

A woman with curly hair is looking at a laptop in a library. The background is a blurred bookshelf. The image is overlaid with a green and blue gradient bar at the top and a white bar at the bottom.

Equitable Return on Investment

Building an ROI Framework for
Education and Workforce Programs



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About Us

BrightHive, Reinvestment Fund, and Third Sector Capital Partners, Inc (“Third Sector”) have partnered to launch a national outcomes based financing Data Advisory Council (DAC) that includes a diverse set of stakeholders with a vested interest in learning how data can support measuring and evaluating the social impact of outcomes-based financing efforts. This report is a publication of the Data Advisory Council created by Third Sector and BrightHive.



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BrightHive helps organizations, networks and communities securely and responsibly link their data to enhance their impact, empower individual and collective decision making, and increase equity of opportunity through collaborative data trusts. BrightHive develops data trusts convening stakeholders and identifying the use case the data trust will address. The Data Trust Data Trust enables partners to discover the information latent in their data and improve systems design to increase the impact of their business operations. BrightHive serves as a Lead Technical Advisor for the DAC, conducting any necessary research and analysis.



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Reinvestment Fund transforms health and well-being throughout the country through long-term commitments to the cities and towns they work with. Reinvestment Fund's work has improved access to critical services and amenities that help families start strong and stay healthy for more than 2 million people nationwide. As a federally certified CDFI, they manage \$1.2 billion pooled from 880 investors.



**THIRD
SECTOR**

Third Sector uses public funding and data as levers to impact how governments, service providers, and their partners work with and improve the lives of the people they serve. This process of adopting an outcomes orientation at every level of the public sector – from an individual program to an entire jurisdiction – leads to quantifiable improvements in people's lives by creating new incentives to inspire sustainable operational changes within systems and services. Third Sector has launched 18 outcomes-oriented contracts that transitioned over \$800 million in public funding towards outcomes. Third Sector serves as a Co-Lead of the DAC and advises the development and publishing of key insights

1. EXECUTIVE SUMMARY

This report presents recommendations for an initial Return on Investment (ROI) Metrics framework that broadens impact measurement in education and workforce programs. As income inequality increases unprecedentedly and automation threatens jobs, it is imperative to better align public and private resources toward the most effective programs. Post-secondary students and workforce training participants should be equipped with appropriate impact data to make informed decisions about their futures. To improve economic opportunity nationwide, the Data Advisory Council (DAC) strives to develop a post-secondary and workforce impact standard that will lead to better outcomes for students and workforce training participants.

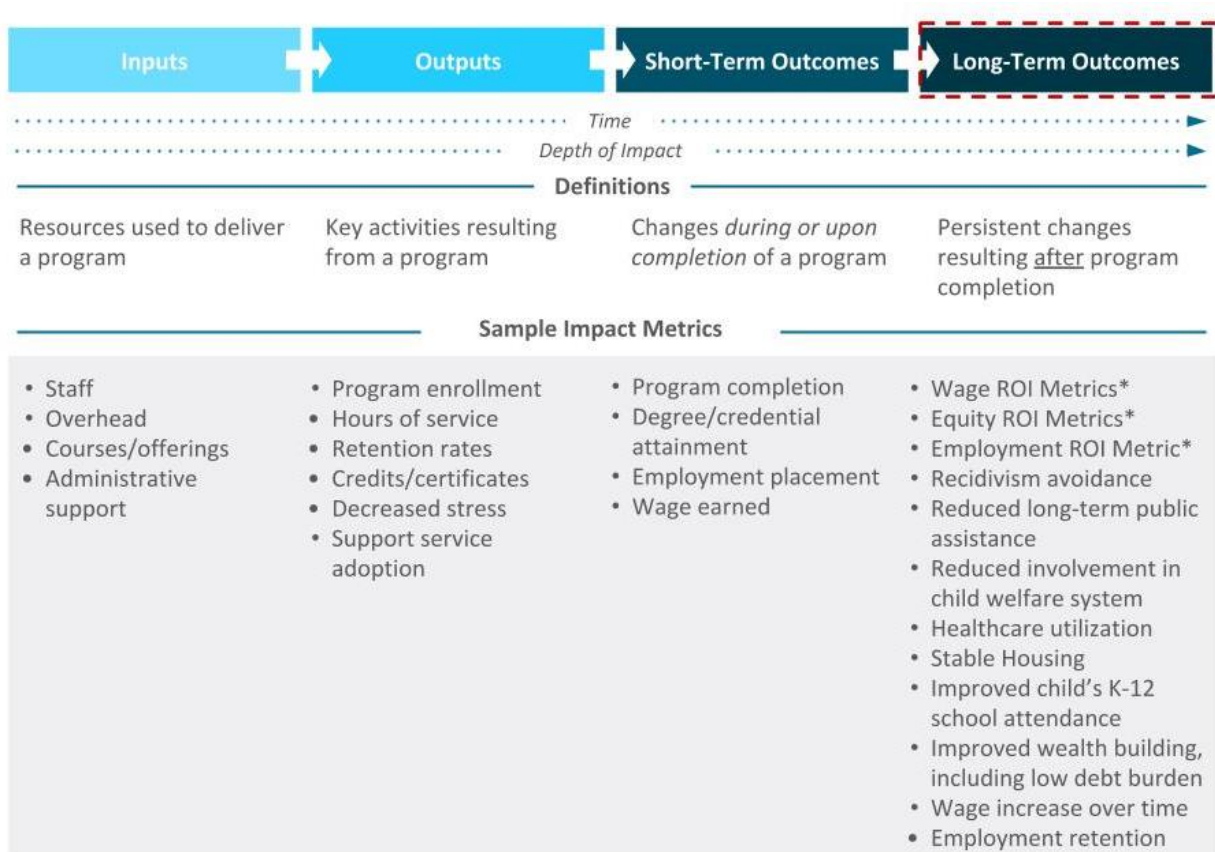
The basis for this report is to summarize the use case for ROI Metrics for the DAC and key stakeholders in the workforce and post-secondary education fields. The DAC is comprised of a diverse set of stakeholders who collectively steward the development and evolution of next-generation metrics for evaluating the impact of post-secondary and workforce programs. Key community stakeholders include education and workforce training program participants (“Learners”), training service providers (“Trainers”), state and local government agencies (“Governments”), and philanthropic and investment organizations (“Funders”). The process of measuring the ROI Metrics will support all stakeholders in improving coordination of public and private resources to expand economic opportunity nationwide.

The central goal of measuring ROI Metrics¹ is to provide the workforce and education community with a data-driven framework to make better informed decisions concerning the effectiveness of career pathways, workforce programs, and funding allocation. The ROI Metrics, defined in detail in the Appendix, are primarily focused on employment placement, wage growth and equity. Though the ROI Metrics set a rigorous, long-term standard to describe the effectiveness of training programs for prospective job seekers, they should not be the sole indicators of a successful program. Measurement of intermediate performance indicators, defined as “Inputs”, “Outputs”, “Short-Term Outcomes”, and “Long-Term Outcomes” through an Outcomes Continuum are necessary to ensure programs progress toward long-term outcomes. More importantly, measuring program impact through the Outcomes Continuum ensures that programs address the various life barriers that prevent stable employability. The Outcomes Continuum framework below is described in Section 4 and detailed in use cases in Section 5.

ROI Metrics	
Employment:	Employment premium
Wage:	Earnings premium
	Earnings premium per median institution household income
	Earnings premium per net price dollar
Equity:	Theil Index ratio
	Benefit incidence analysis
	Demographic-level expected earnings premium

¹ For details on each of the ROI Metrics, their definition and data sources, see **Appendix A**

Summary of the Outcomes Continuum Framework



When a program's impact is measured with the Outcomes Continuum, stakeholders can also explore the potential to scale outcomes-based financing (OBF)², among other funding efforts, while ensuring that the diverse needs of Governments, Trainers, Funders, and Learners are met in a human-centered way. Creating multi-stakeholder partnerships is required to co-develop a clear definition of how a program's goals and impact will be measured (e.g., via the Outcomes Continuum) and compensated (e.g., OBF). For example, implementing OBF creates data-informed partnerships that encourage investments in successful programs and reward continuous improvement in service delivery. Tracking the Outcomes Continuum for a program can also ensure measurement and analysis of racial, socioeconomic, and other disparities are the backbone of service delivery and program evaluation. For Trainers and Learners, assessing a program through the Outcomes Continuum could support programmatic insights at the individual and community levels to adapt services to tackle remaining disparities in economic opportunity.

By applying the Outcomes Continuum to program assessment, the DAC in the future will be able to address the following questions: What are the key performance indicators that Trainers, Governments, and Funders need to monitor to ensure a program can measure one or more of the ROI Metrics? How

² Full definition found in Section 3: Data Alignment with Outcomes-Based Financing (OBF). Outcomes-based financing (OBF) encourages spending on interventions that produce results, improve service delivery, and enable governments or philanthropists to pay directly for impact by tying payments to real, measured outcomes. Examples include Pay for Success efforts, talent financing tools such as career impact bonds and income-sharing agreements, Opportunity Zones (OZ) investments, community investing, and other data-driven financing mechanisms.

does a Learner know a program is worthwhile prior to and during enrollment? How does the measurement and interpretation of “impact” differ for Learners, Trainers, Governments, and Funders?

Section 6 of this report will specifically focus on how Governments, Funders, Learners and Trainers can measure short-term gains that ensure program fidelity and learner success. The section considers how each stakeholder could adopt the ROI Metrics and identifies discussion topics for implementing the measurement of the Outcomes Continuum. Recommendations for the DAC are detailed in Section 7 and identify the main challenges and questions to consider in order to sustainably embed the Outcomes Continuum for impact assessment and measure the ROI Metrics, among other long-term outcomes. The main challenges addressed in Section 7 are aligning the ROI Metrics with outputs and short-term outcomes, embedding Human Centered Design³ to define additional outcomes, integrating administrative government data across social service areas, and convening stakeholders to address inequities reflected in the impact data. These challenges, however, do not hinder our optimism that the DAC and community stakeholders can continue to integrate the ROI Metrics into an Outcomes Continuum. More broadly, the outcomes-driven framework presented in this report can facilitate a behavioral shift among Learners, Trainers, Governments, and Funders regarding how each stakeholder relies on data insights for implementation and decision-making (e.g., funding, policy, and coordination).

³ Human-centred design is a philosophy that empowers an individual or team to design products, services, systems, and experiences that address the core needs of those who experience a problem.

2. RETURN ON INVESTMENT (ROI) METRICS OVERVIEW

This report introduces a data framework to improve the decision-making of various education and workforce development stakeholders by providing more holistic, evidence-based insights on the long-term impacts of training programs. Measuring the impact of programs will support individuals' capacity to determine what to study, what type of program to pursue, and what institution to attend. Costs and benefits can vary significantly for individuals across post-secondary programs and institutions. In an ideal state, a recruitment effort led by a workforce service provider or the decision a student and their family must make to participate in a workforce program would be informed by the *long-term benefits* that offset any short-term commitment costs.. Similarly, the decision to invest public or private resources in an employment training program would be guided by quantifiable future “outcomes” – the program impact *after* the Learner has completed the curriculum.

Existing data to inform the effectiveness of employment and education programs is limited in the time frame and depth of impact. The Data Advisory Council (DAC) recognizes that relying on near-term performance indicators like program enrollment and participation hours is insufficient to appropriately define “program impact” and/or justify funding investment. With a data framework that holistically measures program impact, the DAC also seeks to provide guidance to help public and private stakeholders improve their allocation of resources to enhance pathways to economic opportunities. Outcomes-based financing (OBF) can improve such resource distribution decisions by enabling governments and their philanthropic and investment partners to fund services provided specific outcomes are achieved.

BrightHive, in partnership with the DAC, developed Return on Investment (ROI) Metrics and methods with an equity lens to be used for evaluating program outcomes (collectively to be referred to as “ROI Metrics” in **Figure 1**)⁴. BrightHive, with support from the Small Business Innovation Research (SBIR) program and the U.S. Department of Education, convened researchers, practitioners, and policymakers (the “ROI Research Network”) throughout 2019 to develop initial recommendations for the DAC to improve transparency and accountability in the education and training pipeline. These recommendations were revised and ultimately adopted.

⁴ The ROI Metrics are based on four principles developed by Colorado's Department of Higher Education: Price, Debt, Choice, and Value. Those factors were important in order to balance Learner needs with the long-term impact required by Funders, Governments, and Trainers. For more details, consult the following [Colorado Report](#).

Figure 1. Summary of the Return on Investment (ROI) Metrics⁵

ROI Metrics	
Employment	<p>Metric: Employment Premium</p> <p>Description: This metric is calculated by taking the employment rate in the cohort before and after program completion and subtracting the overall employment rate change for the period.</p>
	<p>Wage</p> <p>Metric: Earnings Premium</p> <p>Description: This metric is calculated by taking the difference of individuals' pre- and post-program earnings and subtracting a baseline difference derived from macroeconomic statistics.</p> <p>Metric: Earnings Premium Per Median Institution Household Income</p> <p>Description: For individuals in a given age cohort, this metric is calculated by taking the difference of individuals' pre- and post-program earnings, subtracting a baseline difference derived from macroeconomic statistics, and dividing by the median institutional household income (MIHI). MIHI is calculated by using student addresses at enrollment to place them into SES quintiles. The median household income within each quintile is extracted from Census data, and MIHI is calculated as the weighted mean of these values over the whole student population.</p> <p>Metric: Earnings Premium Per Net Price Dollar</p> <p>Description: This will be calculated in the same manner as the earnings premium produced above, but will instead use net price calculations utilizing spending and cost data originating with institutions.</p>
Equity	<p>Metric: Theil Index Ratio (multiple applications)</p> <p>Description: Intergroup inequality is assessed here on the basis of the adjusted mean earnings premium per group, and is assessed on the basis of (a) gender, (b) race and (c) socioeconomic status quintile (based on census tract). In order to identify the approximate amount of inequality accounted for by differences in socioeconomic status, a ratio is constructed using the Theil index (dividing the term representing cross-group disparity by the total value of the index). The absolute value of this ratio will range between 0 and 1, with values closer to 0 representing greater cross-group equality.</p>
	<p>Metric: Benefit Incidence Analysis (two variations)</p> <p>Description: This metric yields the proportion of total spending that benefits students in (a) different racial groups and (b) different quintiles of socioeconomic status. Benefit in this calculation will be identified by macroeconomic-adjusted earnings premium; SES will again be estimated by census tract. This metric is calculated at the institution level</p>
	<p>Metric: Demographic-Level Expected Earnings Premium</p> <p>Description: For individuals with a given set of demographic characteristics (along axes of race, gender and ethnicity) this metric is calculated by taking the difference of individuals' pre- and post-program earnings and subtracting a baseline difference derived from macroeconomic statistics. This is roughly equivalent to a linear regression model with factors for all possible demographic features. This formula is identical to the one above, but should be calculated for n members of a given intersection of different demographic categories.</p>

⁵ For details on each of the ROI Metrics, their definition and data sources, see **Appendix A** "Return on Investment Metric Recommendations For Equitable Outcomes"

The ROI Metrics analyze program impact, and measure racial, socioeconomic, and geographic disparities within the framework. The central goal of ROI Metrics is to provide the workforce and education community with a data-driven framework to make more informed decisions concerning the effectiveness of career pathways, workforce programs, and funding allocation. Key community stakeholders include education and workforce training program participants (“Learners”), training service providers (“Trainers”), state and local government agencies (“Governments”), and philanthropic and investment organizations (“Funders”). By equipping these stakeholder groups with better data, a rigorous set of ROI Metrics can improve the outcomes of Learners, lead to more targeted investments for job creation, and establish a more holistic definition of self-sufficiency and economic opportunity.

With an improved framework to articulate impact, the DAC strives to implement more outcomes-based financing (OBF) strategies for education and workforce programs. OBF enables governments and their philanthropic and investment partners to fund services if specific outcomes are achieved. The implementation of OBF creates data-informed partnerships that facilitate investments in programs that produce results and reward continuous improvement in service delivery. Integrating a focus on performance into how programs are funded, however, is challenging without a holistic data framework that defines and quantifies “success.” This report’s focus on the ROI Metrics, seen in **Figure 1**, is the first step toward guiding the DAC to develop benchmarks, sample portfolios, return on investment, and performance targets for training, post-secondary education, and workforce programs. `

3. DATA ALIGNMENT WITH OUTCOMES-BASED FINANCING (OBF)

The ROI Metrics in **Figure 1** set a rigorous, long-term standard for the DAC to aspire to in order to make better informed decisions regarding the effectiveness of career pathways, workforce programs, and funding allocation. Based on Third Sector’s experience, this report will identify how the ROI Metrics and its data inputs can be used for outcomes-based financing (OBF) and other ways to fund programs. A focus will be placed on how the measurement of the recommended ROI Metrics can be supported by Governments, Trainers, Funders, and Learners.



The DAC’s outcomes-based financing (OBF) efforts will provide governments and their philanthropic and investment partners with the added capacity to fund services if specific outcomes are achieved. Data inputs that the ROI Metrics require enable OBF to maximize program investments via three main elements:

- A clear set of objectives and indicators for various stakeholders
- Guidelines to collect data on the progress of selected outcomes and indicators
- Financial incentives with “upside” payments, cost reimbursement, or repayment for Trainers or Funders – both of which are contingent on outcome achievement

Governments

For Governments, OBF could facilitate direct service agreements with Trainers with all or a portion of payment for services contingent upon achievement of specific program milestones. These “contingent” terms can be applied as modifications to cost-reimbursement agreements with Trainers issued via competitive RFP processes, other direct agreements for services, or grants.

Governments can also partner with Funders (or employers) who provide upfront dollars to Trainers in lieu of Government funding at the onset of the program. Government payments are subsequently made to repay or compensate Funders (or employers) based on program outcomes delivered by a Trainer (e.g., program completion rates or employment placements).

Funders

For Funders, OBF can be used at different stages of program implementation. At the onset, philanthropic organizations, private or community development financial institutions, social impact investors, and/or individual grant makers may fully or partially disburse funds to a Trainer contingent upon achievement of specific program milestones (e.g., enrollments).

Partnerships where Governments or employers compensate Funders for capitalizing a Trainer’s program from the onset of services require contingent repayment upon results achieved by a Trainer at the conclusion of a program. Contingent repayments may be applicable to loans, program related investments, or recoverable grants.

Both OBF contingencies for Funders described above may take the form of Pay for Success Agreements, Career Impact Bonds or Income Sharing Agreements, Opportunity Zone investments, community investing and other data-driven financing mechanisms.⁶



For any OBF agreement, Governments' or Funders' disbursement payments are based on specific outcomes achieved by the Trainer. Before an OBF contract is implemented, Governments or Funders, and Trainers mutually agree on the specific terms and conditions of the program. These terms include measurement of program "success," the impact validation processes, and/or payment structures. Once implemented, Trainers deliver services and a program is validated with independent, rigorous outcomes data often provided by Government. Once the Trainers achieve the defined outcomes, Government or Funders subsequently make payments.

The disbursement of Funder or Government dollars for a program *could be* contingent on the measurement of ROI Metrics. However, such metrics should not be the only markers of "success" for the release of OBF payments nor should they be the sole indicators of a successful program. Measurement of key performance indicators (defined in the Outcomes Continuum in **Figure 2** as "Outputs" and "Short-Term Outcomes") are important to inform operational adjustments to drive improvements on long-term outcomes. Key performance indicators also provide Trainers with the visibility to both see the progress of their programs in real time and execute needed changes while a program is being delivered. This visibility also highlights performance indicators that can encourage and motivate Learners to complete a curriculum and reassure Funders and Governments that their investments are generating early but promising results. When Funders, Trainers, Governments, and Learners collectively assess and share key performance indicators, it creates a behavioral shift that upholds a cultural commitment to improvement, reinvestment, and fidelity to a program's vision for long-term impact and collaboration.

⁶ Pay for Success (PFS) is an approach to contracting that ties payment to service delivery to the achievement of measurable outcomes. Career Impact Bond (CIB) are a PFS strategy and a form of an income share agreement. In a CIB, Funders cover upfront program costs, which Learners repay as a fixed percent of their income over a set time period once they gain meaningful employment. Opportunity Zone investments are a federal investment policy to encourage long-term investments in low-income urban and rural communities nationwide.

4. OUTCOMES CONTINUUM OVERVIEW

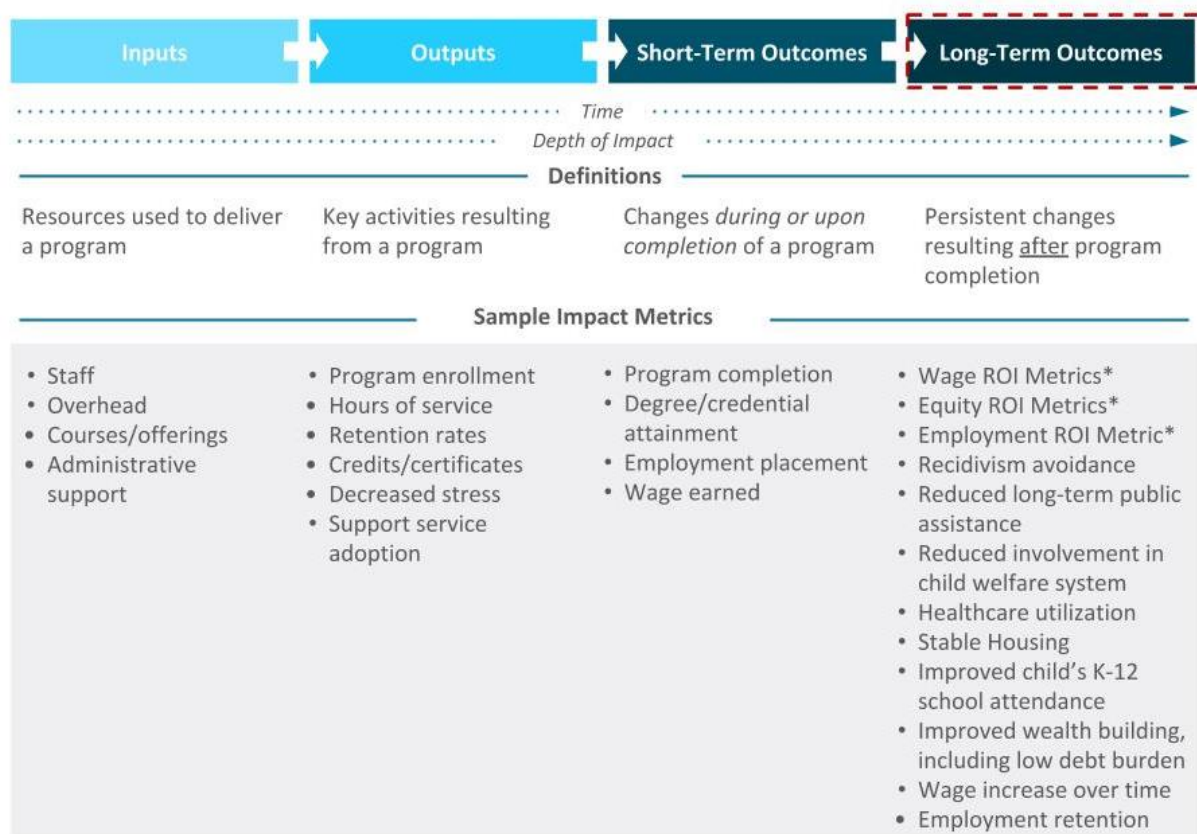
The ROI Metrics are specific to an individual or cohort, and are categorized in three distinct groupings of Employment, Wage, and Equity performance (ROI Metrics in **Figure 1**). The ROI Metrics are longitudinal and/or measure performance relative to a population group that may not have access to the same program. For each ROI Metric, the assessment of an individual Learner's progress may occur upon program completion or after a program is completed.

The Employment and Wage ROI Metrics compare the pre- and post-program outcomes for program completers while adjusting for employment placement rates and earnings. The Equity ROI Metrics aim to identify intergroup differences in pre- and post-program wages, and total institutional spending that benefits students by adjusting for race, gender and socioeconomic status.

Long-Term Outcomes

The recommended ROI Metrics in **Figure 1** are rigorous, and aim to be lasting indicators of success in the education and workforce sector. Yet, such metrics should not be the only performance indicators that guide Funder or Government OBF payments to Trainers. As illustrated in the Outcomes Continuum in **Figure 2**, the ROI Metrics are one of the many long-term outcomes to measure impact *after program completion*, likely quarters or years after a program is completed by a Learner.

Figure 2: Summary of the Outcomes Continuum Framework



*See ROI Metrics in **Figure 1** and Appendix A for full definitions, methods, and details on each ROI Metric

Learners face various life barriers that threaten the attainment of stable and fulfilling employment measured by the ROI Metrics. For example, Learners with the lowest employment outcomes are those living in poverty; currently or previously involved in the child welfare, foster care, or justice system; or have performed below grade level or have not achieved high school equivalency. Depending on the needs of Learners, measurement of other long-term outcomes, in addition to the ROI Metrics, could include:

- Recidivism avoidance (arrest, conviction, and/or incarceration)
- Reduced long-term public assistance (e.g., TANF, SNAP, etc.)
- Reduced involvement in child welfare system
- Preventative / more appropriate healthcare utilization (e.g., Medicaid)
- Stable housing
- Improved child's K-12 school attendance
- Improved wealth building, including low debt burden
- Retention or progression of wages, employment, and/or annual income level

Considering how these other long-term outcomes impact employability, an appropriate next step for the DAC and ROI Research Network would be to determine how other long-term outcomes could be measured with the same rigor and intentionality as the ROI Metrics in **Figure 1**.

Determining program success or funding disbursement by assessing long-term outcomes can be challenging for all stakeholders. Validation of the ROI Metrics, let alone any outcomes, typically requires access to state or national government datasets that Trainers, Funders, and even Government organizations typically cannot access. The long-term outcomes also require analysis of data months, quarters, or years after a Learner completes a program. In the absence of follow-up surveys, long-term and recurring administrative data access is required at the individualized or cohort level to measure all long-term metrics. Depending on the population group and program's Theory of Change⁷, outcome data may require integration with various agency administrative data sets. Those datasets could include the following:

- **State:** Dept. of Workforce Development, Adult / Post-Secondary Education, K-12 Education, Employment Services, Unemployment Insurance, Human Services, Healthcare, Corrections, or their equivalents
- **National:** Department of Labor (WIOA), Education Perkins (CTE), Health & Human Services (TANF, SNAP, Medicaid); United States Census Bureau (US Census or American Community Survey); and/or nonprofit education partners like the National Student Clearinghouse

Long-term outcome information is typically sourced from administrative government datasets managed by government staff or in partnership with specialized data partners, such as universities, philanthropic organizations, third party data vendors/managers, and/or public/private data partnerships committed to maintaining integrated, longitudinal data systems.

Interim Key Performance Indicators

As is the case with any commitment to assess long-term results, Trainers, Government, and Funders require interim key performance indicators to make necessary operational adjustments to ensure that

⁷ A 'theory of change' explains how activities are understood to produce a series of results that contribute to achieving the final intended impacts. It can be developed for any level of intervention – an event, a project, a program, a policy, a strategy or an organization.

long-term outcomes can be assessed. Access to and insights on “Inputs”, “Outputs” and “Short-Term Outcomes” data in the Outcomes Continuum in **Figure 2** is critical to the delivery of any of the ROI Metrics.

- **Inputs** are the resources needed for a Trainer to deliver a program, such as staff and overhead. Tracking information on inputs is necessary for Trainers to effectively administer a program and a budget, but this data does not provide insight into the long-term impact on Learners. Exclusively measuring inputs assesses program implementation but fails to analyze how the program impacts its participants, and can encourage an excessive focus on compliance vs. performance.
- **Outputs** are the key activities resulting from participation in a program, such as program enrollment and length of service. Outputs, like inputs, are typically assessed by Trainers and are useful indicators for Learners, Funders, and Government to understand operational progression (e.g., program attendance, retention, or time-commitment). While outputs can serve as proxies for more meaningful measurements of outcomes, they generally convey limited information on true programmatic impact.
- **Short-Term Outcomes** are changes experienced by a Learner during or upon completion of a program. These outcomes can include degrees/credential attainment or employment placement upon completion. Short-term outcomes typically utilize the same data sources as long-term outcomes, but require less time to determine impact and are more directly linked to the services delivered.

Access to outputs and short-term outcome data allows for Trainers, Funders, and Government to assess progress during program delivery and/or immediately after a Learner completes a program. Relative to “status quo” population-level statistics, the benchmark for achievement requires a thorough understanding of the evidence-base of a Trainer’s program and the Trainer’s track record of delivering the outputs and short-term outcomes that achieve the ROI Metrics, among other long-term outcomes. Using this data, stakeholders can understand whether the Trainer is implementing its model with fidelity, and whether program activities are leading to the intended impacts. Similarly, tracking progress with data disaggregated by racial, socioeconomic, gender, and other demographic or geographic variables can improve stakeholder understanding of life barriers faced by Learners that experience disparities in program access and outcome achievement.⁸

For Funders and Governments, outputs and short-term outcome achievement can be more immediate and practical alternatives to long-term outcomes to initiate, withhold, and/or terminate OBF payments and disbursements. It is imperative that stakeholders explicitly articulate a Theory of Change which links outputs and short-term outcomes to the long-term outcomes that are most indicative of a lasting impact on individuals’ economic self-sufficiency.

A holistic review of the Outcomes Continuum in **Figure 2** for a program may include reports or dashboards comprised of individual or cohort-level “Inputs”, “Outputs” and “Short-Term Outcomes”. Reviews should be conducted by working groups or committees comprised of Trainers, Funders, Governments, and Learners. The cadence (weekly, monthly, quarterly, biannual) and composition (staff level) will vary depending on OBF structure, expertise, and capacity.

⁸ *The Roadmap for Racial Equity: An Imperative for Workforce Development Advocates*. National Skills Coalition, Sept. 2019, www.nationalskillscoalition.org/resources/publications/file/Racial-Equity-Report_6x9_web.pdf.

Enabling an Outcomes-Based Financing (OBF) Environment

The Outcomes Continuum underscores the importance of defining and measuring key performance indicators to track and achieve long-term outcomes of interest to the DAC. When these data insights are leveraged to implement OBF, the benefits go beyond accurately measuring program's impact or validating an investment. The process of tying funding to the achievement of specific outcomes leads to data integration that better informs all stakeholders on how resources of the job-creation ecosystem can be better deployed.

Figure 3: Vision for Systems Change



For example, as seen in Vision for Systems Change in **Figure 3**, OBF implementation may require new/focused policy (e.g., new data sharing agreements) to ensure a program can access the data described in the Outcomes Continuum. Measuring program progress (via outputs or short-term outcomes) or program success (long-term outcomes) creates an incentive for Funders, Trainers, Governments, and when appropriate, Learners, to work together on a recurring basis. Multi-stakeholder partnerships are required to co-develop and clearly define how a program's goals and impact will be measured (e.g., the Outcomes Continuum) and compensated (e.g., OBF). These new work streams catalyze a shift in culture and behavior among all stakeholders due to financial rationale (payment for outcome delivery) that requires the development of a continuous data feedback loop for Trainers and their partners. Transparent collaboration paves the way for course-correction of programs and improvement in the allocation of resources like staffing or funding.

5. OUTCOMES CONTINUUM: USE CASES IN COLORADO & ARKANSAS

This section details two workforce use cases of leveraging Outcomes Continuums: the Colorado Department of Higher Education's (CDHE) report on return on investment for post-secondary credentials and lessons learned from the Arkansas Career Pathways Initiative (CPI). The Colorado example offers a view into how decision-makers, including Funders, can holistically define long-term program impact and work with key public stakeholders to integrate wage and post-secondary education data. The Arkansas CPI case demonstrates how Governments and Trainers can focus their efforts on addressing employability barriers after developing the capacity to track outcomes data and disaggregate data to define "unmet need." Both cases provide greater transparency and accountability in the education or workforce sector and utilize a version of the Outcomes Continuum framework to track or achieve their long-term outcomes.

Colorado Department of Higher Education ROI Report

Colorado Department of Higher Education (CDHE) efforts establish a model for how all public and private stakeholders can integrate administrative data to measure the Outcomes Continuum for an education or workforce program. Through cross-sector collaboration, Colorado developed its own environment (similar to what is described in Vision for Systems Change in **Figure 3**) to better inform Government's funding and policy to improve post-secondary and employment programs in the state. Such an environment would be equally effective in supporting an OBF effort funded by Government or Funders. Ultimately, CDHE developed the data infrastructure and relationships to set a policy agenda for lawmakers, educate taxpayers, and guide students and jobseekers on how to establish career pathways for prosperity in equitable and transparent ways.

Colorado CDHE developed a Learner-centric framework to define "Return on Investment." The state established [HB18-1226](#): Higher Education Review Degree Program Costs And Outcomes, a legislative statute that allowed for ongoing data integration between public post-secondary institutions and the CDHE, as well as wage data from the Colorado Department of Labor and Employment (unemployment insurance) and other Trainers. If the DAC strives to better understand or apply the ROI Metrics for a specific program or community, data integration similar to Colorado's will be required. Whether or not enabling legislation (or an agency directive) is required to share data depends on key stakeholders involved in program support.

Intentional data sharing among various stakeholders also made program outcome data accessible to Learners via a public facing portal, [MyColoradoJourney](#). The portal is a case management tool that provides Learners and their families with guidance for accomplishing life goals (e.g, applying to the right college, finding the best job or career switch), navigating various service options, and understanding workforce needs by region and industry – insights derived from "Inputs", "Outputs", and "Short-Term Outcomes" in the Outcomes Continuum in **Figure 2**. Reflecting the systems change opportunity in Vision for Systems Change in **Figure 3**, Colorado's intentional design around individual user-needs and life barriers preventing program access informed state policy recommendations to promote regulations on student education loan services and support more college savings accounts for children.

CDHE's vision for improving economic opportunity was data-informed and human-centered. With holistic data insights, Learners and their families are empowered to make informed decisions on the best training pathways for their unique circumstances. There is increased accountability and transparency for

Governments and Trainers, and the talent pipeline can be adapted to meet the growing regional workforce demand. The state would be unable to articulate its policy and funding strategies or set performance goals for Trainers and partner agencies without the creation of robust data collection practices. More importantly, by defining the state's Return on Investment metrics with the needs of Learners, CDHE created a responsive analysis and data collection methodology to better track outputs, and short-term and long-term outcomes state-wide.

Arkansas Career Pathways Initiative (CPI)

While the CHDE example focused on defining and measuring Learners' outcomes, Arkansas' CPI tracks outputs and Learner outcomes to address disparities. [Arkansas Career Pathways Initiative \(CPI\)](#) provides education and career coaches for low-income custodial parents to gain degrees and credentials in pre-selected, high-wage industries. Parents are enrolled in community colleges and technical career centers at four-year universities in Arkansas. CPI support services seek to reduce barriers to a post-secondary education by providing reliable transportation and affordable childcare, among other life supports.

A recurring data review of CPI's outputs and outcomes ensures community college resources and coaching support are appropriately deployed. For a Learner, that means that CPI measures student enrollment (output), and credentials, employment, and wages (outcomes) to ensure the program remains successful. From a systems perspective, the state monitors Learners' needs in order to utilize federal funding to fill the gap for tuition funding and wraparound support services. Deliberate coordination of the community college system with government agencies ensures CPI is accessible state-wide across rural and urban areas. Data-informed policy making ensures i) a Learner pathway unfolds within the post-secondary system with the support of TANF funding and ii) alignment with the employment/skills gaps in the state's key industries.

An independent evaluation determined that CPI generated numerous benefits for the state. CPI has resulted in a Return on Investment of 179% to the state of Arkansas and its taxpayers over a five-year time frame. From an equity perspective, CPI has been instrumental in ensuring its services and achievement supports Learners of color: Black CPI students are three times as likely as their counterparts in the general community college population to obtain a certificate or degree and Latino CPI students are four times as likely as their community college counterparts to earn a credential.⁹ With its outcome datasets and agency partnerships, the state is currently exploring ways to expand CPI to specifically address the needs of non-custodial parent Learners and students previously in the justice or foster care systems. These targeted outreach efforts will ensure that CPI can continue to improve employability for those facing the most challenging workforce barriers.

Arkansas' CPI program is a successful example of how to implement an Outcomes Continuum framework to yield high impact, high ROI decision-making. By aligning community college and state funding with students' credential and employment achievement, Arkansas is meeting industry demands while maximizing its public return on investment in ways that are reducing education access barriers for Learners.

⁹ *The Roadmap for Racial Equity: An Imperative for Workforce Development Advocates*. National Skills Coalition, Sept. 2019, www.nationalskillscoalition.org/resources/publications/file/Racial-Equity-Report_6x9_web.pdf.

6. STAKEHOLDER ADOPTION OF ROI METRICS

Government

Who is Government?

Governments are the largest providers and public funders for education, training, and workforce programs. In this report, **“Government”** includes public education systems (post-secondary institutions) and the federal, state, and county agencies that administer data reporting and funding streams for education, training, and workforce programs implemented by public, private, and non-profit Trainers. Governments utilize outcomes to allocate current and future resources toward effective programs and inform future policies. Such programs and policies would enable OBF, increase data sharing and integration, and promote systems-coordination across education, workforce, industry, philanthropy, and social impact investing.

Governments have the unique position and responsibility to coordinate and collect impact data, which plays an increasingly important role in decision-making for Governments, Funders, and Trainers. Governments and Funders are required to prioritize their allocation of their scarce financial and data resources toward specific education and training programs. For all stakeholders, however, program impact data is often missing or not integrated across program areas (e.g., workforce and education).

How can the Government Adopt ROI Metrics?

- **Efficient and Robust Use of Public Funds:** As stewards of public funds, Government can utilize the ROI Metrics to efficiently invest limited public resources in high impact programs and services. The ROI Metrics identify successful programs that are valuable to Learners and their communities and employers that contribute to the tax base funding education and workforce programs.
- **Inform Policy:** ROI Metrics are a useful tool to support policy decisions to create more efficient use of funds as the metrics provide crucial insights into program impact. As described in Section 5, the [Colorado ROI Report](#) informed state policy recommendations that promoted regulations on student education loan services and child college savings accounts. The ROI Metrics and other long-term outcomes enable Governments to focus on supporting the sustained impact of a program on the life trajectory of an individual. This is particularly relevant for policies that aim to support specific populations with high barriers to education or employment services.
- **Incentivizing Data Sharing:** Governments have unique access to data across programs and agencies. Section 5 highlights great examples of how [Colorado](#) and [Arkansas](#) established data partnerships and used those insights to improve service delivery for job seekers. With a focus on ROI Metrics or any long-term outcomes, Government has the most capacity and authority to maintain a longitudinal, Learner-specific assessment of program impact. Such data infrastructure can be integrated with the data from the education and workforce systems, in addition to healthcare, justice, and other social services to provide better insights into the broader impact of the program.

Outstanding Discussion Topics for Government

- How do Governments address data quality issues to spur meaningful use of ROI Metrics and the Outcomes Continuum? High quality and transparent data is imperative to measure ROI Metrics and other long-term outcomes, and there are a number of data quality challenges for Government and their partners. Some challenges include: integrating data across agencies and domains, retaining confidentiality policies while sharing data extracts with key stakeholders and creating consistent analysis code that de-identifies data but remains able to match individuals across datasets.
- What types of data sharing agreements can Governments establish with Trainers? Data sharing agreements between Governments and Trainers permits Trainers to access the outcomes results (e.g., wages earned by Learners) from their programs and assess impact. Governments can subsequently decide to reallocate existing or future funds into those programs delivering the outcomes that leadership has identified as top priority or that lead to increased tax revenue or reduced public service utilization. Data use can also be critically helpful to streamline identification and enrollment of potential Learners into programs, especially for those individuals referred from other government programs seeking to place individuals on a pathway toward self-sufficiency.

Funders

Who are Funders?

“**Funders**” are philanthropic and impact investing organizations committed to funding education, training, and workforce initiatives. Funders provide different types of flexible funding to explore and implement education and workforce programs ranging from grants to loans. To justify their funding commitments, funders require appropriate measurements of program success. Within the DAC and ROI Research Network there were a number of social investors and foundations including the Ewing Marion Kauffman Foundation, the Kresge Foundation, the Lumina Foundation, and Reinvestment Fund, among others. For OBF efforts, determining what type of program impact will lead to funding disbursement or repayment is critically important. Funders on the one hand want to ensure that programs achieve lasting change in the lives of Learners (outcomes), but want to ensure the benchmarks for any compensation or repayment of its investments can be reasonably achieved and reliably measured.

How can Funders Adopt ROI Metrics?

- **Impact Measurement:** The ROI Metrics are strong indicators of program impact on employment outcomes. Funders may rely on the ROI Metrics to articulate the positive change of well-being for a community or individuals -- the lasting “social impact” -- achieved with institutional investment. The communication of ROI Metrics and the Outcomes Continuum is appropriate for reporting to Limited Partners (current or prospective), fund managers and program officers, and various public audiences.
- **Investment Management:** At an institutional level, ROI Metric assessment will allow Funders to further quantify the most impactful investments. More precise impact measurement ensures that the organization can make more informed decisions regarding how to allocate future dollars to maximize community impact.

- **Funding Disbursement/Repayment:** While ROI Metrics are very good markers of program impact on employability, they should not be the only benchmarks for OBF disbursement of upfront funds or repayment at the conclusion of a program. The time frame in which ROI Metrics are validated (months to years) will likely occur after the full cost to deliver a program is incurred by a Trainer or Learner. Disbursement contingent only on ROI Metric measurement may create a cash flow burden on a Trainer and/or Learner that threatens the successful completion of a program. Exploring how output or short-term outcome achievement can be one of many disbursement milestones can help mitigate these timing challenges.

Outstanding Discussion Topics for Funders

- What are the outputs and short-term outcomes correlated with each of the ROI Metrics? A thorough understanding of how key performance indicators are related to ROI Metric measurement will enable Funders and program stakeholders to identify the outputs and short-term outcomes that should be monitored during program implementation. Leveraging intermediary step outcomes will create shorter term benchmarks for OBF efforts that could lead to further disbursement of funds and/or repayments prior to the latent validation of ROI Metric measurements. Identifying appropriate outputs and short-term outcomes will enable funders to identify the metrics that are sufficiently ambitious, but achievable within the funding period of a loan or grant.
- How can other social areas aligned with Funder mission (housing, reentry, etc.) be incorporated into the ROI Metrics or new ROI Metrics? Sustained employability, the focus of the ROI Metrics, is impacted by compounding life needs. Whether it relates to housing instability, health (physical, mental, or behavioral), or other system involvements (e.g., engagement with SNAP, TANF, incarceration, foster care, etc.) the feasibility of achieving the initial ROI Metrics will vary based on resources required for program delivery (e.g., staffing, program records, case management, design).

Learners

Who are Learners?

For this report, a “**Learner**” is a recipient of education, training and/or workforce programs. Learners have an increasing number of choices, including traditional post-secondary education, workforce development led by non-profit organizations, employer-sponsored training, and/or various private, skill development seminars or intense “boot camps.” No matter the program, Learners are typically in transition and strive to develop skills for sustainable employability, and may or may not need additional support (e.g., housing, transportation, case management, etc.).

Learners come from a variety of backgrounds, face different barriers to gaining skills, and have different goals for their careers. For those reasons, Learners seek insights on the near-term and long-term “benefits” and “costs” of a program to help them understand which program and Trainer is the best fit for their needs. While enrolled, Learners will seek to understand how near-term outputs and upcoming short-term outcomes get them closer to achieving the lasting employment, wage, and equity goals of the ROI Metrics. Learners want to engage Trainers that rely on the Outcomes Continuum to adapt programs and coordinate partnerships to better address barriers to access, debt burdens, or other demographic disparities faced by Learners with the highest unmet needs. ROI Metrics may highlight long-term

employability gains, but may not provide Trainers with valuable insights to understand what motivates individuals to pursue and commit to training.¹⁰

In order to achieve sustainable employment and growing wages defined within the ROI Metrics, there are various key performance indicators and milestones for Learners and Trainers to monitor to ensure the pathway for economic opportunity is viable. Both stakeholders want to understand short-term outcomes of various programs such as skill attainment (e.g credentials, degrees, and job placements) and access to social networks. Sustainability requires insight into long-term outcomes: Will a program lead to job security and wage growth in a satisfying career in a growing industry? Learners and their families may have to consider the upside associated with current/future debt load or foregone wages.

How can Learners Adopt ROI Metrics?

- **Information Transparency:** Currently, Trainers or Governments are gatekeepers to the vital data in the Outcomes Continuum in **Figure 2**. Access to ROI Metrics or long-term outcomes of a program ensures that Learners make more informed decisions on what education and career path is best for them prior to making multi-month/year time or financial commitments. Increasing data transparency with Learners before and during enrollment will also allow Learners and Trainers to align expectations on progression through a program (and to course correct, as needed).
- **Shared Language for “Success”:** Learners are the beneficiaries of a shared language for program success. The ROI Metrics currently focus Funders, Trainers, and Governments on the main Employment, Wage, and Equity goals. The time in which success benchmarks are achieved will be defined differently by a younger, non-White Learner who is committed to credential accumulation than to an experienced worker in a rural community that is prioritizing any wage earnings to make ends meet. Learner input is essential for refining the ROI Metrics and the Outcomes Continuum.

Outstanding Discussion Topics for Learners

- How can stakeholders and the DAC effectively communicate short-term and long-term outcomes to Learners in order to support program selection? It is important to meet Learners where they are at and consider how Learners currently make decisions. The DAC should consider the appropriate communication and explanation of the ROI Metrics and other long-term outcomes, including the term “ROI.” Stakeholders should keep in mind that most Learners make education and workforce training decisions through their family, social, or professional networks, and not through a Government website or ROI tool.
- How do we enhance the ROI Metrics and the Outcomes Continuum with information about Learner preferences? When choosing a program, Learners consider a number of factors that affect their quality of life, such as the type of work they enjoy, find fulfilling, or aligns with the lifestyle choices they and their families want to make. The ROI Metrics alone do not account for all of a Learner’s view of success, such as job happiness, living wage, and life purpose.

¹⁰“Back to School?” *Strada Education Network*, Gallup, 22 Sept. 2019, www.stradaeducation.org/report/back-to-school/.

- How can Trainers be responsive to the needs of all potential Learners? When considering OBF payments for ROI Metric assessments, those benchmarks should avoid setting incentives for Trainers to not enroll Learners that are “hardest to serve.” Any form of “hand-picking” to ensure program success could be a logical but an unfortunate result of an OBF effort. The ROI Metrics aim for transparency and accountability to outcomes for all, and in doing so, Trainers should in fact be incentivized to serve individuals with the greatest need/barriers to achieve sustainable employability.

Trainers

Who are Trainers?

“Trainers” are defined in this report as non-profit, public, or private organizations who provide education, workforce, and support services to Learners. Organizations may include secondary or post-secondary institutions (e.g., high schools, community colleges, vocational and trade schools, two or four year universities, and/or private educators) or workforce development organizations (e.g., American Job Centers, contracted community based organizations, and/or employers). Trainers implement skills training, credential programs, apprenticeships, or boot camps; and support service providers (e.g., community based organizations, government agencies, or private organizations) focused on cash assistance, housing, child care, transportation, behavioral/mental health services, legal services, translation support, mentorship, and other support services. Trainers may be funded by government, philanthropy, revenue/profits earned, and/or financial institutions, including social impact investors. They strive to validate the success and sustainability of their programs.

A Trainer aims to offer a program or service that enables individuals to meet a demand in the workforce through education, training, or work experience. Trainers are often gate keepers of their own impact metrics (usually inputs and outputs), and work in partnership with employers, governments, and data specialists to integrate short-term and long-term outcomes.

How can Trainers Adopt ROI Metrics?

- **Operational Improvements:** Most Trainers have the data and capacity to document the inputs and outputs of the Outcomes Continuum. However, most have minimal to no access to government administrative data sets or the necessary capabilities to analyze this data, which limits their insight into the long-term impact of their services. The ROI Metrics can be used to refine a Trainer’s approach to service delivery by showing what mix of support creates the largest improvement in short-term and long-term outcomes for different types of Learners enrolled. As noted above, the ROI Metrics should be paired with outputs and short-term outcomes to help Trainers make real-time improvements to their model.
- **Better Targeting of Services:** By disaggregating the ROI Metrics by key factors such as demographics, prior educational attainment, and other barriers an individual Learner is facing, Trainers can better target their recruitment efforts. Trainers can identify populations that are currently under-enrolled in their services, as well as the types of Learners who are best suited for their particular offerings. For Trainers, disaggregated insights from the Outcomes Continuum will better align their programs (and value proposition) with the specific needs and barriers to employability that Learners face.

- **Communicating Impact:** Effective Trainers can use the ROI Metrics and Outcomes Continuum to demonstrate the impact of their services to both Learners and Funders. It is critical for Trainers to effectively communicate their value proposition to potential clients and their families. Tracking the ROI Metrics can also help Trainers make a compelling case to Funders and Governments that additional resources and/or coordination could create meaningful changes in Learners' lives.

Outstanding Discussion Topics for Trainers

- How can Trainers overcome data collection barriers? Trainers are usually limited to the inputs and outputs of their own program. Following up with individuals to obtain outcomes information post-program completion is resource intensive and often relies on participant self-reporting. It is therefore important for Trainers to have partnerships with public and private data partners, as shown in **Figure 3**, that are already integrating population level data on employment, educational attainment and other outcomes. Through data sharing agreements, Trainers can access administrative data that is more easily scaled, is more reliable, and can be more readily linked with other information about an individual Learner.
- How can Trainers collect and articulate qualitative data on job purpose and happiness beyond wage? Trainers need to consider the other important aspects that lead individuals to feel fulfilled in their work beyond the wages paid and employment retention. Qualitative context collected by Trainers can highlight whether current services are providing Learners access to meaningful careers, increased leadership, or talent development. Organizations such as Gallup, Strata and Bloomberg are working on qualitative measurements of happiness and fulfillment in jobs and degrees.
- Where can ROI Metrics support Trainers in ensuring equity of access? ROI Metrics need to be paired with a purposeful disaggregation of baseline outcomes and program impacts by race, gender, and socioeconomic class to ensure that Trainers are actively making their services accessible to those most in need. For example, in workforce programs, Workforce Innovation and Opportunity Act (WIOA) providers may under-enroll 16-24 year olds with prior foster care or justice involvement due to limited outreach efforts, lack of Learner trust in “perpetual programming,” or limited resources to provide comprehensive support, among other challenges. For some programs, it may be important to first focus on redesigning the outreach and enrollment processes to make services more accessible to particular populations in highest need of training. For these reasons, some Trainers may explore designing programs explicitly for specific population groups defined by their demographic profile (socioeconomic, racial, or geographic criteria), family composition, or system involvements that are tailored to address each groups' unique barriers to educational advancement and job placement.

7. RECOMMENDATIONS FOR THE DATA ADVISORY COUNCIL (DAC)

The ROI Metrics presented in Section 2, are a handful of carefully designed “Long-Term Outcomes”. When paired with other elements of the Outcomes Continuum described in Section 4, such as “Short-Term Outcomes” and “Outputs”, the ROI Metrics are part of a holistic measurement system to determine program impact and validate resource investment over a designated time period. Additionally, assessing a program through the Outcomes Continuum provides Trainers and Learners with programmatic insights at the individual and community level to adapt services to address barriers that cement disparities in economic opportunity. For Trainers, a review of the Outcomes Continuum during service delivery could include dashboards comprised of individual or cohort-level “Inputs”, “Outputs”, and “Short-Term Outcomes”. Funders and Governments should support the delivery of one or more of the “Long-Term Outcomes.” At the same time, they should also integrate data collection and facilitate collaborative interpretation of data insights to better inform the coordination of funding, policy and community efforts. Better data transparency on how outputs and outcomes lead to ROI Metric measurement will support the assessment of existing Learner barriers and identify any equity gaps within programs. Trainers can identify who their program serves well and which populations the program should devote more resources to recruiting and supporting. Transparent outcomes enable Learners to better assess what program can set them up for success.

To ensure the insights of the DAC and ROI Research Network are sustainably implemented, detailed discussion among DAC partners is required to:

- **Align the ROI Metrics with Outputs and Short-Term Outcomes.** By understanding which outputs and short-term outcomes lead to the assessment of ROI Metrics, Governments, Trainers, Learners, and Funders can agree on what intermittent and lasting impact looks like. It also enables Trainers, Funders, and Government to assess progress during program delivery or immediately after a Learner completes a program. Potential questions include:
 - How does the track record of specific programs or Trainers align with the ROI Metrics?
 - Which outputs and short-term outcomes does the ROI Research Network recommend as essential for each ROI Metric?
- **Apply Human-Centered Design to the ROI Metrics.** Human Centered Design (HCD) is the study of how people respond to a problem or opportunity. It is a bottom-up approach that can inform policy, program, or funding solutions based on how Learners and their support networks interact with programs and their environments. When applied, HCD insight can ensure time and resources allocated to measure the ROI Metrics are invested directly in line with community needs. Certain populations may have disparate achievement of positive ROI Metrics outcomes relative to other program participants due to the unique barriers they are facing. “Success” will therefore need to be contextualized where enrollment (output) of a previously underserved community or program completion (short-term outcome) for students with low retention rates may be as important as one of the ROI Metrics. Potential questions include:
 - How do Learners value the ROI Metrics outcomes? How may that differ for Funders, Governments, or Trainer’s priorities?

- Are the correlated outputs and short-term outcomes of an ROI Metric indicators of the root causes that hinder access to educational or economic opportunity?
- **Define other long-term outcomes, such as those detailed in Section 4.** The DAC could consider how these comprehensive long-term outcomes could be measured with the same rigor and intentionality as the ROI Metrics. Potential questions include:
 - In addition to the ROI Metrics how should stable housing, reduction in long-term public assistance, or recidivism avoidance be considered?
 - Which long-term outcomes other than the ROI Metrics would Funders and Governments be willing and able to support?
- **Create a historical or current baseline for the ROI Metrics.** Establishing a baseline is important to determine what, if any, outcomes are achievable. A baseline outcomes analysis will allow all stakeholders to understand how to measurably improve the “status quo.” The analysis quantifies the life outcomes of a population over a defined period of time and is often disaggregated by specific demographic characteristics to highlight disparities. The analysis examines service access or utilization, in addition to quality of service, cost, and various outcomes. Potential questions include:
 - What are the time, funding, and staffing resources required to develop a baseline outcomes analysis for a sub-population of Learners?
 - What magnitude of improvement is reasonable to expect for any of the ROI Metrics?
- **Establish access to data and integrate data sources in order to measure the ROI Metrics.** Tracking long-term outcome information requires access to state or county government datasets that Trainers, Funders and evaluators typically cannot access. Potential questions include:
 - What data partnerships are required in order to measure the ROI Metrics?
 - How can data within the Outcomes Continuum, specifically the short and long term outcomes, be collected accurately and in a timely manner?
- **Address common challenges and barriers to data integration and utilization.** A few challenges for Trainers, Governments and Funders include: timeliness in accessing source data, analysis of data, and the collection of de-identified Learner Outcomes data. Trainers and Governments also face capacity challenges with matching data sets of individual participants on a recurring basis, integrating data from different agencies, and maintaining the data infrastructure to collect, analyze and publish outcomes. Potential questions include:
 - Which existing data partnerships can the DAC leverage to support Trainers, Funders, Governments, and Learners?
 - How can data sources be integrated and translated into insights to improve Trainers’ service delivery?

APPENDIX A: RETURN ON INVESTMENT METRIC RECOMMENDATIONS FOR EQUITABLE OUTCOMES



Return On Investment Metric Recommendations For Equitable Outcomes

Strategic Initiatives

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Matt Lerner

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Introduction

BrightHive has received a grant from the Small Business Innovation Research (SBIR) program and the Department of Education to support the development of return on investment (ROI) metrics for initial use in Colorado and future expansion to other locations. These metrics will help students and other stakeholders by providing greater transparency and accountability in the education market, and will also provide methods for measuring, analyzing and addressing equity in educational outcomes.

BrightHive has convened an expert academic advisory panel, the ROI Research Network, in order to provide experience, insight and input during the development of a set of ROI metrics. Following a landscape analysis and qualitative research by BrightHive staff, the ROI research network has met routinely over the course of Autumn 2019 in order to assist the development of these metrics.

This document will present context, background, and the major concerns of the ROI metric selection process. It will discuss the strengths and weaknesses of different metrics and metric types and ultimately suggest two sets of ROI metrics: a "near-term" set which can be produced using currently available data and a "long-term" set that will require significantly more data input in the future.

The Network defined four key ecosystem roles or personas representing different use cases and contexts for the interpretation of ROI metrics. These roles include student, government, investor, and employer, as well as the "equity perspective."

As BrightHive has moved forward developing recommended ROI metrics, we have tried to keep in mind a set of basic principles and considerations. These include:

- **Comprehensibility** - Metrics need to be easily understood by their users. Complexity reduces usability, and though some informative metrics are unavoidably “black box” for users without statistical training, we strive to make sure that recommended metrics are explainable to their potential users. Metrics should be easily interpretable for all stakeholders.
- **Replicability** - Metrics should be replicability both across time and across different geographic locales. Variables necessary for metric calculation should be reliably available for the foreseeable future, and there should be a reasonable expectation that these variables will be available in other future locations.
- **Statistical Validity** - Metrics should defensibly represent the real-world quantities they claim to measure. Though perfect statistical rigor may not be possible, we try to formulate metrics that reliably estimate the underlying phenomena they exist to represent.
- **Behavior change** - The deployment of the resulting ROI metrics will drive behavior change across their user base. We formulate metrics bearing in mind that measures developed using past data will be used to drive changes in the distribution of future data, and try to select metrics which are likely to result in positive behavior change, and which are robust in the face of differing institutional incentives.

A primary takeaway from BrightHive's engagement with the ROI Research Network has been an awareness of the diversity of requirements with respect to measures of return and investment. Different stakeholders act in pursuit of very different types of return. For example, students may prioritize individual financial success (both in terms of near-term wages and long-term career capital), while government stakeholders may prioritize possible returns to society in the form of economic growth and social good. To this end, we seek to make ROI metrics broadly interoperable, and endeavor to recommend metrics that satisfy the concerns of as many stakeholders as possible.

With respect to equity, we have noted that stakeholders hold a broad diversity of views as to what concerns are consequential when considering equity. One primary consideration is that, in the educational context, concerns about equity are better understood as relating to intergroup inequality as opposed to statistical dispersion. For this reason, common measures of inequality as represented by statistical dispersion such as Gini coefficients and Lorenz curves (discussed in greater detail below) are unlikely to be good near-term choices for representing concerns about equity with respect to ethnicity, gender, or social position.

Some background on equity and ROI measurement

Equity and Equality

BrightHive's research surfaced multiple conceptions of equity and equality across stakeholders. These views differ in subtle but meaningful ways, so we have tried to work with as capacious a definition as possible in order to accommodate these different views. A review of the philosophical and sociological literature reveals that the terms "equity" and "equality", though often used interchangeably, have conventional meanings that also differ significantly. **Equality** refers generally to a situation in which individuals' circumstances are the same. Broadly speaking, references to equality tend to be references to equality of opportunity (in which all individuals have equal access to some good regardless of their group or individual attributes), or to equality of condition (in which attainment of some good is equally distributed across groups of individuals that differ in significant ways). Equality can therefore be seen as a potentially objective quantitative statement about individuals' or groups' states, or as a similarly rigorous benchmark for performance.

Equity, on the other hand, is the application of principles of justice and fairness to distributional questions, often with reference to the idiosyncrasies of individuals and groups. While equality can be assessed by a simple intergroup comparison, concerns about equity can make reference to historical discrimination, cultural power, and the needs, strengths, and social positions of different groups. Operationally, equity is a continual process by which equality can be achieved.

In this document, we attempt to heed both considerations. Metrics potentially addressing both concerns are referred to here broadly as "equity metrics." As quantitative measures, these metrics will necessarily be situated in relation to equality (e.g. a uniform distribution of resources) as a benchmark, but are selected partially on the basis of their applicability to an equity use case.

Historical and conceptual review

Note: Material and organization in this section is largely adapted from [\(Handbook on Measuring Equity in Education 2018\)](#)

Equity

Conversations about equity and equality in education often invoke related concepts such as fairness, justice and redistribution. In general, as outlined above, equity is a process by which equality is achieved. Equality is a particular outcome that, in the minds of many stakeholders, satisfies the value of fairness. Whether or not a distribution is equal (and therefore fair) is an empirical question that must be evaluated using data. However, what we choose to measure defines what kind of equality is sought. There are several popular viewpoints on this topic.

The **minimum education standard** is an outcome standard in which all individuals meet at least a basic level of proficiency in a given skill. A typical example is reading proficiency: large disparities may (and often do) continue to exist even when most individuals exceed the minimum bar for reading proficiency, since some individuals far exceed the basic required level while others barely meet it. Students who live in environments where serious systemic challenges are present, such as highly unequal urban settings, can continue to meet minimum standards en masse while simultaneously attaining wildly disparate outcomes.

Equality of educational condition is a common view (Lynch and Baker 2005) in which fairness takes the form of equal outcomes across individuals, regardless of their other significant differences with respect to socio-economic status, race, or income level. For example, an equal situation can be said to obtain when all children score similarly on statewide reading assessments regardless of their school lunch status.

Impartiality is the application of the concept of equality of opportunity to the domain of education. This concept acknowledges that despite the presence of a situation in which groups have the same nominal opportunities, children cannot be fully responsible for their own educational outcomes. For this reason, statistical measures of impartiality seek to verify that educational outcomes are uncorrelated with group membership. They should in this sense be taken as possible indicators—though not perfect evidence—of a possible underlying situation of unequal opportunity.¹

ROI

Return on investment (ROI) is broadly defined as "a measurement focus that compares program benefit to the program costs." (Phillips 1998). ROI is related to both cost-effectiveness and cost-benefit analysis. In its simplest context, ROI is a simple ratio of total financial return and total investment, thus representing units of benefit per unit of cost or units of return per unit of investment. In the educational context, different stakeholders have made different types of investment and seek different types of return. Students invest time and tuition, and seek a return primarily in terms of future wages. Governments invest funding in education programs, and seek returns both social (e.g. increased equality in educational attainment or wage levels) and economic (increased labor productivity).

Over a given time frame, for example, a student's ROI may be \$10 in additional income for every \$1 of tuition. A government may see social variations of ROI, such as a 1%

¹ Projects to equalize unequal situations are by definition redistributive. Redistribution can refer either to the simple project of changing the distribution of some good across the population, or to the explicit transfer of resources from some group to another. The first sense of the concept can exist without the second. For example, progressive taxation is (partially) an attempt to equalize the distribution of wealth across society, but it does not necessarily transfer income from those with high net worth to those with low net worth (though this is often the case). Since educational attainment is not a good that can be directly redistributed across individuals, efforts to increase the equality of outcomes in education can attempt to adjust the flow of educational resources to individuals in a way that reduces inequality of condition. These resources can be strictly financial, or they can take the form of explicit institutional attention, specialized programs, outreach efforts or admissions policies.

reduction in the gender wage gap per \$1 million investment in education, or a 5% increase in worker output per \$10 million investment.

Although simple to calculate, the use of ROI as a metric comes with potential pitfalls and opportunities for misuse and misinterpretation. Since ROI metrics don't necessarily include a unit of time, they are often unveiled without reference to the time horizon over which they were calculated, and their use can invite risk if applied on different time frames. In addition, subtle changes in measurement of either side of the ratio can dramatically influence ROI figures, and users must take care to compare apples with apples when analyzing the path of ROI metrics across time. Finally, the deployment of ROI metrics in practice can introduce perverse incentives with the dire consequences encapsulated in Goodhart's Law: "When a metric becomes a target, it ceases to be a useful measure." For example, a military contract that selects widget contractors on the basis of helmets (return) produced per dollar (investment) could easily end up selecting a helmet manufacturer with a high ROI driven by the cost savings on cheaply made, shoddily produced helmets. Individual ROI metrics are therefore not substitutes for a holistic assessment methodology.

*For a survey of existing methods and perspectives on ROI and equity measurement, please see **Appendix B**.*

Recommendations

Overview and considerations

Constructing the initial set of near-term and long-term metrics recommendations laid out below entails several caveats and challenges.

First, launching a relatively small pilot program presents data constraints that make statistically robust results difficult to achieve. In many cases, program sizes within institutions are small, making ROI and equity metrics sensitive and potentially imprecise. We recommend that any user interface or document presenting these metrics explicitly avoid presenting metrics for programs with total cohort sizes below thirty (30) individuals.

In addition, self-selection and sampling bias poses severe problems for the causal story we will implicitly offer to stakeholders when we present these metrics. Variance across aggregate, program-level statistics about post-graduation student performance is driven partly by program effects, but also partly by program composition and macroeconomic trends. In the metrics below, we have attempted to meet this challenge in two ways. By using the difference between pre- and post-program earnings as an outcome, we partially account for variation in students' "starting points" and partially account for differences in student ability. By incorporating baseline measurements for wage and employment growth, we account for the impact of long-term macroeconomic trends and the differing challenges faced by workers of different ages and education levels. And finally, by offering multiple variations on an inequality-adjusted ROI metric, we partially account for differing socioeconomic compositions across programs.

Smart decisions about what information to present to prospective students, and how to present it, are vital. After deployment of these metrics, research into how these metrics have affected student choices should be an important aspect of a forward-looking measurement effort.

For formal details on these metrics, please see Appendix A.

Near-term metrics

Metric: Earnings premium

Concern: ROI

Description: This metric is calculated by taking the difference of individuals' pre- and post-program earnings and subtracting a baseline difference derived from macroeconomic statistics.

Metric: Earnings premium per median institution household income

Concern: ROI

Description: For individuals in a given age cohort, this metric is calculated by taking the difference of individuals' pre- and post-program earnings, subtracting a baseline difference derived from macroeconomic statistics, and dividing by the median institutional household income (MIHI). MIHI is calculated by using student addresses at enrollment to place them into SES quintiles. The median household income within each quintile is extracted from Census data, and MIHI is calculated as the weighted mean of these values over the whole student population.

Metric: Demographic-level expected earnings premium

Concern: ROI

Description: For individuals with a given set of demographic characteristics (along axes of race, gender and ethnicity) this metric is calculated by taking the difference of individuals' pre- and post-program earnings and subtracting a baseline difference derived from macroeconomic statistics. This is roughly equivalent to a linear regression model with factors for all possible demographic features. This formula is identical to the one above, but should be calculated for **n** members of a given intersection of different demographic categories.

Metric: Employment premium

Concern: ROI

Description: This metric is calculated by taking the employment rate in the cohort before and after program completion and subtracting the overall employment rate change for the period.

Metric: Theil Index ratio (multiple applications)

Concern: ROI

Description: Intergroup inequality is assessed here on the basis of the adjusted mean earnings premium per group, and is assessed on the basis of (a) gender, (b) race and (c) socioeconomic status quintile (based on census tract). In order to identify the approximate amount of inequality accounted for by differences in socioeconomic status, a ratio is constructed using the Theil index (dividing the term representing cross-group disparity by the total value of the index). The absolute value of this ratio will range between 0 and 1, with values closer to 0 representing greater cross-group equality.

Long-term metrics

Metric: Earnings premium per net price dollar

Concern: ROI

Description: This will be calculated in the same manner as the earnings premium produced above, but will instead use net price calculations utilizing spending and cost data originating with institutions.

Metric: Benefit incidence analysis (two variations)

Concern: Equity

Description: This metric yields the proportion of total spending that benefits students in (a) different racial groups and (b) different quintiles of socioeconomic status. Benefit in this calculation will be identified by macroeconomic-adjusted earnings premium; SES will again be estimated by census tract. This metric is calculated at the institution level.

Making decisions about metric use

Metrics are indices of underlying phenomena, not perfect representations of the phenomena themselves. As such, wage premium calculations are an index of a program's capacity to increase student earnings, not a perfect measurement of it. Likewise, equity metrics are an index of possible underlying inequities, not a characterization of those inequities or even conclusive evidence that they exist. The ROI and equity metrics presented in this document are tools for decision-making by students, administrators, and policymakers. They should be part of a larger discussion, and a broader decision-making process, for all parties who see and use them

Security is a prerequisite

The metrics described above make significant use of individual-level data. In particular, the production of these metrics is dependent upon the linkage of student-level educational histories with wage and unemployment data. As such, the dataset used to create these recommended ROI metrics is highly sensitive, and an ROI calculation framework should not be put in place without a secure infrastructure for combining and organizing these data flows, complete with well-defined legal, ethical and governance conditions. Successful deployment of the ROI metrics depends on the integrity of their source.

ROI metrics should not be calculated at populations below 30 individuals per stratum

For statistical rigor, ROI metrics should not be reported when the available dataset used to calculate the metric is available only for fewer than 30 individuals. This means:

- For programs for which under 30 linked wage/education records are available, no earnings or wage premium should be reported.
- For programs or institutions with fewer than 30 individuals in any demographic class (e.g. fewer than 30 Native American students or fewer than 30 low-SES students), equity metrics such as the Theil Index Ratio should exclude information about individuals in that class.

Differentially missing data can obviate metric effectiveness

In general, metrics should not be calculated on the basis of data for which large swaths of individual student observations are empty or unavailable. More specifically, metrics should not be reported if missing data, including wage data, cannot be reasonably presumed to be missing at random. Conventional statistical tests can be used to determine if data for a given student subpopulation is differentially missing at a significant level.

Examples:

- If data for students who entered a program with low-SES backgrounds is missing at a significantly greater rate than data from other students, outcome and equity metrics for this program should not be reported.
- If data for Hispanic students at the institution level is differentially missing, outcome and equity metrics at the institution level should not be reported (please note that this does not necessarily entail that program-level metrics are obviated).

Presentation depends on student needs

The ROI metrics presented in this document capture only a segment of the concerns of both traditional and nontraditional students. Beyond simply wages and expected probability of employment, students are interested in the likelihood that they will be employed in their field of choice and their stability of employment. When picking programs, they may be concerned about flexibility, program difficulty, and more subjective factors such as personal enjoyment.

Presenting a given metric to students via a dashboard or other product constitutes a suggestion that the metric in question is relevant to those students. This may not always be the case, and metric users should be careful not to position these metrics as singular indicators of program quality or equity.

Starting point recommendations

- For institutions with more than 30 historical individuals per program and more than 30 historical individuals per demographic subgroup, no differentially missing data, and a secure linkage of educational history with wage and unemployment data.
 - Report program- and institution-level ROI and equity metrics.
- For institutions with a secure data linkage, differentially missing data at the institution level, but programs for which there is no differentially missing data
 - Report program-level ROI and equity metrics only
- For institutions with no secure linkage of data
 - Do not attempt to calculate or report ROI or equity metrics

Appendix A: Formal metric descriptions

Metric: Earnings premium per dollar tuition²

$$\frac{1}{n \times \text{tuition}} \sum_{i=1}^n (E_{i_{\text{after}}} - E_{i_{\text{before}}}) - (E_{i_{\text{before}}} \times \Delta \text{baseline wages}_i)$$

Metric: Earnings premium per dollar of program median household income

$$\frac{1}{n \times \text{program median HH income}} \sum_{i=1}^n (E_{i_{\text{after}}} - E_{i_{\text{before}}}) - (E_{i_{\text{before}}} \times \Delta \text{baseline wages}_i)$$

Metric: Employment premium per dollar tuition³

$$\frac{1}{n \times \text{tuition}} \sum_{i=1}^n (1_{\text{employed after}} - 1_{\text{employed before}}) - \Delta \text{local employment}_i$$

Metric: Theil Index ratio (multiple applications)

$$\frac{\sum_{i=1}^m s_i T_i}{\sum_{i=1}^m s_i T_i + \sum_{i=1}^m s_i \ln \frac{1}{x_i}} \text{ for } s_i = \frac{N_i}{N}$$

Metric: Benefit incidence analysis

For m programs, the share of benefits accruing to group j from total spending on education, where e_{ij} is the share of students in group j enrolled in program i , and s_i is the share of spending for program m , is given simply by $x_j = \sum_{i=1}^m e_{ij} s_i$.

² Change in baseline wages is calculated by fitting a modified Mincer regression to define a model for wage growth given education level, age, and experience. For traditional students, this model is used in conjunction with mean wages for high school graduates in order to establish a counterfactual wage growth scenario. For nontraditional students, the model is applied to individuals' pre-program wages in order to forecast counterfactual wage growth on a person-by-person basis.

³ Change in local employment here is calculated using monthly local area unemployment statistics from the Bureau of Labor Statistics

Appendix B: Background on existing metrics

Existing measures of equity

Education researchers use a wide variety of existing quantitative measures of equity. One of the challenges of this project is that many existing statistical metrics of inequality are in fact measures of statistical dispersion constructed for use with a continuous probability distribution. These measures lend themselves well to visualizations, such as plots depicting the empirical distribution of test scores across the population, or Lorenz curves illustrating the current distribution as compared to a perfectly equal benchmark. In this context, however, users of equity metrics may be primarily concerned with intergroup inequality (as related to the definition of "impartiality" above). In this section we survey some of the existing metrics currently used to assess educational equity, and raise possible concerns or considerations where important.

Visualization

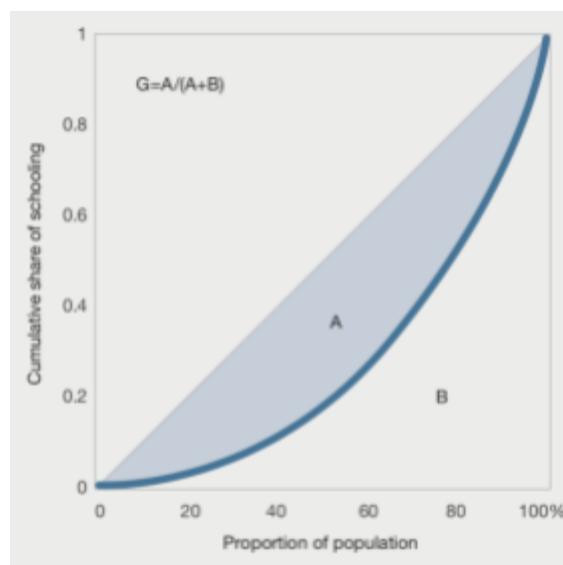
Measures of impartiality are easily visualized as a bar chart or other display of categorical data, and easily interpretable by relatively unsophisticated users. Visual measures of statistical dispersion, such as the Lorenz curve, may require more interpretation. Visualizations are valuable for analysts and stakeholders at an early stage of exploratory analysis, and can serve a valuable internal purpose as a locus of conversation around equity. However, visualizations are primarily communications tools, and the creation of these products should be an ancillary benefit of the measurement process, not its central focus.

Equality of condition

There are two main categories of metric used for assessing equality of condition. The first are measures of statistical dispersion, simple mathematical constructs that describe the amount of variation in a dataset. The textbook example is variance, the average squared deviation from the mean value of the data. The second type are cumulative information measures, which specifically address the degree of inequality (defined variously) across a dataset, and often return values on a scale from perfect equality to perfect inequality.

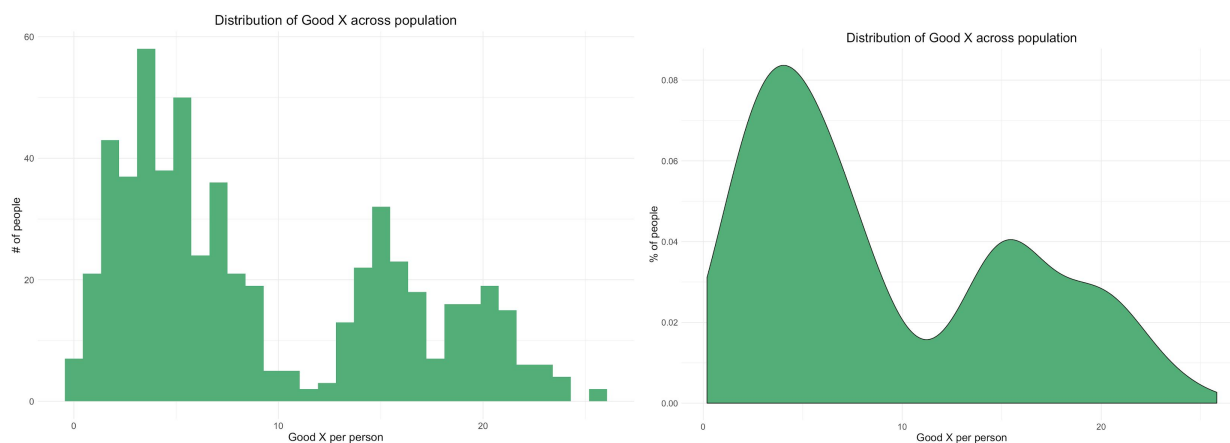
The **Gini coefficient** is one of the most common metrics used for assessing inequality across a continuous distribution. A Gini coefficient of 0 represents perfect equality (in which the distribution across individuals is uniform); the metric approaches 1 as the distribution approaches a point in which all resources are allocated to one individual. The Gini coefficient can be understood through visualization. In the **Lorenz curve** below, the 45 degree line represents perfect equality, while the curved line denotes the actual distribution

of wealth. The Gini coefficient is understood as the ratio between the shaded region (A) and the total area under the line of equality (A+B).



Source: Handbook on Measuring Equity in Education

The use of histograms or probability distribution functions to visually represent the distribution of a continuous measurement can also be a useful tool for understanding how evenly distributed a good or resource is. The side-by-side histogram and density plot below show two different ways of presenting the same data:



The plot on the left is a histogram, with equal-width bins whose height represents the number of individuals in the population. The plot on the right illustrates the same distribution but depicts a **probability density**, in which the y-axis represents a percentage of the population as opposed to a count. The use of **variance** or its square root, **standard deviation**, as an equity metric is equivalent to characterizing equity via the dispersion of this

density, or (in other words) how tightly clustered the data is around its average value.⁴ One final measure of statistical dispersion to consider here is the **coefficient of variation**, a dimensionless quantity equal to the ratio between the standard deviation of a dataset and its mean. By standardizing dispersion using the data mean, the coefficient makes the scale of the measurement irrelevant, and allows for theoretical comparability between measurements with different units. However, the metric is highly sensitive: of two datasets in the same unit with the same variance, the one with the greater mean will have a lower coefficient of variation. Depending on use case, this feature of the metric may be undesirable

Impartiality

Simple metrics of impartiality often take the form of gaps, such as the well-documented “wage gap” between male and female workers, or ratios, such as the ratio of CEO wages to average employee salary. In general, metrics of impartiality compare use aggregate group-level statistics (such as mean educational attainment by race) in order to characterize inequality across multiple groups. In the context of a specific educational institution, efforts to deploy impartiality metrics can be hamstrung by small sample sizes, which can make impartiality metrics highly sensitive to small changes in the makeup of the student population. For example, a naïve (population-unweighted) metric of academic performance across ethnic background might be deployed across a student population containing only two Native American students; in this scenario, the replacement of a single high-performing student in that group with a low-performing student could dramatically alter metrics describing the distribution of performance across ethnicities

- **Gaps** are the simplest measure of impartiality. For example, a simple comparison of means yields a gap: if North Dakotans make an average of \$40k/year and South Dakotans make an average of \$45k, the Dakota wage gap is \$5k/year.
- **Ratios** express a summary statistic for one group in terms of another. In the example above, the North/South wage ratio is $40/45 = 8/9$. This is an example of a **parity index**. One common use of ratios in educational equity assessment is the **Palma ratio**, defined as the ratio of the education share of the top 10% of the population to that of the bottom 40%.
- **Group standard deviation** is a measure of dispersion of group means around the mean of group means. The use of Group S.D. will be of limited utility in settings with small group sizes, and may not be informative without the deployment of other metrics.

⁴ One weakness of variance as a metric is that it is most useful in a context of normality, e.g. when the data under review follows a Gaussian distribution (or “bell curve”). In settings where data follows significantly different distributions, analysts’ intuitions about the meaning of variance may be misleading.

- **Benefit incidence analysis (BIA)** is a methodology for assessing the portion of some investment that benefits different subgroups of a population. BIA is commonly used in public-sector health care assessment in order to identify how public spending benefits health care utilization rates by group. In education, BIA can be used (for example) to identify the share of an education subsidy that benefits low-income students. Used in conjunction with a quantitative benchmark of fairness, BIA can be used to identify whether resources are being disbursed in a way that improves overall equity, and has a history of use in the education sector (**Lassibille and Tan 2007**).
- **Group Gini** is a modification of the Gini coefficient discussed above. This metric is again on a 0-1 scale of equality to inequality, and uses sample size-weighted group means to assess intergroup inequality. Used in conjunction with the population-level Gini, this metric can be used to approximate the percentage of total disparity explained by cross-group inequality. However, this calculation can contain a significant amount of statistical uncertainty.
- The **Theil Index** is derived from Shannon information entropy, a measure of the randomness in a dataset. The uniform distribution representing the benchmark of total equality is the maximum entropy (e.g. most random) distribution on any interval; within a group, the Theil index is (roughly) a way of measuring the degree to which the data departs from this distribution. Calculated at the population level, the Theil Index can be decomposed into two terms, with one representing the sum of within-group Theil indices and the other representing a cross-group Theil index. As in the case of Group Gini, a ratio can be constructed that represents the amount of overall disparity accounted for by intergroup inequality.

Existing measures of ROI and related metrics

Outside of the basic ROI calculation, there are several existing ROI metrics used in contemporary assessment and several important perspectives on ROI (construed broadly). In academic economics, discussion about the return to education often revolves around the so-called "Mincer equation" (Grossbard 2006), a regression model used to estimate the earnings premium— the percentage increase in annual wages corresponding to an additional year of schooling (Psacharopoulos and Patrinos 2018). The Mincerian method competes in the economic literature with the full-discounting method, which estimates the present value of expected earnings by using lifetime earnings profiles associated with different education levels (de la Fuente and Jimeno 2008).

Economists have found it difficult to assess the social returns to education (e.g. Acemoglu and Angrist 2008) when separated from private returns (e.g. the earnings premium), yet there is some evidence that increased levels of education are positively correlated with voter participation (Milligan, Moretti and Oreopoulos 2003) and and lower

crime (Lochner and Moretti 2004). Nevertheless, there is no commonly accepted strategy for assessing the social returns of increased education spending.

With respect to private returns, there is a broad diversity in the types of return and cost analyzed. Below is a survey of some of the most common methodologies in the education space, as well as context and examples drawn from other domains that may be applicable here.

- **Net present value (NPV)** is an elaboration of the basic ROI calculation that takes into account the time value of money. In education, NPV calculations factor in a discount rate in order to give an amount in present dollars that reflects the value of future expected earnings. If an individual's discount rate is 10%, and if she can expect to earn an additional \$10,000 per year thanks to her education, the NPV of her first year's expected earnings is \$9,090.91 and the NPV of her second year's earnings is \$8,264.46. Typically, NPV is calculated for a set of years over a fixed time frame. The discounted earnings are summed together and can be plugged into a conventional ROI metric in order to get a figure that provides (for example) the expected return on an investment made in the present over the course of a lifetime. NPV calculations are potentially applicable both to students and to other stakeholders.
- **Internal rate of return (IRR)** is in some respects the inverse of NPV. Rather than a dollar figure, the IRR is a percentage rate of annual return on an investment, and it is calculated by setting the sum of all future cash flows equal to the total investment made in the present. It is sometimes called the "effective interest rate" can be usefully thought of as just that— a fixed annual percentage return on an initial investment. IRR calculations, like NPV are potentially applicable both to students and to other stakeholders.
- The U.S. Department of Education offers a **net price calculator** which allows students to calculate the expected net price of their education based on information used to estimate these students' Expected Family Contribution (EFC). This tool does not have a feature to allow students to assess their future financial returns, but it does have the advantage of providing a usable interface designed explicitly for prospective students. The source code for the calculator is available to the public.
- **Responsibility center management (RCM)**, also known as responsibility-centered management or responsibility center budgeting, is not an explicit formula but rather a budgeting process that uses mission-driven metrics to assess different allocations. At its most basic, RCM is a decentralized process in which both revenues and costs are assigned to the university units and departments that originate them. The system is currently used by the University of Arizona, Drexel University and others in their budgeting processes.

- **Cost-benefit analysis (CBA)** can be thought of as an expansion of the concept of ROI. In CBA, all costs and benefits, including nominally non-monetary values, are converted into a common dollar value and adjusted for the time value of money; generally speaking, NPV (discussed above) is used for both sides of the ratio. CBA has been applied in public policy for more than half a century. The approach has been applied in education, as in assessment of K-12 programs (Belfield and Levin 2007). CBA relies on precision in estimates of both costs and benefits, and is typically accompanied by a sensitivity analysis in order to test the robustness of its findings.
- **Cost-effectiveness analysis (CEA)** is the process of comparing different possible paths on the basis of their relative costs and outcomes. In recent years, cost-effectiveness has become an increasingly important standard in global health, where philosophers have argued that a moral imperative favors its use: with finite resources, choosing a less cost-effective intervention is equivalent to sacrificing thousands of lives due to a "failure to prioritize" (Ord 2013). A similar, though somewhat less dire situation, obtains in education, where economists have argued that the education space has failed to take note of successes of CEA in domains such as crime and health (Levin and Belfield 2013), despite the sizable and rising costs of education and its obvious importance to society. Unlike CBA, CEA does not require that all values be converted into a common unit.

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