assessed in study programs. These effects are potential value to students and employers. New assessment might be developed and made widely available, for which the “Fitness for Work” assessment ETS has developed under the TAACCCT Grant in NYES, the experience at Berry College, and the use in Australia of a survey of student engagement that includes “work integrated learning” as a specific engagement scale represent examples.

For SUNY Works, there may be value in encouraging the creation of a venue through which interested and involved faculty, cooperating employers, and interested third-parties (among which, state agencies, sponsors, and SUNY staff) can identify questions and issues, present the results of careful studies for wider discussion and review, and otherwise participate in the evolution of work-based applied learning across SUNY. A model here is the Australian Collaborative Education Network.

Taken together, the features and points of leverage that we identify and illustrate in this report provide a range of options for consideration, with adaptation, by SUNY. Existing work-based applied learning initiatives found on campuses throughout SUNY are often well-structured and include organized workshops, but they do not as often include work-based experiences that early in the student’s academic career, integrate those experiences into the core curriculum, and offer alternative assessments. Of course, particular features in a given work-based learning opportunity will depend on the campus setting and field of study, and particular means to encourage and support such learning opportunities for all students may not be appropriate — or effective — in all instances. Our review suggests, however, that building opportunities into the curriculum, making it an important part of what students at SUNY do, and working closely with stakeholders to make sure educational and other needs are met are keys to successful initiatives.

There is much to build on: many students throughout SUNY presently participate in applied learning experiences, and SUNY already incorporates design features and points of leverage found in initiatives elsewhere. SUNY Works’ continuing efforts, we suggest, will benefit from support for the development of information on the effects of applied learning experiences, at campus and SUNY system level and relevant for use by students, employers, and faculty as well as officials and the wider public. Beyond this, there may be more to learn from the very wide range of experiences on campuses and within systems that have extended — or aim to extend — applied learning broadly. In these ways, SUNY Works can identify, adapt, evaluate, and refine means to advance the ambitious goal set by Governor Cuomo and Chancellor Zimpher: an opportunity for every SUNY student to have an applied learning experience.

Appendix A: Survey

Thank you for participating in our survey. Your feedback is important. The information that you and colleagues from around SUNY provide will be used to help SUNY system administration better support the development of applied learning experiences for students across SUNY.

PART A: Respondent

Please answer the following questions regarding your institutional affiliation and position.

1. What is the name of your institution?
2. What is your current position?
3. How long have you held this position?
 - o Two years or less
 - o Three to five years
 - o Six to ten years
 - o More than ten years
4. How long have you been on this campus?
 - o Two years or less
 - o Three to five years
 - o Six to ten years
 - o More than ten years
5. What other administrative or academic positions have you held?
 - o No other positions
 - o A position similar to this one on this campus (e.g. different college)
 - o A position similar to this one at another campus
 - o A position not similar to this one, with any institution, organization, or employer
6. In which offices or areas have you worked in your career to date. Check all that apply.
 - o Student Affairs
 - o Career Office
 - o Student Employment Office
 - o Financial aid office
 - o President or Provost Office
 - o Office of the dean of college or division
 - o Business and finance office
 - o Counsel
 - o Research office
 - o Development office
 - o Human Resources office
 - o Institutional Research, including assessment and accreditation
 - o Other position in institutional administration
 - o An academic position (faculty, teaching)
 - o Other position in higher education
 - o Other position outside higher education (please specify)

7. In which of the following applied learning programs do you have some involvement? Check all that apply.
- Internships
 - Co-operative learning
 - Service learning
 - Community Service
 - Clinical-teacher preparation
 - Clinical placements – healthcare
 - Research/entrepreneurship/field study
 - Work study
 - Other (please specify)

PART B: Applied Learning Programs on Campus

8. For the program you know the most about, what type of program is this?
- Internships
 - Co-operative Learning
 - Service Learning
 - Community Service
 - Clinical-teacher preparation
 - Clinical placements – healthcare
 - Research/entrepreneurship/field study
 - Work study
 - Other (please specify)
9. How many years has this program been available to students?
- Not yet available
 - Two years of less
 - Three to five years
 - Six to ten years
 - More than ten years
 - Don't know/Unsure
10. Is this program among the oldest or among the newest applied learning programs on your campus?
- Not applicable (i.e. program is not yet available)
 - Among oldest
 - Among newest
 - Don't know/Unsure
11. Where did this program get its start?
- Within an academic or professional department
 - Within a college or division on this campus
 - At campus level
 - Don't know/Unsure
 - Other (please specify)
12. Where is this program now located?
- Within an academic or professional department
 - Within a college or division on this campus

- At campus level
 - Don't know/Unsure
 - Other (please specify)
13. What were the primary reasons for the launch of this program? Check all that apply.
- Faculty interest
 - Student demand
 - Employer demand
 - President or Provost interest
 - External funding
 - Additional staffing provided by the campus to establish such a program
 - Don't know/Unsure
 - Other (please specify)
14. Now, looking again at the primary reasons for the launch of this program, which ONE would you consider to be the MOST important reason? Check one.
- Faculty interest
 - Student demand
 - Employer demand
 - President or Provost interest
 - External funding
 - Additional staffing provided by the campus to establish such a program
 - Don't know/Unsure
 - Other (please specify)
15. At present, which individuals, groups, of offices are directly involved in day-to-day operations of this program? Check all that apply.
- Program Director
 - Career Office
 - Student affairs office
 - Student employment office
 - Student financial aid office
 - Faculty at department level
 - Faculty at college or division level
 - President or Provost office
 - Business and finance office
 - Counsel
 - Research office
 - Development office
 - Human Resources office
 - Institutional Office, including assessment and accreditation
 - Employer(s) taking student placements
 - Employer(s) participating in advisory capacities
 - Sponsor/donor
 - SUNY Administration
 - Federal, state, regional, local agency
 - Other (please specify)

16. Which individuals, groups, or offices are directly involved in planning and oversight of this program? Check all that apply.
- Program Director
 - Career Office
 - Student affairs office
 - Student employment office
 - Student financial aid office
 - Faculty at department level
 - Faculty at college or division level
 - President or Provost office
 - Business and finance office
 - Counsel
 - Research office
 - Development office
 - Human Resources office
 - Institutional Office, including assessment and accreditation
 - Employer(s) taking student placements
 - Employer(s) participating in advisory capacities
 - Sponsor/donor
 - SUNY Administration
 - Federal, state, regional, local agency
 - Other (please specify)
17. What/who is the most influential individual, group, or office to sustain this program on this campus? Check all that apply.
- Program Director
 - Career Office
 - Student affairs office
 - Student employment office
 - Student financial aid office
 - Faculty at department level
 - Faculty at college or division level
 - President or Provost office
 - Business and finance office
 - Counsel
 - Research office
 - Development office
 - Human Resources office
 - Institutional Office, including assessment and accreditation
 - Employer(s) taking student placements
 - Employer(s) participating in advisory capacities
 - Sponsor/donor
 - SUNY Administration
 - Federal, state, regional, local agency
 - Other (please specify)
18. Now, looking again at the list of influential individual/groups/offices, which ONE would you consider to be the MOST influential to sustain this program on this campus? Check one.
- Program Director
 - Career Office

- Student affairs office
 - Student employment office
 - Student financial aid office
 - Faculty at department level
 - Faculty at college or division level
 - President or Provost office
 - Business and finance office
 - Counsel
 - Research office
 - Development office
 - Human Resources office
 - Institutional Office, including assessment and accreditation
 - Employer(s) taking student placements
 - Employer(s) participating in advisory capacities
 - Sponsor/donor
 - SUNY Administration
 - Federal, state, regional, local agency
 - Other (please specify)
19. What/who is the most influential individual, group, or office to expand this program on this campus? Check all that apply.
- Program Director
 - Career Office
 - Student affairs office
 - Student employment office
 - Student financial aid office
 - Faculty at department level
 - Faculty at college or division level
 - President or Provost office
 - Business and finance office
 - Counsel
 - Research office
 - Development office
 - Human Resources office
 - Institutional Office, including assessment and accreditation
 - Employer(s) taking student placements
 - Employer(s) participating in advisory capacities
 - Sponsor/donor
 - SUNY Administration
 - Federal, state, regional, local agency
 - Other (please specify)
20. Now, looking again at the list of influential individual/groups/offices, which ONE would you consider to be the MOST influential to expand this program on this campus? Check one.
- Program Director
 - Career Office
 - Student affairs office
 - Student employment office
 - Student financial aid office
 - Faculty at department level

- o Faculty at college or division level
- o President or Provost office
- o Business and finance office
- o Counsel
- o Research office
- o Development office
- o Human Resources office
- o Institutional Office, including assessment and accreditation
- o Employer(s) taking student placements
- o Employer(s) participating in advisory capacities
- o Sponsor/donor
- o SUNY Administration
- o Federal, state, regional, local agency
- o Other (please specify)

21. In your view, what might prevent expansion of this program to more students on this campus? Check all that apply.

- o The structure of this program applies to a particular field
- o Faculty in some departments or some colleges or divisions do not support this type of applied learning program because there is limited room in the curriculum for it
- o Faculty in some departments or some colleges or divisions do not support this type of applied learning program because the knowledge or skills acquired in such a program are not believed to contribute substantially to the curriculum objectives
- o Incentives for faculty and staff are insufficient to support the work needed to expand this program
- o Employers in sectors served by some graduates do not value the experiences from this type of applied learning program in recruitment
- o Students anticipating graduation do not see the benefit of applied learning experiences from this type of program for continuation of their studies in another degree program or campus
- o Students anticipating graduation do not see the benefit of applied learning experiences from this type of program for employment in their anticipated job or
- o The resources needed to expand this program are not likely to be made available
- o Legal or insurance issues
- o Other (please specify)

22. Now, looking again at the reasons that might prevent expansion of this program to more students on this campus, which ONE would you consider to be the MOST important reason? Check one.

- o The structure of this program applies to a particular field
- o Faculty in some departments or some colleges or divisions do not support this type of applied learning program because there is limited room in the curriculum for it
- o Faculty in some departments or some colleges or divisions do not support this type of applied learning program because the knowledge or skills acquired in such a program are not believed to contribute substantially to the curriculum objectives
- o Incentives for faculty and staff are insufficient to support the work needed to expand this program
- o Employers in sectors served by some graduates do not value the experiences from this type of applied learning program in recruitment
- o Students anticipating graduation do not see the benefit of applied learning experiences from this type of program for continuation of their studies in another degree program or campus

- o Students anticipating graduation do not see the benefit of applied learning experiences from this type of program for employment in their anticipated job or
 - o The resources needed to expand this program are not likely to be made available
 - o Legal or insurance issues
 - o Other (please specify)
23. In your view, what might prevent expansion of this type of program to more students on campuses elsewhere in SUNY? Check all that apply.
- o The profiles of academic programs at other campuses are different than what we offer
 - o The profiles of students at other campuses are different than at my campus
 - o Faculty interest in this type of applied learning program at other campuses is weaker than at my campus
 - o Student interest in this type of applied learning program at other campuses is weaker than at my campus
 - o Connections with employers at other campuses are not as strong as at my campus
 - o Resources in support of this type of applied learning are less than at my campus
 - o Other (please specify)
24. Now, looking again at the reasons that might prevent expansion of this type of program to more students on campuses elsewhere in SUNY, which ONE would you consider to be the MOST important reason? Check one.
- o The profiles of academic programs at other campuses are different than what we offer
 - o The profiles of students at other campuses are different than at my campus
 - o Faculty interest in this type of applied learning program at other campuses is weaker than at my campus
 - o Student interest in this type of applied learning program at other campuses is weaker than at my campus
 - o Connections with employers at other campuses are not as strong as at my campus
 - o Resources in support of this type of applied learning are less than at my campus
 - o Other (please specify)
25. Please provide any additional thoughts or comments on the development of applied learning on your campus.

Appendix B: Procedure and Detailed Results of Retention and Graduation Effects Using Propensity Score Matching

We used propensity score matching to obtain estimates of the average treatment effects for the treated (ATT), i.e., taking at least one internship.

Retention

First, we used all student characteristics in the logistic regression (these are shown in Appendix C, Tables 3.8 and 3.9) to predict the propensity of taking at least one internship by the end of the third and fourth academic years for each student. Our check of common support shows that the common support condition appears to pose no barrier to the analysis, since the ranges of propensity scores for the treatment and control groups largely overlapped. In this step, we did not exclude cases from the treatment group (i.e., internship takers in any year to the year of retention) that lie outside of the range of common support, i.e., those cases with propensity scores higher than the maximum value of the control group. Had we done so, we may have lost matches at the boundaries of the common support and so greatly reduce the number of cases for the analysis.¹⁰⁵ See Figures 3.2 and 3.3 below.

Next, we used a radius caliper of 0.01 to match each internship-taker with any control observations within ± 0.01 of the internship-taker's propensity score. This strategy helps to avoid the idiosyncratic matches that might result from simple one-to-one nearest neighbor matching. Only one case was excluded from the control group for both the estimations for third and fourth year retention.

Then, each individual remaining in the treatment group (taking at least one internship) was matched with an individual from the control group whose propensity for taking at least one internship was closest to the treated individual. After matching, our treated and control group observations are well-balanced on the observable characteristics. As shown in Figures 3.6 and 3.7, the standardized bias on the observable background characteristics, i.e., the differences in means between treated and untreated cases expressed in terms of standard deviations, have been reduced, mostly to below 5 percent levels. These levels are considered acceptable.¹⁰⁶

We also did a sensitivity test to estimate how strongly an unobserved attribute or characteristic must influence the selection process to eliminate the estimated treatment effect of internship taking on the third year retention. Since our outcomes are binary, we followed Becker and Caliendo¹⁰⁷ to do this test. Results show that, for retention at the end of the third year, the ATT estimation would become insignificant at the .10 level only if there was an unobservable characteristic or attribute that would increase the odds of internship taking by 3.5 times. The relevant statistics are provided in Table 3.12. These results suggest the estimation of treatment effects – internship taking on retention – using propensity score matching is insensitive to unobservable positive selection.

Graduation

Again, we first used all student characteristics in the logistic regression (these are shown in Appendix C, Table 3.10) to predict the propensity of taking at least one internship by the end of the Spring semester of the fourth academic year for each student. Our check of common support shows, again, that the common support condition appears to pose no barrier to the analysis since the ranges of propensity scores for the treatment and control groups largely overlapped. See Figure 3.4.

Next, we used a radius caliper of 0.01 to match each internship-taker with any control observations within ± 0.01 of the internship-taker's propensity score. Only one case was excluded from the control group.

Then, each individual remaining in the treatment group (taking at least one internship) group was matched with an individual from the control group whose propensity of internship taking is closest to the treated individual. After matching, our treated and control group observations are well-balanced on the observable characteristics. See Figure 3.7.

Again, we carried out sensitivity analyses. The results show that for graduation by the end of the Spring semester of the fourth year, the ATT estimation would become insignificant at the .10 level only if there was an unobservable characteristic or attribute that would increase the odds of internship taking by .4 times. This suggests that the estimation is somewhat sensitive to unobservable positive selection. The relevant statistics are provided in Table 3.13.

Appendix C: Tables and Figures for the Pilot Study

Table 3.1. Demographic and Socioeconomic Characteristics of Students in the Pilot Study		
Characteristics	Number of cases	Percentage of sample
Cohort		
Fall 2006	2,708	32.4
Fall 2007	2,760	33.1
Fall 2008	2,880	34.5
Gender		
Female	3,941	47.2
Male	4,407	52.8
Ethnicity		
American Indian/Alaska Native	19	0.2
Asian	2,277	27.3
Black/African American	486	5.8
Hispanic of any race	668	8.0
Non-Resident Alien	436	5.2
Race and Ethnicity unknown	1,733	20.8
White	2,729	32.7
Tuition residency in first term		
Foreign not U.S.	355	4.3
New York	7,308	87.5
Out-of-state U.S	685	8.2
Ever Offered Pell (as proxy to family resourcefulness)		
No	5,004	59.9
Yes	3,344	40.1
Overall Sample	8,348	100.0

Table 3.2. Descriptive Statistics on College Preparedness					
	Number of Observations	Mean	Std. Dev.	Min	Max
SAT Math Score	7715	615.0	73.8	370	800
SAT Critical Reading Score	7716	562.8	82.4	210	800
High School GPA	8097	90.2	4.5	71	99.9

Internships	N of	
	Students	Percent
1	638	44.46
2	526	36.66
3	178	12.40
4	53	3.69
5	25	1.74
6	11	0.77
7	3	0.21
9	1	0.07
Total	1,435	100

Demographic and Socioeconomic Background		At least one Internship	
		No	Yes
Gender***	Female	77.59	22.41
	Male	87.47	12.53
Ethnicity***	American Indian/Alaskan Native	89.47	10.53
	Asian	80.90	19.10
	Black/African American	76.13	23.87
	Hispanic of any race	80.24	19.76
	Non-Resident Alien	86.70	13.30
	Race and Ethnicity Unknown	82.69	17.31
	White	85.64	14.36
Tuition Residency in First Term*	Foreign not U.S.	87.04	12.96
	New York	82.70	17.30
	Out-of-state U.S.	81.75	18.25
Ever Offered Pell	No	83.09	16.91
	Yes	82.39	17.61
Total		82.81	17.19
*p<0.10, **p<0.05, ***p<0.01			

Academic Performance	Group	At Least Once	Never	Combined	Difference
SAT Math	N	1329	6386	7715	
	Mean	604.85	617.16	615.04	-12.32***
SAT Critical Reading	N	1353	6363	7716	
	Mean	559.51	563.50	562.80	-3.98*
High School GPA	N	1430	6667	8097	
	Mean	90.34	90.13	90.17	0.21
College GPA - 1 st Term	N	1435	6913	8348	
	Mean	3.00	2.72	2.77	0.27***
Note: Difference is At Least Once - Never					
*p<0.10, **p<0.05, ***p<0.01					

Table 3.6. Results of the Logistic Regression for Internship Taking

	Regression Coefficient (Log-odds)	Odds Ratio (OR)	Predicted Probabilities	Marginal Effects
Intercept	-1.62***	0.20***	0.165***	
Male	-0.61***	0.54***	0.097***	-0.068***
Ethnicity				
American Indian/Alaskan Native	-0.33	0.72	0.125	-0.04
Asian	0.46***	1.58***	0.239***	0.073***
Black/ African American	0.53***	1.69***	0.251***	0.086***
Hispanic of any race	0.34***	1.41***	0.218***	0.053***
Non-Resident Alien	0.05	1.05	0.171***	0.006
Race and Ethnicity Unknown	0.24***	1.27***	0.200***	0.035***
Tuition Residency in First Term				
Out-of-state U.S.	0.02	1.02	0.167***	0.002
Foreign not U.S.	-0.27	0.76	0.131***	-0.034
Offered Pell	-0.13*	0.88*	0.149***	-0.017*
SAT Math (Standardized)	-0.15***	0.86***	0.145***	-0.021***
SAT Critical Reading (Standardized)	-0.03	0.97	0.161***	-0.004
High School GPA (Standardized)	-0.08**	0.93**	0.155***	-0.011**
College GPA - 1 st Term (Standardized)	0.44***	1.55***	0.234***	0.060***
Entering Cohort				
2007	0.04	1.04	0.171***	0.006
2008	0.21***	1.23***	0.196***	0.031***

*p<0.10, **p<0.05, ***p<0.01

Table 3.7. Internship Taking and Retention by Academic Year — A “Flow” Model

Academic Year	Intern Status	Entered Number	Retained Number	Retention Rate
1	At least once	55	53	96.36
	Never	8,293	7,487	90.28
	Total	8,348	7,540	90.32
2***	At least once	279	272	97.49
	Never	7,261	6,487	89.34
	Total	7,540	6,759	89.64
3***	At least once	730	728	99.73
	Never	6,025	5,679	94.26
	Total	6,755	6,407	94.85
4***	At least once	1,250	1,226	98.08
	Never	5,025	4,796	95.44
	Total	6,275	6,022	95.97
5***	At least once	388	365	94.07
	Never	1,878	1,678	89.35
	Total	2,266	2,043	90.16
6***	At least once	69	56	81.16
	Never	522	399	76.44
	Total	591	455	76.99

*p<0.10, **p<0.05, ***p<0.01

**Table 3.8 Results of the Logistic Regression
for Retention at the Beginning of the Fourth Year**

	Regression Coefficient (Log-odds)	Odds Ratio (OR)	Predicted Probabilities	Marginal Effects
Intercept	3.40***	29.94***	0.968***	
Take at least one internship by the end of Year 3	2.88***	17.83***	0.998***	0.030***
Male	-0.02	0.98	0.967***	-0.001
Ethnicity				
American Indian/Alaskan Native				
Asian	0.56***	1.75***	0.981***	0.014***
Black/African American	0.25	1.28	0.975***	0.007
Hispanic of any race	0.44*	1.55*	0.979***	0.011*
Non-Resident Alien	0.75*	2.11*	0.984***	0.017*
Race and Ethnicity Unknown	0.20	1.22	0.973***	0.006
Tuition Residency in First Term				
Out-of-state U.S.	-0.33	0.72	0.955***	-0.012
Foreign not U.S.	-0.62	0.54	0.941***	-0.026
Offered Pell	0.11	1.11	0.971***	0.003
SAT Math (Standardized)	-0.05	0.95	0.966***	-0.002
SAT Critical Reading (Standardized)	-0.06	0.94	0.966***	-0.002
High School GPA (Standardized)	0.02	1.02	0.968***	0.001
Cumulative GPA by the end of the Spring of Year 2 (Standardized)	1.22***	3.38***	0.990***	0.038***
Entering Cohort				
2007	0.02	1.02	0.968***	0.001
2008	0.03	1.03	0.969***	0.001
Sample Size	5,909			
Note: The variable American Indian/Alaskan Native predicts retention perfectly, thus was dropped and 11 observations not used				
*p<0.10, **p<0.05, ***p<0.01				

**Table 3.9. Results of the Logistic Regression
for Retention at the Beginning of the Fifth Year**

	Regression Coefficient (Log-odds)	Odds Ratio (OR)	Predicted Probabilities	Marginal Effects
Intercept	4.53***	92.69***	0.989***	
Take at least one internship by the end of Year 4	0.29	1.34	0.992***	0.003
Male	0.20	1.22	0.991***	0.002
Ethnicity				
American Indian/Alaskan Native	-1.30	0.27	0.962***	-0.027
Asian	0.16	1.17	0.991***	0.002
Black/African American	0.18	1.20	0.991***	0.002
Hispanic of any race	-0.21	0.81	0.987***	-0.002
Non-Resident Alien	-0.19	0.83	0.987***	-0.002
Race and Ethnicity Unknown	0.17	1.18	0.991***	0.002
Tuition Residency in First Term				
Out-of-state U.S.	-0.52*	0.60*	0.982***	-0.007
Foreign not U.S.	0.96	2.60	0.996***	0.007
Offered Pell	-0.23	0.80	0.987***	-0.003
SAT Math (Standardized)	-0.13	0.87	0.988***	-0.001
SAT Critical Reading (Standardized)	-0.25***	0.78***	0.986***	-0.003**
High School GPA (Standardized)	0.11	1.12	0.990***	0.001
Cumulative GPA by the end of the Spring of Year 3 (Standardized)	1.42***	4.14***	0.997***	0.015***
Entering Cohort				
2007	-0.73***	0.48***	0.978***	-0.011***
2008	-0.43**	0.65**	0.984***	-0.006*

*p<0.10, **p<0.05, ***p<0.01

Table 3.10. Results of the Logistic Regression for Graduation, Spring, Fourth Year

	Regression Coefficient (Log-odds)	Odds Ratio (OR)	Predicted Probabilities	Marginal Effects
Intercept	0.07	1.08	0.518***	
Took at least one internship by the end of the Spring Semester of Year 4	0.57***	1.76***	0.655***	0.136***
Male	-0.46***	0.63***	0.404***	-0.115***
Ethnicity				
American Indian/Alaskan Native	-1.08	0.34	0.268*	-0.251*
Asian	0.24***	1.27***	0.577***	0.059***
Black/ African American	0.43***	1.54***	0.624***	0.105***
Hispanic of any race	-0.06	0.94	0.504***	-0.015
Non-Resident Alien	0.00	1.00	0.519***	0.000
Race and Ethnicity Unknown	0.07	1.07	0.536***	0.018
Tuition Residency in First Term				
Out-of-state U.S.	0.38***	1.47***	0.613***	0.094***
Foreign not U.S.	0.05	1.05	0.532***	0.013
Offered Pell	-0.16**	0.85**	0.479***	-0.040**
SAT Math (Standardized)	0.07*	1.07*	0.536***	0.018*
SAT Critical Reading (Standardized)	-0.12***	0.89***	0.490***	-0.029***
High School GPA (Standardized)	-0.08**	0.93**	0.500***	-0.019**
Cumulative GPA by the end of the Spring Semester of Year 4 (Standardized)	1.30***	3.68***	0.799***	0.325***
Entering Cohort				
2007	0.09	1.10	0.541***	0.023
2008	0.16**	1.18**	0.559***	0.040**

*p<0.10, **p<0.05, ***p<0.01

Table 3.11. Effects (ATT) of Internship-Taking on Retention and Graduation

Outcomes	ATT	S.E.
Retention at the End of the 3rd Year	0.028***	0.008
Retention at the End of the 4th Year	0.004	0.007
Graduation in Spring of the 4th Year	0.095***	0.023

ATT: Average Treatment Effects for the Treated.
*p<0.10, **p<0.05, ***p<0.01

**Table 3.12. Sensitivity Test: Mantel-Haenszel (1959)
Bounds for Retention at the End of the Third Year**

Gamma	Q_mh+	Q_mh-	p_mh+	p_mh-
1	3.814	3.814	0.000	0.000
1.5	2.989	4.792	0.001	0.000
2	2.475	5.597	0.007	0.000
2.5	2.112	6.298	0.017	0.000
3	1.833	6.926	0.033	0.000
3.5	1.610	7.501	0.054	0.000
4	1.424	8.034	0.077	0.000
4.5	1.265	8.534	0.103	0.000
5	1.126	9.005	0.130	0.000
5.5	1.004	9.452	0.158	0.000
6	0.894	9.879	0.186	0.000

Gamma : odds of differential assignment due to unobserved factors
 Q_mh+ : Mantel-Haenszel statistic (assumption: overestimation of treatment effect)
 Q_mh- : Mantel-Haenszel statistic (assumption: underestimation of treatment effect)
 p_mh+ : significance level (assumption: overestimation of treatment effect)
 p_mh- : significance level (assumption: underestimation of treatment effect)

**Table 3.13. Sensitivity Test: Mantel-Haenszel (1959)
Bounds for Graduation, Spring of the Fourth Year**

Gamma	Q_mh+	Q_mh-	p_mh+	p_mh-
1	4.081	4.081	0.000	0.000
1.1	3.131	5.036	0.001	0.000
1.2	2.265	5.910	0.012	0.000
1.3	1.469	6.717	0.071	0.000
1.4	0.733	7.467	0.232	0.000
1.5	0.048	8.168	0.481	0.000

Gamma : odds of differential assignment due to unobserved factors
 Q_mh+ : Mantel-Haenszel statistic (assumption: overestimation of treatment effect)
 Q_mh- : Mantel-Haenszel statistic (assumption: underestimation of treatment effect)
 p_mh+ : significance level (assumption: overestimation of treatment effect)
 p_mh- : significance level (assumption: underestimation of treatment effect)

Figure 3.1. Number of Students Taking Internships by Year and Term

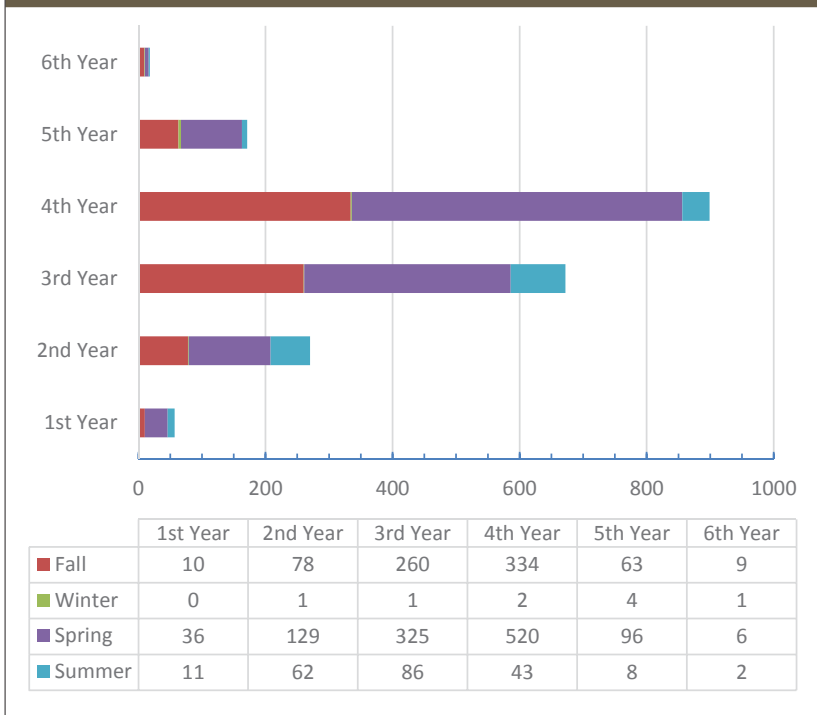
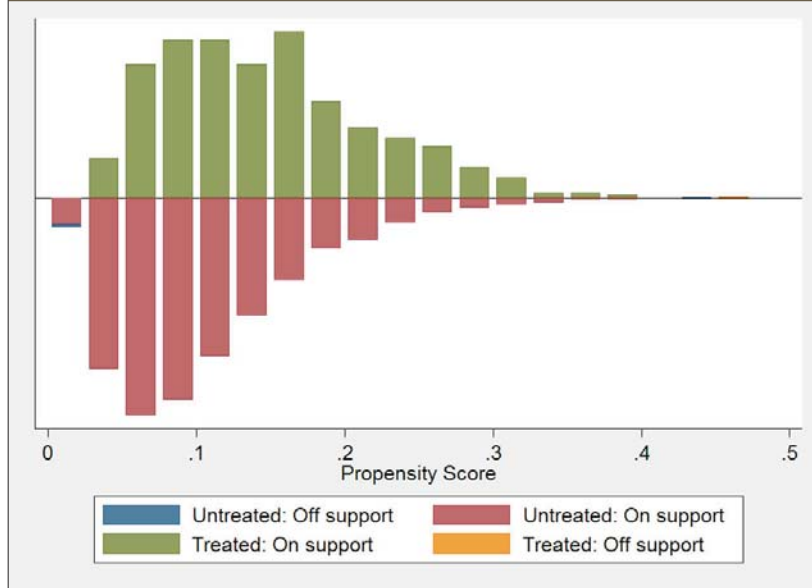
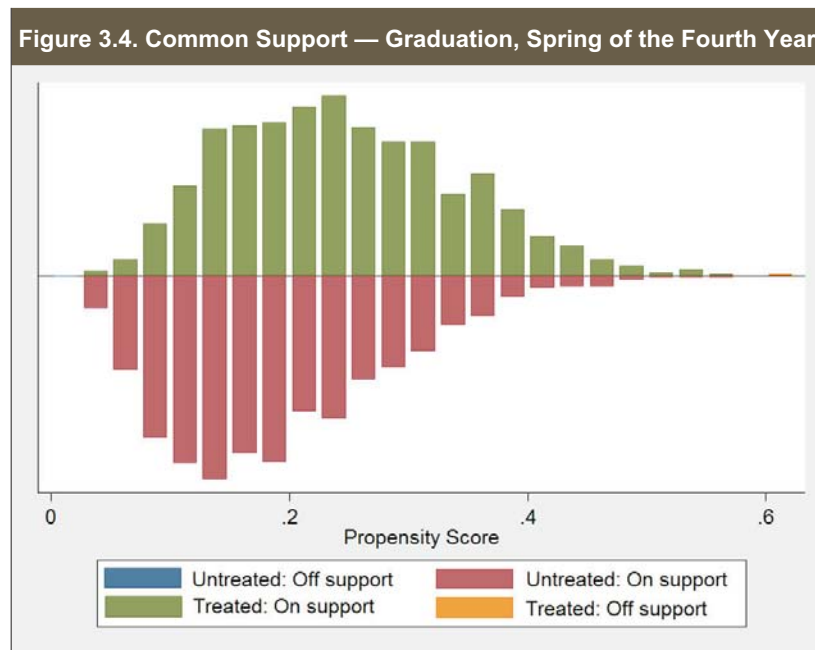
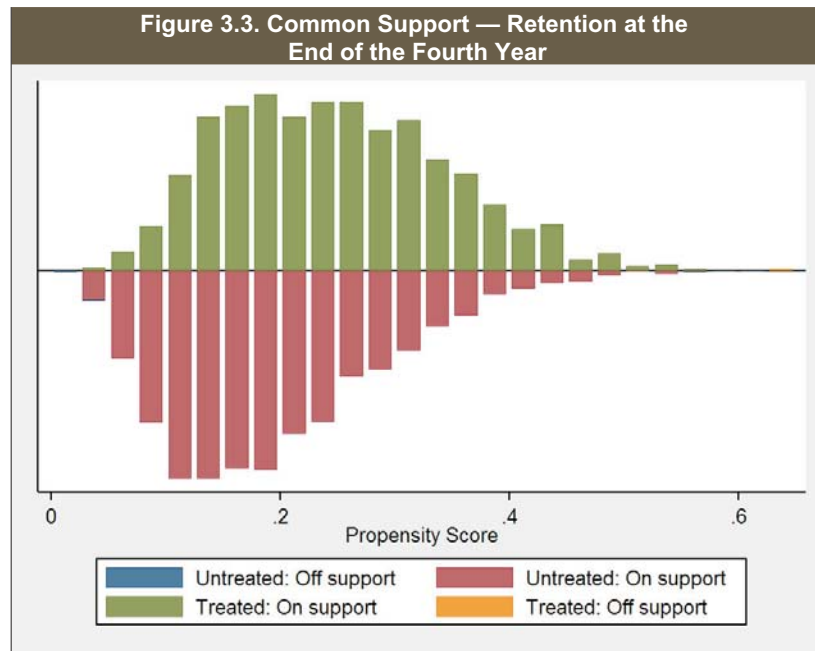
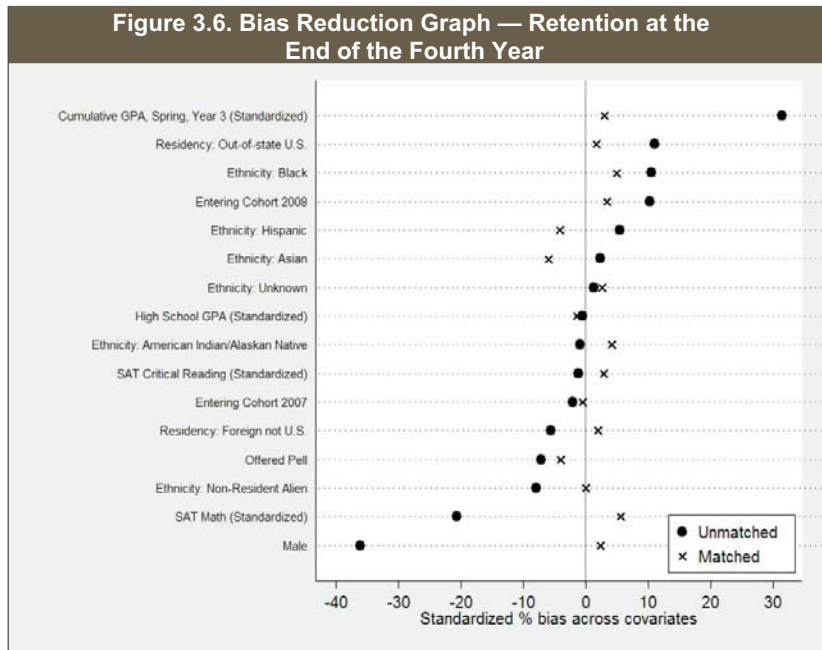
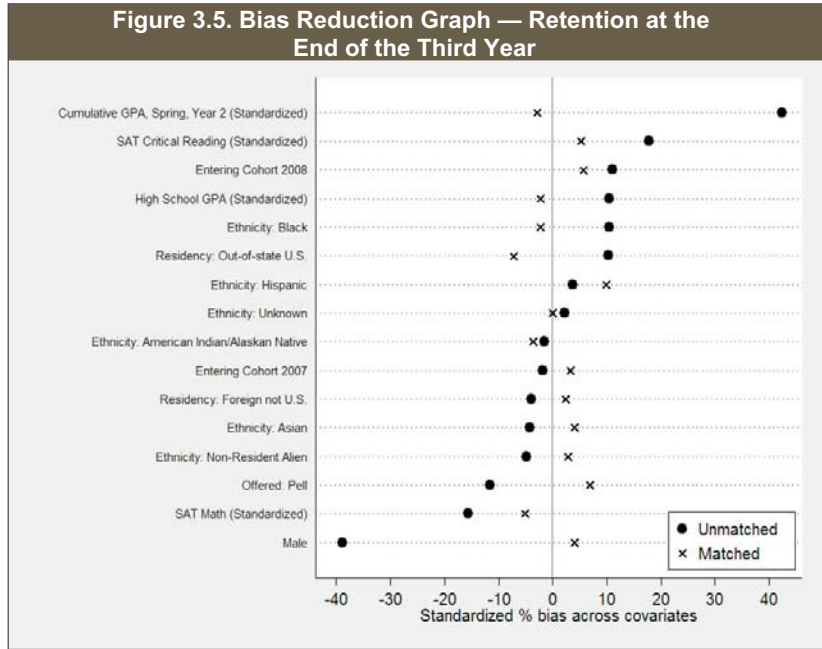
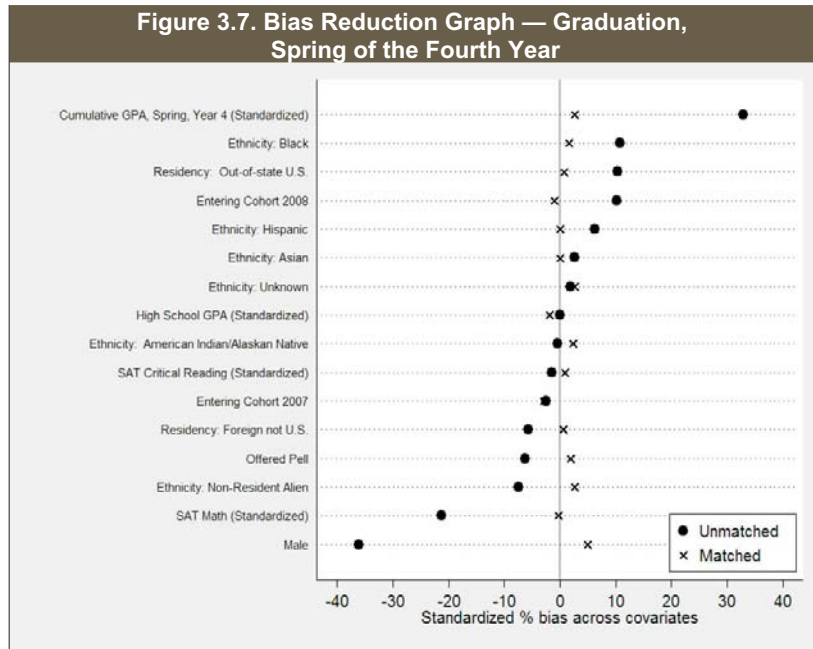


Figure 3.2. Common Support — Retention at the End of the Third Year









Endnotes

- 1 Drawing on the work of John Dewey, Kurt Lewin, and Jean Piaget, David A. Kolb devised a four-stage theory of learning based on concrete experience and reflective observation. See David A. Kolb, *Experiential Learning: Experience as the Source of Learning and Development* (Englewood Cliffs, NJ: Prentice Hall, 1984).
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- 4 SUNY Works Grant Proposal. Submitted to Lumina Foundation for Education, August 18, 2010.
- 5 As of July 2013, SUNY has been working with twelve community colleges (Adirondack, Broome, Cayuga, Fulton-Montgomery, Hudson Valley, Monroe, Niagara, Onondaga, Orange, Rockland, Schenectady, and Suffolk), four four-year colleges (Buffalo State, Fashion Institute of Technology, Oneonta, and Oswego) and two public research universities (Albany and Stony Brook) with the ultimate goal of bringing SUNY Works to scale at all sixty-four SUNY campuses.
- 6 SUNY Works Grant Proposal, Lumina, 5.
- 7 Swati Desai and Katie Zuber, "SUNY Works: A Baseline Report," Delivered to SUNY System Administration, 2014
- 8 We had conversations with Nancy Hoffman and Amy Lloyd, Jobs for the Future; Dennis Jones and Patrick Kelly, National Center for Higher Education Management Systems; Steven Robbins, Samuel Rikoon, and Jennifer Lentini, Educational Testing Service; Sandra Gregerman, University of Michigan; Richard Freeland, commissioner of higher education, Massachusetts, and former president, Northeastern University; Peter Smith, Kaplan Higher Education and former president, California State University at Monterey Bay; and Earl Hale, former executive director, Washington State Board for Community and Technical Colleges.
- 9 "SUNY Applied Learning Workshop" in Syracuse, NY, September 18-19; Rutgers/Federal Reserve Banks of Atlanta and Kansas City, "Transforming Workforce Development Policies for the 21st Century," New Brunswick, NJ, October 15-17; Center for Analysis of Postsecondary Education and Employment (CAPSEE), *The Value of Education – And How to Further Strengthen It*, Washington, DC, September 18-19.
- 10 Dennis Jones, president, National Center for Higher Education Management Systems, provided advice and assistance in the development of the framework.
- 11 SUNY Works Grant Proposal, Lumina, 5.
- 12 Nancy Zimpher, "Bringing Co-Op to Scale: How SUNY Is Preparing Students for Success & Meeting New York's Workforce Needs," *The Best of Co-Op: A Guide to the Leading Colleges & Employers* (Albany, NY: State University of New York, 2013-14), 22. For a more comprehensive list of organizations and employers participating in SUNY Works, see: <http://www.suny.edu/suny-works/suny-works-employers/>.

- 13 Of note, Otterbein University in Westerville, OH, reserves the term “internship” for for-credit experiences in which students work closely with a faculty internship sponsor and an on-site work supervisor to plan the experience and “professional experience” for noncredit experiences in which the University plays no role in the supervision or evaluation of the internship.
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- 17 Commonwealth of Australia, “Transforming Australia’s higher education system,” *Bradley Review*, Canberra, Australia, 2009.
- 18 The Bradley Review is the main reference, although complementary inquiries and working groups have been convened to look further into funding and other matters. The Bradley Review final report (Commonwealth of Australia, 2009), as well as a more recent overarching examination of tertiary education in Australia carried out by the Center for Studies in Higher Education, University of Melbourne may be consulted for further details. See Simon Marginson, ed., *Tertiary Education in Australia* (Melbourne, Australia: Center for the Study of Higher Education, University of Melbourne, 2013).
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- 23 The description relies on information and details provided in Kathrin Hoeckel and Robert Schwartz, “A Learning for Jobs Review of Germany.” *OECD Reviews of Vocational Education and Training* (Paris, France: OECD Publishing, 2010).
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- 25 Swiss Bachelor of Arts UAS in Conservation, http://www.swiss-crc.ch/resources/bachelor_en.pdf.
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are still with us (known today as Amtrak, NSTAR, the Massachusetts Bay Transportation Authority, and the Boston and Maine Corporation." See "Northeastern University Co-op Reflections," <http://www.northeastern.edu/coop100/employer/index.html>.

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- 48 Interview with Bill Ziegler, statewide co-op curriculum coordinator, March 11, 2014.
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states with indicators on time to degree. The percentages refer to policies in the mid-2000s. Australia's higher education reform (discussed above) included a recommendation for annual reporting on student engagement in work-integrated learning, along the lines of NSSE in the U.S.

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