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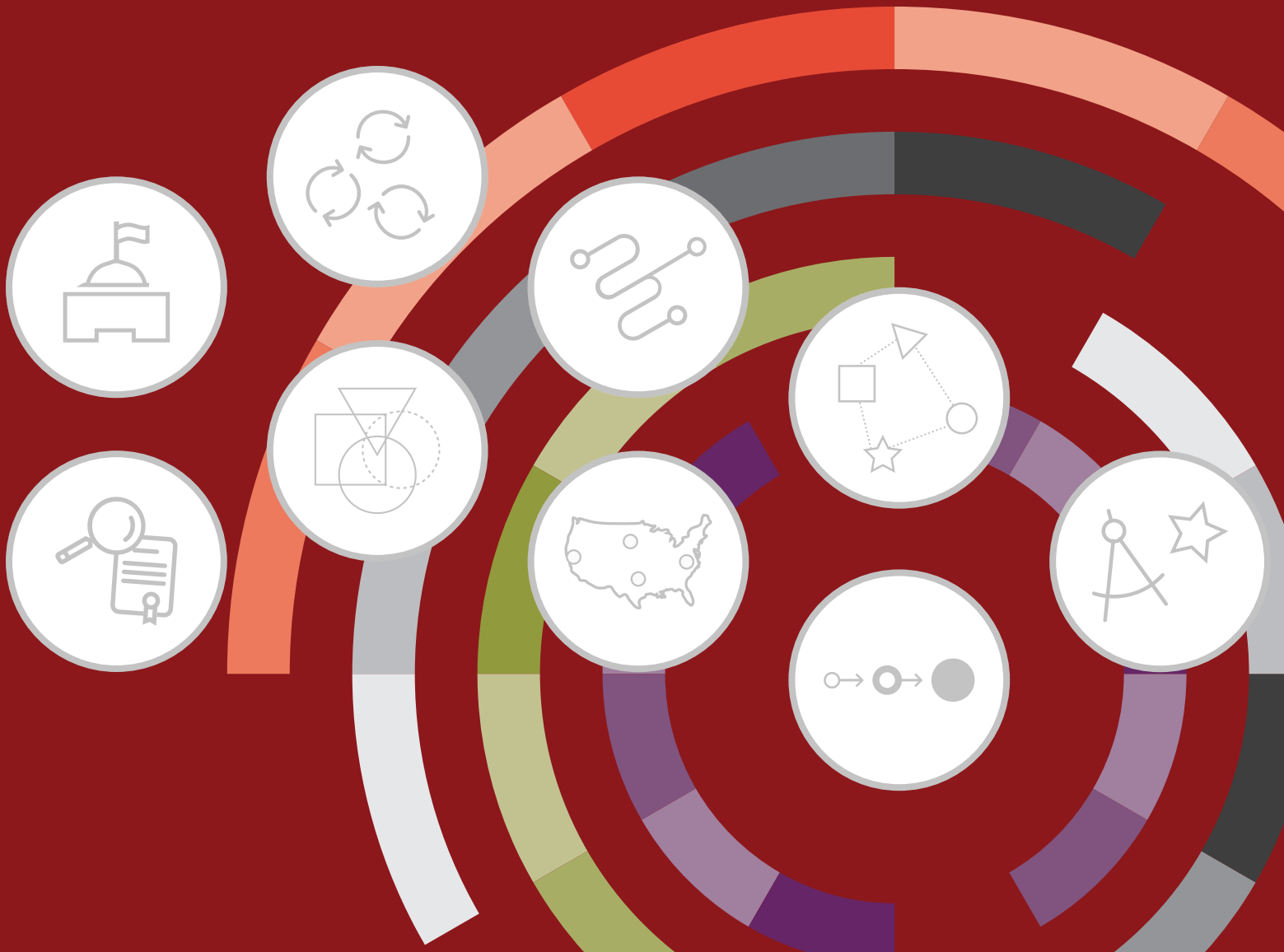
An Applied Science to Support Working Learners

A report to the National Science Foundation re Award # 2128165

by Mitchell L. Stevens, Geleana Drew Alston, Marie Cini, Sean Gallagher, Ilana Horwitz, Cathrael Kazin, Pamela Clouser McCann, Zach Pardos, Elizabeth A. Roumell, Hadass Sheffer, Holly Zanville & Richard Settersten



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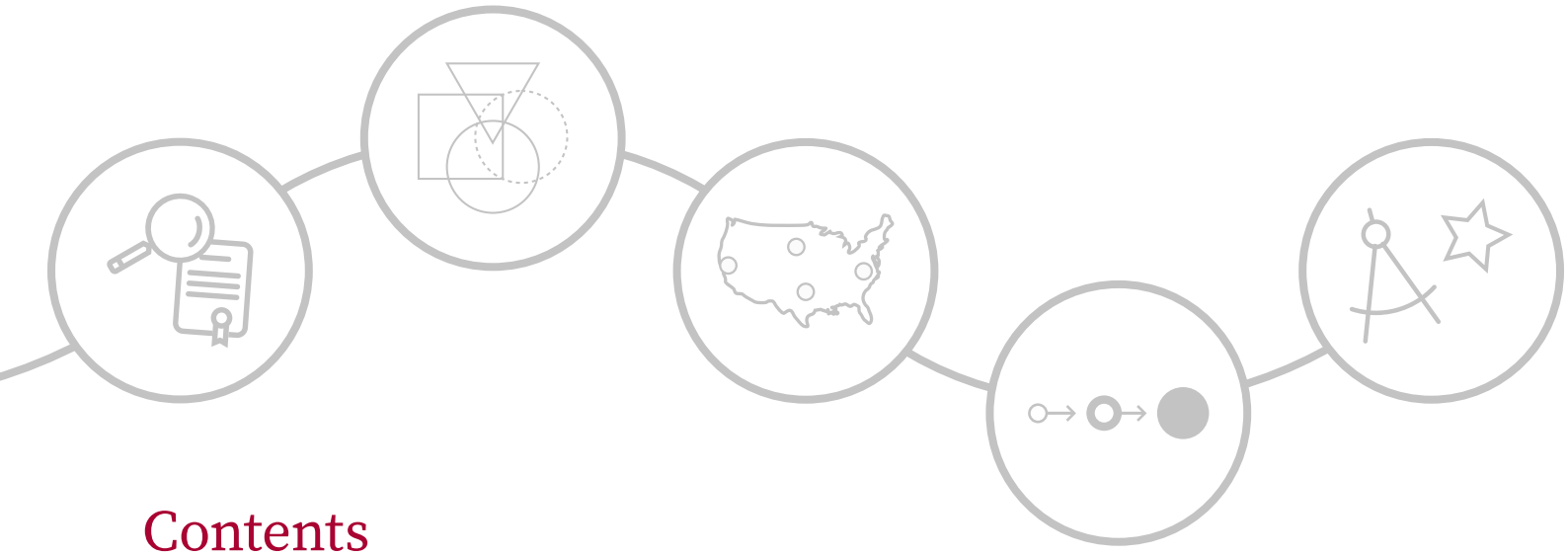
Stanford collaborators include the Center on Longevity, Office of Community Engagement, Pathways Lab, Transforming Learning Accelerator and Vice Provost for Digital Education.



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Summary

Supported with funds from the National Science Foundation, Stanford University hosted a virtual convening in July 2021 to frame an applied science to support working learners. The goal of this science is to measurably improve educational opportunities and mechanisms of occupational mobility for adult Americans. We forward nine recommendations.

Motivation

Our nation is in urgent need of more effective and varied educational pathways to meaningful lifelong employment. In the twentieth century, the United States led the world in developing a democratic citizenry and skilled labor force through mass access to higher education (Goldin & Katz 2010; Stevens & Gebre-Medhin 2016). Yet today, only about a third of American adults have a four–year college degree and enjoy the social status and job opportunities it confers. (U.S. Census Bureau 2019). While expanding the numbers of four-year college graduates remains one important policy goal, it cannot be the only path to educational and economic opportunity.

We need more ways to reward the ambitions of Americans who do not have four-year college degrees who seek opportunity for themselves and those who depend on them. Serving these working learners is the target of our endeavor.

In recent years, educational innovators and entrepreneurs throughout the public, private, and philanthropic sectors have created a spectacular array of new tools and platforms for learning and occupational advancement. Yet the basic science that might inform this activity remains nascent. This lack of knowledge creates significant risks for educational providers, government agencies, and learners alike. Providers need information to guide investments in new learning tools and programs; government agencies need solid evidence to make funding and regulatory decisions; and learners face serious risks as they enter a burgeoning marketplace filled with promises, yet thin on information and light on consumer (i.e., learner) protections. We seek to coalesce and inform a concerted national effort to direct scientific talent to taming these risks.

The need for lifelong learning has become more critical during the current century for four key reasons:

1. The growth of service-oriented and knowledge-based jobs requires workers to possess high-level literacy, numeracy, critical-thinking, and interactive skills associated with postsecondary education (Brint 2018; Carnevale et al. 2018).
2. The definition of “workforce-relevant skills” has changed with the evolution of digital platforms for managing flows of money, people, goods, and information (Merisotis 2020).

3. Constant dynamism in nearly every field of human activity has come to require workers to develop the flexibility and growth mindsets that enable transitions between jobs, careers, and business sectors (Brynjolfsson & McAffee 2014).

4. The increase in human life spans means that people will work more years over the course of longer lives, and are more likely to transition among different jobs and careers, requiring them to acquire new knowledge and skills throughout their century-long lives (Horwitz & Stevens 2021).

Yet remarkably, adult learning is presently a very small research field in the United States. Virtually all learning-science research is focused on children and adolescents. For nearly three decades, the National Science Foundation (NSF) has funded research on STEM education for K-12 and college students; this investment has created a rich and growing body of applied science on children's learning in general and STEM instruction in particular (NSF 2013).

Despite the large population of adult learners, there has been no comparable investment in understanding their needs. Adult learners face challenges of unlearning and relearning that younger learners do not (Darby & Sloutsky 2015). Additionally the many life commitments of adults — work, childcare, and eldercare, for example — increase and complicate the opportunity costs of pursuing educational credentials (Settersten & Schneider 2018). Insights from sciences focused on children and young people likely fits adults only partially, if at all.

The steady rise of online platforms has generated optimism about building a science of adult learning (Koedinger, Booth & Klohr 2013; Reich 2020; Waldrop 2013; Western Governors University 2020). There has been a great deal of entrepreneurial activity in online learning environments and ongoing promise for digitally-mediated instruction to bend the cost curve in postsecondary education (Bettinger & Loeb 2017; Bowen 2013). Yet online learning has a considerable way to go in leveraging big data and scale to improve quality (Kizilcec et al. 2020; McPherson & Bacow 2015). Especially for those without the benefit of strong K-12 preparation, exclusively online instructional experiences yield low measured learning and persistence relative to in-person instruction (Xu & Jaggars 2014). Yet it also is the case that carefully designed online programs can yield comparable learning outcomes to face-to-face instruction (Bowen et al. 2014; Tallent-Runnels, Thomas & Lan 2006). Hybrid models, which combine the convenience of the web with meaningful instruction and peer interaction, show particular promise (see Baum & McPherson 2019 and Protopsaltis & Baum 2019 for reviews).

The nation's postsecondary future will be populated by a wider variety of providers and certifications and thus require new forms of assessment, funding, and governance (Baum, Holzer & Luetmer 2020; Laryea et al. 2021; Stevens & Kirst 2015). Researchers and federal science agencies seeking to understand, govern, and improve educational opportunities for working learners will need to recognize and work within this complicated and dynamic ecology of provision.

Planning, Participation, and Format

Our work was organized as a project of national agenda-setting and distributed peer review. A diverse organizing group of thirteen people (see page 23) met throughout the Winter and Spring of 2021 to develop a framework for cross-sector dialogue. Organizers took advantage of digital media to enable a highly inclusive assembly of researchers and adult-education practitioners from academia, philanthropy, government-funded service organizations, and education businesses. The organizing group ultimately distributed over 400 invitations to participate in the July 2021 virtual convening. The response was robust, with over **180 contributors**. To ensure that the assembly enjoyed the wisdom of working learners themselves, eight individuals were recruited to serve as consultants and every effort was made to ensure that they were represented in all convening discussions.

Our discussion was organized around **six broad questions** to stimulate discussion, each of which received its own "workstream", participants, and conveners:

1. Who are working learners, and how can we best recognize and honor their diversity?
2. How can we improve job search and employer evaluation, hiring, and promotion practices to better serve working learners?
3. How should we grow the sciences of adult learning and academic progress?
4. How can we best support the academic engagement and persistence of working learners?
5. How can we foster stronger connections between working learners, colleges, universities, and workplaces?
6. How should we observe, measure, and compare the learning, occupational, and other gains from opportunities for working learners?

To inform the workstreams, the organizers also commissioned **six white papers**. Participants were pre-assigned to workstreams based on their stated interests and expertise. Conveners were given considerable autonomy over workstream content and activities, with the only expectation that they submit a brief written document at the end of the convening to inform the production of this report.

The convening was assembled during two-hour sessions on each of four consecutive Wednesday mornings in July 2021 (7, 14, 21, 28). To ensure that the assembly enjoyed the wisdom of working learners themselves, organizers partnered Temple University's **Hope Center** to recruit eight people to serve as consultants during the convening. In the second portion of each session, participants broke into workstreams for in-depth discussions. The sequential character of the convening enabled insight to accumulate across sessions. Concluding share-outs were especially helpful in informing this report.

This document was first drafted in September and October of 2021, with written input and critical readings from named authors and several other convening participants. The subsequent draft was distributed to all registered participants for feedback in November 2021. Thus while our recommendations do not represent a consensus among our uncommonly diverse assembly, they have received uncommonly broad peer review.

Recommendations

1 The applied science of working learners should be defined and built as a civic project.

A well educated citizenry is essential for a functioning democracy: this idea was central to the expansion of higher education in the decades following World War II. Between 1944 and 1980, Americans came to quickly lead the world in access to substantial educational opportunities beyond high school (Loss 2012; Schofer & Meyer 2005). That national investment paid off handsomely in sustained prosperity and a vital civic life that saw significant progress in the rights, well-being, and happiness of historically disadvantaged groups (Rose 2018; Hout 2012).

Today the diffusion of economic prosperity has waned and the health of our democracy is in question. We suspect it is no accident that the growing economic inequality and political discord at the current moment in our national history has occurred as postsecondary education has become increasingly unaffordable and inaccessible for the majority of the population (Goldrick-Rab 2016; Hamilton & Nielsen 2021). The educational needs of adults over the age of 25 have been especially under-resourced, with the vast majority of public-sector programs designed to assist in college access and completion targeted to young people (AIR 2021; Blumenstyk 2018).

Building an applied science can optimize critical investments of public and private capital in lifelong learning and improve learning opportunities for those who have been overlooked by education policy and planning in recent decades. Investment in a multi-disciplinary applied science of working learners should be framed as one component of a distributed effort to both redesign and build new pathways to and through postsecondary education for all Americans.

2 The learning sciences and the sciences of educational attainment and returns are different but complementary. They should be better connected and reciprocally informed.

The learning sciences and the sciences of educational attainment and returns address different substantive problems, deploy different methods, require different data, and draw on different expertise. *The learning sciences* investigate the cognitive, physiological, and social processes of learning by human individuals and groups. *The sciences of educational attainment and returns* investigate how individuals and demographic groups move through formal educational systems — usually but not always schools — and how job earnings and other life benefits accrue to people on the basis of educational attainments.

People can accrue educational credentials and enjoy returns from those credentials without learning very much; people also can learn a lot without attaining a credential or enjoying its benefits. Failure to acknowledge this distinction hampers cumulative science when researchers instrument their studies on different substantive outcomes, use different conceptual frameworks, cite different scientific literatures, and often talk past one another.

Advancing an applied science to serve working learners will require investing in both strands of inquiry simultaneously and conjointly. Doing so does not necessarily require active collaboration of scientists who study learning and those who study academic progress in every program of research. Rather, it means that researchers and their patrons should recognize the importance of both domains, note their methodological differences, and actively seek points of synergy. Researchers also should conscientiously develop a shared conceptual vocabulary that will enable them to better motivate and carry out complementary research programs.

Developing that vocabulary will likely require fresh definitions of inherited terms. During the twentieth century and into the present, researchers of higher education have developed a conceptual toolkit for understanding how adolescents navigate undergraduate academic programs. If these researchers wish to contribute to the applied science of working learners, they likely will need to revisit their core concepts of *academic integration, engagement, and persistence*. To the extent that these concepts are currently keyed to the study of teenagers enrolled in full-time coursework conveyed in physical classrooms (or most recently in hybrid classrooms), they may not fit adult learners very well. For example, if academic engagement is defined as the

amount of time students spend on a physical campus and the number of organizational relationships they maintain, those with full-time commitments outside of school will systematically appear as lacking. Similarly, if academic persistence is defined as the absence of college exits, those who move in and out of educational programs may be erroneously identified as "dropouts" or "stopouts."

The applied science we call for here will be well served by the development of new vocabularies to describe learner progress. For example, perseverance — defined as maintaining commitment to a goal despite difficulty or delay — might replace engagement and persistence to more accurately describe exhibited behavior (Sheffer, Palmer & Mattei 2019). *Ability to learn* may be another such term (Dahlin, Chuang & Roulet 2017).

3 The heuristic of pathways can enable accumulation and integration of knowledge about working learners.

A potential bridge between the sciences of learning and the sciences of educational attainment and returns is the concept of *pathways*. Pathways refer to the sequences of learning and/or educational attainments people accrue over time and to the social/organizational channels and conditions that enable or constrain learning or attainment (Armstrong & Hamilton 2013; Bailey, Jaggars & Jenkins 2015; Boylan 2020; Stevens et al. 2018; Symonds, Schwartz & Ferguson 2011).

Consider Figure 1. Researchers can analyze pathways as properties of both the actor (in red) navigating a complex system to forge a path and the characteristics of the social/organizational systems through which paths are forged (the maze). These two aspects of pathways intersect to produce *progress*: sequences of opportunities, experiences, learnings, credentials, and earnings/jobs that accumulate throughout the life course.

Figure 1: Pathways as Features of Both Human Actors and Social/Organizational Systems

This conceptualization is useful for both learning sciences and the sciences of educational attainment and returns because it recognizes the iterative aspect of the phenomenon of study — whether that phenomenon is measured as learning, course or program completion, credentialing, employment, or some combination of these. It also provides a means of recognizing the diverse and changing social/organizational channels and conditions people confront as their progress unfolds.

Pathways and progress are amenable to observation and

experimental intervention at multiple scales. At the micro level, when instructional programs are delivered through digital media, it is possible to observe the learning sequences of individual persons and entire cohorts and to target learning interventions at observed points of struggle (e.g.,Bowen 2013; Kizilcec, Piech & Schneider 2013).

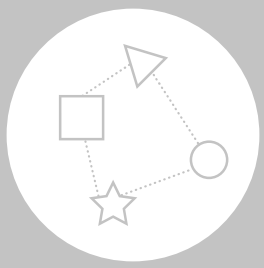
At the meso level, colleges and universities routinely maintain detailed records of the sequences of courses students take as they progress toward degrees; these data can be rich sources for tracing academic paths (Angus et al. 2019; Pardos & Nam 2020). Curriculums may also be examined to determine the relative complexity of sequences leading to degrees (Baker 2018), and curricular choice may be instrumented for observation and recommendation when it takes place on digital platforms (Chaturapruek et al. 2021; Pardos, Fan, & Jiang 2019).

At the macro level, well-designed longitudinal data-collection programs make it possible to observe how cohorts of people accumulate sequences of educational and work experiences over time (see Recommendations 4 & 7).

Qualitative studies also are essential because pathways have important emotional and subjective aspects. People experience pathways as embodied persons. Their age, gender, race/ethnicity, socioeconomic status, and prior and current experiences affect their conceptions of what paths are appropriate, possible, or available to them — and thus are likely to influence every stage or juncture along the way (Bonilla, Dee & Penner 2021; Cech 2021; Correll 2004; DeLuca et al. 2021; Holland & DeLuca 2016; Markus & Nurius 1986). Similarly, pathways provided by organizations and institutions are imbued with cultural meanings. For example, pathways leading to jobs historically associated with women and femininity (e.g., teaching, nursing) or men and masculinity (e.g., construction, law enforcement, engineering) will likely be apprised differently by people depending upon their physical embodiment and gender identity (Armstrong & Hamilton 2013; England 2010). All of this has consequences for education policy and resource allocation (e.g., Schanzenbach & Turner 2022).

Given their affective and cultural complexity, the study of pathways will require and reward a multi-method and interdisciplinary social-science approach, one informed by pressing questions about the future of work and learning and the shifting cultural meanings of work and learning in a post-pandemic world.

4 Data infrastructure to support this science should be built collaboratively among government agencies, education providers, employers, and philanthropies.



The data infrastructure the nation inherits from the twentieth century was built in accordance with a theory of human-capital development, which presumed that formal education concluded with the close of childhood, before adult commitment to a full-time career in a single occupational domain. It was built also on the notions that (a) schools are the near-exclusive organizations providing formal education; (b) government agencies are the primary producers and arbiters of data about educational progress and returns on educational investments. Current federal programs for funding postsecondary education, which encourage people to invest their own money in conventional Associates (AA), Bachelors (BA), and postgraduate credentials in early adulthood, further embody these notions — even while none of them are any longer tenable.

Federally funded longitudinal data-collection programs such as the **Education Longitudinal Study** (ELS) and **National Education Longitudinal Study** (NELS) deeply inform understanding of the educational attainments and labor-market returns for cohorts of students who have moved through K-20 schools. These and other legacy data sources continue to yield important insight about the character of adult education and career trajectories (e.g., Boylan 2020; Skrentny & Lewis 2021; Grodsky et al. 2021). Yet there is clear scientific and policy consensus that the nation needs better mechanisms collecting and integrating information describing learning, formal education, and occupational progress across the entire lifespan (AWPAB **2019**, **2020**).

Additionally, inherited data systems tend to be organized around measures of institutional success — retention and graduation rates in colleges and universities, for example — rather than measures of success or progress defined by learners themselves. The current movement for schools and employers to assess *skills* rather than confer or reward *credentials* lends additional complexity and ambiguity about measurement of learning, progress, and value. Infrastructure forward should be built to serve multiple stakeholders: policymakers in government and allied organizations; researchers in academia and industry; and learners themselves, who are seeking to make wise investments in their own futures.

Commercial education and training providers such as 2U, Canvas, Coursera, General Assembly, Straighterline, and others serve millions of learners and routinely collect fine-grained information on how people navigate specific lessons and entire programs of study. Firms such as GlassDoor, LinkedIn/Microsoft, and EMSI-Burning Glass have aggregated stores of resume data to enable scaled observation of careers. Many

employers collect data on employee professional development and careers but generally keep it as a proprietary asset. While there is no question that the information and expertise assembled by such firms would be a gold mine for an applied science of working learners, it will require incentives and public policies to enable collaborative inquiry between scientists and these organizations, as well as across levels of government. The development of these incentives and policies must be a top priority.

Philanthropy has also played a key role in influencing both the development of data on learning and educational progress, as well as on the development of innovative, on-the-ground programs in K12 and postsecondary education. While adult education has long been without substantial philanthropic support, the arena of workforce development has emerged in recent years. In light of their great stores of expertise and their historically central role in shaping the US education sector (Arum & Kepins 2020), philanthropic organizations will be essential contributors to the applied science of working learners.

A wide variety of efforts already well underway nationwide are leveraging and connecting data systems to generate useful knowledge. Examples include efforts by **Lumina Foundation**, **Bill & Melinda Gates Foundation**, and **Strada Education Network** to compare the value of various postsecondary credentials; serial efforts of the **Coleridge Initiative** to provide consulting and hands-on training to public servants seeking to better understand the evolution of regional employment dynamics; **a partnership** between the National Student Clearinghouse, the U.S. Census Bureau, and the National Manufacturing Institute to measure the employment and earnings benefits of industry certifications alone and in combination with degrees and certificates; behavioral-science based interventions to encourage postsecondary progress from **ideas42**; and a distributed collaboration organized by the **Education Design Lab** to observe academic progress of micro-credentials conveyed by community colleges and universities. The University of Michigan's **IRIS**, an ambitious program to longitudinally observe returns on public investments in scientific careers, provides another model. Such projects are important steps toward the fruition of next-generation observational systems that will necessarily be joint ventures between government agencies, philanthropy, conventional schools and new providers, and employers as depicted in Figure 2.

Figure 2: Building Infrastructure for the Applied Science of Working Learners

5 The science must include systematic attention to employers and should be built collaboratively with employers.

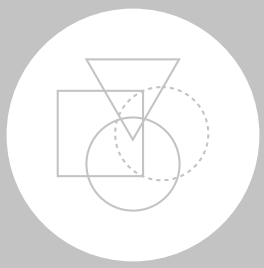
Business and philanthropic capital has seeded many new forms of education and training for working learners. Yet there is very little systematic research on how employers make sense of these new offerings and those who utilize them — even while the value of new learning opportunities and credentials is almost entirely dependent upon employer behavior.

Fortunately, social scientists in a wide range of social-science fields have created a rich literature on how individual decision-makers, personnel offices, and whole industries apprise qualifications for employment (e.g., Gallagher 2016; Gershon 2017; Pedulla 2020; Rivera 2020). Social scientists know a great deal about how what might be called "legacy credentials" (e.g., BA, MA and MBA, and PhD and professional degrees from accredited universities) are understood by employers: how having these degrees and their variable prestige mediate discrimination on the basis of gender, race, class, and cultural similarity; and the extent to which they effectively represent the underlying knowledge or skills of the people who have them, which is often ambiguous. An applied science of working learners should conscientiously inherit and extend this tradition, paying specific attention to how credentials mediate other forms of privilege and the chronic slippage between having credentials and having specific knowledge and skills. Given current enthusiasm for finding new ways to inculcate, measure, and certify skills, this critical lens is especially important.

Studies of employers and employer practices might include large-scale observations of the changes in credential requirements for particular jobs and industries over time; experimental and audit studies designed to gauge employers' assessments of different kinds of credentials and combinations of credentials and applicant demographic characteristics (e.g., applicants' age, race, and gender); and close-range interview and ethnographic studies of hiring and promotion practices of employers seeking to inclusively expand opportunities for different kinds of credentialed workers. In order to best include employers' priorities, needs, and behaviors into this research program, employers must be actively engaged and see value in contributing data and research access. The business case for collaboration might be that demonstrably better hiring, evaluation, job placement and assignments, and promotion practices make for workforce diversity, better retention, and stronger profit margins.

The ideal outcome would be a cycle of continuous feedback among employers, education providers, policymakers, and applied researchers studying the kinds of learning and pathways interventions that are most effective, for which populations, in particular task areas and industry sectors.

6 Leverage a plurality of providers.



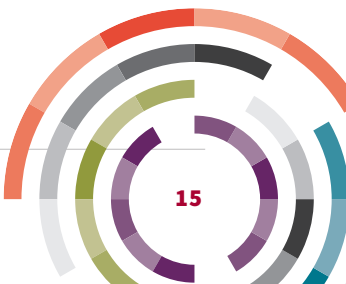
The postsecondary ecology is benefitting from an extraordinary influx of new educational providers offering learning opportunities on a wide array of platforms. In the last fifteen years, these opportunities have been heightened by the unique circumstances of historical conditions including the COVID-19 pandemic and its many social, psychological, health, and economic repercussions. Yet, the vast majority of working learners continue to be served by colleges and universities organized primarily to serve students in face-to-face interactions and aid their progress toward traditionally-accredited associate, bachelor, and graduate degrees. These schools are essential civic assets in virtually every community in the United States. They often are anchor institutions for their communities, serving as town squares for community discussion and catalysts for coordinated economic and political action (Birch, Perry & Taylor 2013; Owen-Smith 2018). The applied science of working learners can be well served by building on this civic infrastructure and the often considerable public goodwill these schools enjoy.

The nation's thousands of community and technical colleges arguably are the backbone of inherited infrastructure for supporting working learners. This is because they are specifically designed to enable educational advancement and occupational mobility for people at the pre-baccalaureate level. In contrast, comprehensive universities, which combine undergraduate instruction with graduate and professional training as well as research, may serve proportionally fewer working learners as they have been defined here. Yet these schools bring significant capacity to house the multidisciplinary, longitudinal research programs called for in Recommendation 7. They also have a century-long tradition of educational outreach through their extension programs, which remain vital units on many university campuses.

Minority-serving institutions (MSIs) also should be cornerstones for an applied science of working learners. These schools know and specifically serve those who are often disadvantaged in labor markets. MSI faculty, administrators, and allied researchers are ideally positioned to assemble both instructional and research capacity for those Americans most in need of expanded learning and work opportunities

In order to rectify a historical pattern of disproportionate investment in a small number of well-resourced and historically white research universities (O'Mara 2015), NSF and other research patrons should encourage or require multi-institutional scientific collaborations among legacy schools representing a plurality of institutional types. At the same time, well-resourced research-intensive schools should not be excluded because they bring significant capacity to any applied science. These schools should be component parts of distributed applied-research programs, a recommendation we believe is harmonious with NSF's **Broadening Participation** portfolio.

Regardless of organizational type, many schools will need to reconfigure their instructional operations to accommodate working learners, rather than the full-time enrollments of the young people who often have been their most privileged clientele. A pressing domain for applied research is to conduct rigorous experiments of program format and instructional delivery to understand how to better serve working learners.



7 Build the science regionally and across sectors, observe longitudinally, and use multiple methods.

Zip codes matter. Those most in need of novel educational and mobility opportunities are the least likely to have the resources and network ties to move from their current homes to jobs and schools elsewhere. Although some jobs are losing their ties to particular locations due to technology and the possibility of remote work, many others — in childcare, healthcare, education, the hospitality sector, and manufacturing — are place-bound. An applied science of labor markets, educational services, and opportunity creation for working learners must be sensitive to regional context.

Many organizations touch working learners as they move through their lives, including employers, schools, workforce-development agencies, and other human-services providers. These organizations are variably configured in relation to one another geographically. Therefore, we advocate for the development of cross-sector partnerships and collaborations for observing the educational and career trajectories of working learners as they move across organizations in particular communities over time.

The benefits of even modest educational and employment interventions may take years to be fully realized and may unfold in unanticipated ways. This is why it is essential to observe longitudinally. For example, exit from a community college before degree completion may be understood as a failure in the short term; but that experience may be sufficient for the employment or personal needs of learners in a given moment. It may also lay a foundation of desire to obtain additional postsecondary education that will benefit learners later (e.g., Nielsen 2015). Non-completion may not be failure if the experience solves immediate life problems, or supports and furthers learners' life plans.

Quantitative studies utilizing data from large samples of subjects are essential for demonstrating general relationships and statistical causation. Qualitative studies, especially those from systematically derived samples, likewise are crucial for understanding mechanisms through which educational and employment interventions succeed or fail. For example, the same interventions may be variably effective depending on the specific organizational contexts in which they occur (Small 2009). Likewise, the mechanism causing the success or failure of an intervention "in the wild" may be quite different from the mechanism of causation presumed by those who designed and implemented it (Chambliss & Takacs 2014; Scott 2020). An adequate applied science requires both quantitative and qualitative observational strategies and active dialogue and harmonization across different observational programs.

8 Incorporate a life-course perspective.

Working learners present a challenge to the ways of organizing and acquiring postsecondary education we inherited from the twentieth century, in which formal schooling was presumed to be full-time and continuous during the first quarter of life — and then be replaced by full-time work (Settersten & Schneider 2018). Working learners seek educational advancement and paid work simultaneously throughout adulthood. An applied science of working learners must be built with attention to how to create learning opportunities that attract and benefit people well beyond the first quarter of life. This requires analytic observation both backward and forward in the life course and is well served by the pathways heuristic.

Creating meaningful opportunities for working learners requires being sensitive to learners' pasts. For example, early school experiences can powerfully shape beliefs and feelings about educational opportunities well into adulthood, variably encouraging or discouraging beliefs about ability and self-efficacy (Carr & Kefalas 2010; Silva 2013). An applied science of working learners should seek to understand adults' variable orientations toward education (e.g., their variable trust in the higher education enterprise [Parker 2019]) and develop practical tools for supporting their investment in educational and occupational transitions.

Understanding the effects of learning and educational attainments on later life outcomes also requires observing the pathways of particular people and demographic groups into occupations, workplaces, neighborhoods, networks, and relationships. Observation should include the variable accumulation of resources and experiences that affect health and wellbeing. Findings can inform the design of educational opportunities and job ladders in ways that equitably and transparently reward motivation, perseverance, and demonstrated capacity.

9 Adults without four-year postsecondary credentials should be a key focal population for the applied science of working learners.

Our assembly focused on *working learners*, a group we defined broadly as all people simultaneously pursuing paid employment and educational advancement. This definition includes a wide variety of socioeconomic statuses and life situations; e.g., high school students with part-time jobs, parents who work full-time while accumulating coursework at a local community college or online university to complete AA or BA degrees or other credentials, and mid-career corporate managers pursuing executive MBAs.

While the study of adult education appropriately includes these diverse populations, most convening participants concurred that the demographic target of this applied science should be *employed adults who do not possess a four-year postsecondary credential*. These **approximately 70 million Americans** are particularly disadvantaged in today's labor markets, in which explicit discrimination on the basis of possession of a BA degree is both legal and widely regarded as legitimate. Many of these working learners likely have the general know-how, specific skills, and work experience to successfully serve in well-compensated jobs that they cannot easily obtain without four-year college degrees. Targeting the educational and mobility needs of this population should be a strategic priority of an applied science of working learners.

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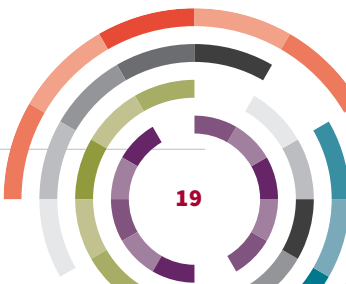

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