

Research Brief

Academic Return-on-Investment (AROI) and School Improvement



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Executive Summary

The evidence-based decision-making emphasis in education has largely focused on the adoption of new practices for which evidence of effectiveness exists. Following adoption, however, the focus shifts to improvement and the appropriate evidence needed to support budget decisions must be *local*, *timely*, and *relevant*. Existing evidence used to support adoption rarely meets these requirements, thus the critical task for educators at the improvement stage is to produce the necessary evidence. Since 2018, we have investigated the viability of Academic Return-on-Investment (AROI) as both a framework and a practical metric for informing budget decisions aimed at improvement.

As a decision-making framework, AROI relies on the notions of *scrutiny* and *return* to provide supporting evidence for leaders' efforts to obtain the greatest academic benefits for each dollar invested. As a metric, AROI is a ratio of effectiveness to costs, weighted by the number of participants, typically interpreted as the change in outcome per unit cost. Although our practical AROI metric compared well with more rigorous cost-effectiveness and value-added analytic results for informing budget decisions, we note the adaptability within a general AROI framework to tailor the research design and methodology to a particular situation and to answer the pertinent decision-oriented research question(s).

Based on our findings, we view AROI as a flexible approach to generating evidence that is local, timely, and relevant to inform budget decisions in the improvement phase of an investment. Developing the necessary organizational and data infrastructure to support AROI implementation requires top leadership support and patience. Because AROI results are informative rather than definitive, close collaboration with investment item owners is crucial to engender trust and guide improvement efforts.

Academic Return-on-Investment (AROI) and Budget Decision-Making: A Research Brief

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Introduction: Evidence for decision-making

The evidence-based decision-making emphasis in education has largely focused on the adoption of new practices for which evidence of effectiveness exists. Where there is alignment between a given local context and the specific context(s) of available, sufficiently rigorous studies, the findings of those studies can be used to support the new investment of resources into a particular practice. This is because the pertinent question at the outset of the adoption phase is whether the practice has demonstrated effectiveness under similar conditions elsewhere, i.e., “what works?” The budget decisions at this stage are dichotomous – invest or not. The primary evidence-related tasks for decision-makers are to locate and interpret existing evidence to support a new investment.

Following adoption, however, the focus shifts to improvement and the pertinent question becomes “what should we do now?” Because the goal is improvement, budget decisions at this phase are not limited to a ‘continue/discontinue’ dichotomy, but also include specifying changes in scope, target population and/or goals based on lessons-learned from initial implementation efforts. During the subsequent improvement phase of an investment, the appropriate evidence needed to support budget decisions must be *local*, *timely*, and *relevant*. Existing evidence used to support adoption rarely meets these requirements, thus the critical tasks for educators at the improvement stage are to produce the necessary evidence and act upon that evidence. Locating and interpreting existing evidence to support a new investment is not a trivial task but producing evidence for continuous improvement presents a higher order of magnitude challenge. Since 2018, our IES-funded Research-Practice Partnership (RPP) between Jefferson County Public Schools

(JCPS; Louisville, KY) Teachers College, Columbia University, and American University has investigated the viability of Academic Return-on-Investment (AROI) as both a framework and a practical metric for informing budget decisions aimed at improvement. In this brief, we present a synopsis of our work on AROI that is primarily aimed at educators and researchers. Although JCPS is a large, urban district with more than 94,000 students in 169 schools, we believe the lessons we have learned through trial and error apply across a broad spectrum of district contexts.

What is AROI?

Kavanagh and Levenson (2017; p. 1) define AROI as “the practice of scientifically evaluating the cost-effectiveness of academic programs and then deciding where to allocate resources accordingly.” As a decision-making framework, AROI relies on the notions of *scrutiny* and *return* to provide supporting evidence for leaders’ efforts to obtain the greatest academic benefits for each dollar invested. As a metric, AROI is a ratio of effectiveness to costs, weighted by the number of participants, typically interpreted as the change in outcome per unit cost. Crucially, cost-effectiveness is relative and thus the AROI metric is intended to be comparative rather than standalone. In other words, knowing the AROI of an investment is not very helpful without the ability to compare with AROI metrics from other investments. Furthermore, AROI comparison results themselves are generally viewed as informative rather than definitive (e.g., Kavanagh & Levenson, 2017), as a key piece of evidence supporting budget decisions.

Local, Timely, and Relevant Information

In 2015, our district implemented a *cycle-based budgeting* (CBB; see sidebar) model in an effort to build a stronger alignment between district’s improvement priorities and investments in programs and initiatives, track implementation of and return on those investments, and inform leaders on when and how to adjust investment strategies. In our CBB model, prospective general budget fund investments are approved for a 1-to-5-year investment cycle to achieve predetermined goals. End-of-cycle items (i.e., those that have reached the end of the predetermined investment term) are reviewed and results are submitted to district leaders to support decisions regarding next steps for that investment during the budget season. The district’s online Investment Tracking System supports the CBB process from proposal to review. Requestors use the system to submit online budget request proposals, with technical support provided by the research department. Information provided in proposals approved by senior district leadership is used by the district

financial office to create budget line items and by the research department for end-of-cycle reviews. Division heads have access to the system to view their active investments.

CYCLE-BASED BUDGETING

Cycle-based budgeting (CBB) is a type of budgeting strategy that allows requestors to designate the length of time – the *cycle* – that they will need to implement an investment in order to achieve specific outcomes for specific students. During the cycle, investment item owners are responsible for implementation and improvement (with support, as needed). At the end of its designated cycle, each investment is reviewed based on the goals specified at the outset and results are provided to key decision-makers. For a more in-depth look at CBB, please visit cyclebasedbudgeting.org

CBB, like AROI, is based on the notions of *scrutiny* and *return*, and so our CBB model implementation laid the groundwork for applying the AROI framework to the general fund budget items recorded in the Investment Tracking System – roughly \$100M in active investments at any given point. Indeed, conversations with our RPP partners quickly arose on how the AROI approach might dovetail with the CBB end-of-cycle review process. We needed a way to feasibly review a considerable number of end-of-cycle investments each year and provide reliable information to decision-makers within a relatively small time-window that is often not aligned with testing cycles and other data availability.

Assessing whether an investment achieved its goal (i.e., did it “work?”) is helpful, but it is insufficient to answer the relevant question of “what do we do now?” because it does not give any clues as to why the investment was or was not successful. In many cases, investments do not achieve stated goals because the goals were unrealistic in the first place. Further complicating goal achievement is the fact that goals were many times focused on a broader level than the target, for example, a reading intervention for a specific subgroup of students was associated with a goal of reducing the whole school’s percentage of reading novices. When target populations and goals are (mis?)aligned in this way, identifying the relevant comparison group becomes challenging, particularly for multi-year investments. Similarly, the comparison condition (i.e., business-as-usual) must be a realistic alternative for decision makers. Policies and laws often dictate some form of intervention, thus ‘no treatment’ control group designs may be less informative for improvement phase budget decisions.

Despite the methodological challenges, we felt that an AROI approach could provide a transparent, structured framework for providing evidence to district decision-makers. Furthermore, the alignment between CBB and AROI regarding scrutiny and return lent itself to a seamless integration. The question then became, could we leverage the data recorded in our Investment Tracking System, along with existing student-level achievement, behavior, and demographic data to produce ‘good enough’ AROI metrics for each investment in a timely manner to support continuous improvement decisions that might involve budget adjustments?

What Does AROI Look Like in Our District?

Earlier, we described the AROI approach and metric in general terms. Within the broad AROI framework, there is considerable leeway to tailor specific aspects of the metric to the particular realities, needs, and priorities of a given district and/or research team. Indeed, our CBB-focused application differs in substantial ways from the model proposed by Kavanagh and Levenson (2017). First, we apply AROI only to existing end-of-cycle investments in the Investment Tracking System. Second, we sought to balance rigor and practicality by creating a metric based on simplified calculations using existing data. The reason for this approach was that we needed a feasible way to compare a significant number of investments annually.

We currently compute two AROI metrics – a previous cohort (PC) and difference-in-difference (DiD) metric. The PC method compares outcomes before and after the investment within the same unit (e.g., student subgroup, school, or group of schools) and the DiD method compares changes in outcomes in treatment units versus those in control units. Both calculations utilize weighted moving averages to account for baseline and investment cycle trends. Finally, our metric relies on budget amounts for costs as opposed to considering the full economic costs of implementation as would be required for a true cost-effectiveness analysis ([Cost Analysis Standards Project, 2021](#)).

How do AROI Metrics Stack up Against More Rigorous Methods?

Our RPP conducted three large-scale cost-effectiveness analyses (CEAs) and two separate Value-Added Analyses (VAAs) to compare results of two more rigorous methods with our AROI results in an effort to validate the metric. The effectiveness results generally agreed in direction and magnitude across the three methods. Somewhat surprisingly, costs between CEA and AROI were similar despite the CEA’s ingredients method of computing costs requiring substantially

more time and effort. This was due in large part to the fact that personnel costs tended to constitute the vast majority of costs for the three investments covered by CEA and these are mostly captured in the budget amounts.

We are not necessarily advocating for our AROI metric but instead providing a concrete example of the flexibility within a general AROI framework to adapt the research design and methodology to a particular situation and to answer the pertinent decision-oriented research question(s). Indeed, our metric comes with several caveats and, in general, we have often found it unhelpful to report the metric alone. Depending on the audience, we have reported trend graphs, lists of programs ranked by effectiveness, or color-coded indicators of success in terms of goal achievement or positive versus negative returns on investment.

Evidence for What, and for Whom?

We want to reiterate the point made by Kavanagh and Levenson (2017) that regardless of design and analytic choices, AROI results are intended to be informative rather than definitive. In other words, the findings should be supplemented with other qualitative and/or quantitative evidence (e.g., implementation ratings) along with determinations of whether an investment is aligned with evolving district priorities. During the last school year, we formalized this process by creating online end-of-cycle review cards for every district-submitted investment up for review. Each card summarized the details of the investment and provided a comparison of budget allotment versus expenditures over the duration of the investment cycle and a summary of the AROI analysis. Division leaders were then given the opportunity to review the cards for their investments and determine whether to seek renewal, expansion, reduction, or discontinuation for each investment. For the first three options, the summary cards provide space for division leaders to add additional supporting evidence and/or planned implementation adjustments prior to submitting a proposal to the district's leadership team (the Superintendent's "cabinet") requesting continued funding.

We initially envisioned our AROI metric as evidence that would directly inform final budget decisions, however, the reality is more nuanced. Instead, the review process revealed three levels of decision-making; item, division, and cabinet. Decisions at the *item level* are made by the item owner – the 'boots on the ground' administrator in charge of implementing and monitoring an investment. Item owners are the source of additional supporting evidence for continued investment and can suggest implementation adjustments to support continuous improvement (i.e.,

increased returns) based on intimate knowledge of the day-to-day working of the investment. Because the primary returns at this level are the goals specified in the original budget request proposal, AROI analysis results are especially informative at this level.

At the *division level*, budget decisions for end-of-cycle investments are based on (1) alignment with division priorities, (2) redundancy or coherence with other division investments, (3) AROI results, and (4) evidence and/or implementation improvement proposals from the item owner. Returns at this level are still primarily viewed in terms of the originally specified goals. Requests for discontinuation or expansion are much more likely at this level and pressure from external stakeholders (i.e., community engagement) to retain or expand certain initiatives also tends to increase. However, that engagement is strongest at the *cabinet level*. Decision criteria at the cabinet level include (1) alignment with district priorities, (2) redundancy or coherence with other district investments, (3) community engagement, and (4) requests from division leaders. Returns (or goals) at this level include the outcomes specified in the original request, but may also include signaling the district's intentions to internal and/or external stakeholders.

Our AROI analyses appeared to directly influence decisions at the item and division levels and indirectly influence cabinet-level decisions. Although this was somewhat unexpected, it likely reflects broader decision criteria at the cabinet level, but also effective filtering at the division level. In other words, division leaders seem to be effective at submitting proposals that are aligned with the cabinet's priorities. Indeed, one investment with limited supporting evidence was discontinued at the division level during the formal review process.

In other cases, personnel changes during the investment cycle meant that item owners and/or division heads were not familiar with AROI or CBB concepts, thus the review process served as an introduction to both. For some investments, the formal review process provided an opportunity to reexamine the program's alignment with the district's racial equity plan and to propose implementation changes based on the district's equity focus. For another program that enjoys tremendous conceptual support from the cabinet and community, the review process afforded the investment item owner a chance to discuss increased resource needs and implementation plans related to planned expansion directly with the division and cabinet.

SCHOOL NURSING

In 2019, we conducted CEA, VAA, and AROI analyses of the district's school nurse program. The consistent findings across the three analyses suggested that the presence of a full-time school nurse was not associated with higher school attendance or lower chronic absenteeism.

As it turns out, our results were not surprising. The program lacked a clear theory of change or logic model linking inputs, activities, outputs, and outcomes. It was not clear which nursing practices should lead to the desired outcomes. Therefore, we concluded that the nursing program *as implemented* was ineffective. We recommended the development of standardized practices based on an explicit logic model, accompanied by a detailed monitoring plan to ensure implementation fidelity, both of which are currently in-progress. While these proposed changes do not guarantee effectiveness, they will facilitate more interpretable AROI results that can better inform budget decisions and support continuous improvement.

Nudging Improvement

Our RPP analyzed the returns on nearly 200 investments spanning the years 2017-2021. During the course of our project, we spoke with numerous teachers, principals, school staff, district staff, senior district leaders, and board members. While it is apparent that our colleagues are committed to improving student outcomes, we found that investments frequently lack explicit theories of change, leading to flawed implementation. In many cases, we were unable to calculate AROI due to incomplete budget request proposals missing goals, measures, and/or target population. When investments were personnel-centered, such as an interventionist, academic coach, or school nurse, the specific activities necessary to achieve their intended goals were rarely specified, even if goals, measures, and targets were explicit. In those cases, even when we could calculate AROI, the results were of little benefit for improvement efforts because it was not clear what actually produced success or failure (see sidebar "School Nursing"). To put it in logic-model terms, without knowing the activities and outputs associated with a given investment, the finding that the investment did or did not achieve its stated goal(s) is not particularly informative to multi-optioned budget decisions, especially decisions to expand or continue with substantial implementation changes.

We sought to address these issues via the end-of-cycle review process and through key changes in the [Investment Tracking System 2.0](#) (ITS 2.0). The EOC summary cards used in the review process indicated when we were unable to compute

AROI due to missing data and identified the type(s) of data that were missing. The cards also provided the percentage of budgeted amounts actually spent during the investment cycle, as a simple proxy for implementation fidelity. For each investment summary review card, we asked specific questions about any missing data (e.g., “*what are the goals, or how is success measured?*” or “*is there a system in place to track program participation, completion, and subsequent retention?*”) and/or large discrepancies between allotments and expenditures. These questions were intended as prompts for item owners’ efforts to provide additional supporting information for their investments and potentially re-evaluate their implementation.

To facilitate an explicit theory of change on the front end, ITS 2.0 now includes a basic logic model whose inputs and outcomes are automatically generated from the information entered into the budget request proposal. Requestors can add additional inputs and/or outcomes, along with activities and outputs. Because it is likely that many requestors are not familiar with logic models, we created online training modules and worked with our Systems Improvement team to align ITS 2.0 language with existing school improvement plans. Our goal in introducing the formalized review process and in updating the investment tracking system was to (re)emphasize scrutiny and returns (i.e., AROI) in a collaborative manner that would nudge our colleagues to make explicit their implicit assumptions about how an investment should lead to improved student outcomes. A secondary goal was to address incomplete budget proposals. Incomplete proposals do not necessarily imply that goals, measures, and target populations are undetermined – we are not privy to all conversations between decision-makers and requestors – however, they do reduce transparency and hinder independent end-of-cycle AROI calculations. For these reasons, ITS 2.0 includes mandatory-entry fields that preclude the submission of incomplete proposals.

Advice on Getting Started with Return-on-Investment Approaches

Although we have gone into some detail about our integrated CBB-AROI approach, we are not implying that CBB is necessary for implementing AROI. While we certainly view AROI as a helpful and easily integrated approach to the CBB end-of-cycle review process, we do not view CBB as an essential condition for adopting an AROI approach. In our estimation, there are three essentials for applying AROI: 1) leadership support, 2) infrastructure, and 3) patience. Leadership support is crucial to signal the importance of viewing investments in terms of scrutiny and return. If decision-makers and division leaders do not emphasize the importance of AROI

verbally and by utilizing analytic results to inform decisions, program personnel will likely view AROI as just another compliance routine rather than a helpful tool for improving outcomes. In fact, AROI might even be viewed as threatening rather than improvement-focused when leadership does not clearly communicate its purpose.

CAUTION AHEAD

Legacy investments avoid scrutiny and therefore are more likely to miss out on chances to demonstrate returns or improve.

Selection-equals-solution thinking is the notion that picking the ‘right’ investment guarantees success. Often these investments are described as successful (past-tense) prior to implementation – as if their selection has solved the problem. This type of thinking can undermine monitoring fidelity of implementation, making AROI analysis difficult. The present focus on evidence-based education practices may inadvertently foster this attitude by overemphasizing selection of such practice while neglecting their implementation and improvement.

We view infrastructure in two categories: *organizational* and *data*. Organizational infrastructure in our case involves a shared vision and collaboration between the Finance and Research Departments, undergirded by leadership support. Without close cooperation between the two departments, our AROI approach would be severely limited. This type of infrastructure also includes good working relationships with other district divisions and school administrators. To the extent that relationships have been and can be cultivated, trusting colleagues can work together to use the AROI approach as intended – to obtain better results at a lower cost. Also crucial to this category is the capacity to conduct rigorous analyses, either locally or through partnerships with external researchers.

Data infrastructure refers to the ability to track investments in terms of costs and effectiveness. In our case, we created the Investment Tracking System to supplement our existing student data warehousing system. This infrastructure also includes idiosyncratic rostering and progress-monitoring systems created and

utilized by divisions and schools. These systems may be a key area for improving efficiency and standardizing practices. In practice, organizational and data infrastructures are reliant on one another to support AROI implementation. Leadership must commit resources to developing infrastructure, but often early development is crucial to obtaining such support.

Last, but not least, we commend patience when implementing AROI (see sidebar “Caution Ahead”). Developing infrastructure takes time, even when leadership is fully supportive. Communicating and reemphasizing scrutiny and return amid personnel and leadership changes requires gracious tenacity and commitment. It may be helpful to start small, perhaps focusing on one or two key investments. Whenever possible, collaborate with trusted colleagues to obtain critical feedback – a crucial aspect of learning from inevitable mistakes and oversights.

Conclusion

We view AROI as a flexible approach to generating evidence that is local, timely, and relevant to inform budget decisions in the post-adoption improvement phase of an investment. Developing the necessary organizational and data infrastructure to support AROI implementation requires top leadership support and patience. Because AROI results are informative rather than definitive, close collaboration with investment item owners will help engender trust and ultimately provide answers to the key question, “what do we do now?”

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