



EDUCATION AND LABOR

Implementation and Outcomes of the Appalachian Renaissance Initiative in Eastern Kentucky Schools

Andrea Phillips, Julia H. Kaufman, John F. Pane, Emma Lee, Andy Bogart

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Published by the RAND Corporation, Santa Monica, Calif.

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Preface

This report presents findings from the evaluation of the Appalachian Renaissance Initiative (ARI), a Race to the Top–District (RTT-D) grant awarded to the Kentucky Valley Educational Cooperative (KVEC). The ARI provided principals, teachers, and students from 17 districts and 99 schools in rural Eastern Kentucky with an array of opportunities and activities intended to support and improve teaching and learning through innovative, personalized learning approaches. In response to RTT-D priorities, the ARI’s activities focused on a range of areas, from personalized learning and next generation classrooms to college and career readiness and educator effectiveness. As intended by the grant program, activities evolved over time to meet the needs of schools, teachers, and students. Principals, teachers, and students were able to choose the activities in which they participated. KVEC offered the ARI from the 2014–2015 through 2017–2018 school years. Findings from the study address implementation of the initiative and effects on student outcomes.

This study was undertaken by RAND Education and Labor, a division of the RAND Corporation that conducts research on early childhood through postsecondary education programs, workforce development, and programs and policies affecting workers, entrepreneurship, financial literacy, and decisionmaking. This study was sponsored by KVEC. This report should be of interest to school system leaders and teachers interested in designing and implementing education reform initiatives aimed at innovating instruction in K–12 schools. In particular, this study may offer useful information for small, rural school districts that may struggle to provide students with the same level of resources and supports as larger districts, as well as regional education agencies interested in leading reform efforts.

More information about RAND can be found at www.rand.org. Questions about this report should be directed to Andrea Phillips at aphillip@rand.org, and questions about RAND Education and Labor should be directed to educationandlabor@rand.org.

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Summary

This report presents findings from RAND’s evaluation of the Appalachian Renaissance Initiative (ARI) in 17 districts totaling 99 kindergarten–12th grade schools within the Kentucky Valley Educational Cooperative (KVEC). The initiative took place from the 2014–2015 through 2017–2018 academic years. KVEC received federal funding through the Race to the Top–District (RTT-D) federal grant program to provide participating districts with an array of opportunities and activities intended to support and improve teaching and learning. In response to RTT-D priorities, ARI activities focused on a range of areas, from personalized learning and next generation classrooms to college and career readiness and educator effectiveness. Principals, teachers, and students were able to choose the activities in which they participated.

Our evaluation examined various aspects of ARI implementation through collection and analysis of documents, surveys, and interviews with those charged with leading the ARI, as well as school principals and teachers. We also conducted an investigation of student achievement outcomes in schools participating in the ARI relative to other schools in Kentucky. The implementation study included all four years the initiative was offered, but, because the study ended earlier than intended, the outcomes study includes only three years of student achievement data (from 2014–2015 to 2016–2017). Despite some lack of alignment between the implementation and outcomes study, we offer some key takeaways from this work. These key findings are noted by each of the four research questions for our study:

1. What activities and opportunities constituted the ARI, and how were they communicated across districts?
 - The ARI comprised 26 different activities: 17 activities focused on building capacity for principals and teachers, and nine specifically targeted student learning. Fourteen of the 26 activities were offered all four years of the ARI.
 - The ARI created numerous structures to communicate about activities to districts, schools, and teachers, including the KVEC ARI leadership team, the Innovation Coordinator (a new position in each district created through the ARI to disseminate information about ARI activities), summits where teachers could share what they learned, technologies such as MondoBoards, and a social learning network called the Holler.
 - Principal and teacher knowledge about ARI activities varied considerably from district to district in the fourth year of the ARI.
 - On the whole, principals reported much more knowledge about ARI activities than teachers.
2. To what extent did districts and schools actively participate in the ARI, and why did participation vary?

- For the activities where KVEC set participation goals for educators and students, those participation goals were met.
 - As expected, at least some principals and teachers from each district participated in the ARI each year. According to Year 4 survey data, about 33 percent of principals and 15 percent of teachers reported participation in any one ARI activity in Year 4.
 - KVEC developed a theory of action for disseminating the ARI that was broadly aimed at fostering widespread engagement and adoption among participants and nonparticipants. It does not appear that the ARI met its goal of spreading the ARI to reach all teachers and students in the participating districts. About one-third of principals and a little more than half of teachers participating in a given ARI activity reported that participation was leading to improvements in instruction, student achievement, and student engagement for all or the majority of their students. And, although participants in ARI activities reported sharing their experiences with their colleagues on surveys and interviews, few nonparticipating teachers reported trying out or adopting these practices.
 - Lack of buy-in for ARI activities may have been a key reason for low spread of ARI-induced change. In particular, only one-third of principals and teachers reported that ARI activities were aligned “a great deal” with their school’s main goals for school improvement, regardless of whether they were participating in those activities.
 - One key aspect of district capacity may have limited participation: Both principals and teachers indicated that participation in the ARI created staffing challenges, as teachers needed to be provided with substitutes for the time they spent away from the classroom to participate in the ARI.
3. What changes in school and student outcomes can be associated with the ARI?
- Across a broad set of schoolwide measures of achievement, high school completion, and college readiness, our analysis did not detect strong signals that the ARI was improving student outcomes by the end of its third year of implementation.
4. What elements of the ARI did stakeholders recommend sustaining?
- Although a relatively low percentage of principals and teachers reported participating in the ARI, the great majority of principals and teachers recommended sustainment of each ARI activity they had knowledge of.
 - Between about 5 and 15 percent of principals and teachers recommended that their district or school be charged with sustaining a specific activity of the ARI; 56 percent of principals and 35 percent of teachers recommended that KVEC be responsible for sustaining them.
 - In interviews, principals and teachers explained that they recommended sustaining the ARI because it was leading to changes for at least some students, and that it may not yet be possible to measure how the ARI has benefitted students.

Taken together, these findings offer some potential recommendations for rural school districts and agencies like KVEC, and for other regional and state entities more broadly, that are working to provide innovative opportunities for principals, teachers, and students to improve teaching and learning.

- When leveraging the strengths of regional education agencies to implement large-scale initiatives, seek mechanisms to help ensure the intended changes will occur at the local level.
- Consider communicating opportunities directly and personally to teachers when possible to bolster knowledge of and participation in activities.
- Consider intensive coaching or classroom support to improve educator effectiveness.
- Provide a set of activities with a focus on particular aspects of students' learning, possibly in specific subject areas, to help principals and teachers link activities to improvements in teaching and learning, as well as to school goals.
- Provide a set of activities with a focus on particular aspects of students' learning, possibly in specific subject areas, that are available to all teachers.
- Consider how to align activities more closely with school goals and needs for all or the majority of students, as this may increase principal and teacher buy-in.
- Consider infrastructure and resource constraints other than funding that may hinder participation.

From the perspective of participating districts and schools, the ARI offered an exciting and unique opportunity for teachers and students to engage in innovative work to personalize learning, particularly given their rural setting and the small districts in which they work. Despite that perception, our evaluation indicated low teacher and principal buy-in, even among those same teachers and principals who recommended sustaining those activities. Our evaluation is limited, in that many of our implementation findings are based on self-report data. Furthermore, we could focus only on school-level data for our outcomes analysis. Some potential impact of the ARI, such as effects on students' socioemotional growth or engagement, is not assessed in this evaluation.

Acknowledgments

First, we wish to thank KVEC for subcontracting with the RAND Corporation to conduct this independent study of the ARI. We would like to thank Jeffrey Hawkins and Dessie Bowling, who led the design and implementation of the ARI at KVEC in partnership with superintendents who govern the Cooperative. We would also like to recognize the leaders of the ARI activities for their contributions to the initiative and support of the study. These people provided contacts for our data collection work, participated in interviews, and encouraged participation in our study. They also reviewed a draft of this report and provided helpful feedback that we incorporated to the extent possible. This work would not be possible without the district and school staff that participated in the initiative. We are grateful for their partnership and collegiality throughout the project. We would also like to thank the external organizations that partnered to deliver activities of the ARI and supported the evaluation. Finally, we would like to thank the advisory council of the initiative.

Several RAND Corporation colleagues contributed to the analyses and therefore this report. Lindsey Thompson, Courtney Kase, Serafina Lanna, Garrett Baker, Michelle Bongard, Sophie Meyers, Ivy Todd, and Mark Barrett contributed to various aspects of the data collection and analysis. Melanie Rote also contributed to the project and this report.

Cathy Stasz provided valuable assistance over the life of the project. She oversaw the quality assurance of this document and production process. Our peer reviewers, Rebecca Kilburn and Courtney Tanenbaum, provided insightful feedback that helped us improve this report.

Abbreviations

AHEC	Appalachian Higher Education Consortium
ALL	Appalachian Leadership Lab
ARI	Appalachian Renaissance Initiative
ATI	Appalachian Technology Institute
C3R	Creating College and Career Readiness
FIRESummit	Finding Innovation in Rural Education Summit
IC	Innovation Coordinator
KDE	Kentucky Department of Education
KVEC	Kentucky Valley Educational Cooperative
MILL	Mobile Inquiry Learning Lab
PAN	Professional Action Network
PDAS	Perpetual Data Analysis System
PETLL	Perpetuating Excellence in Teaching, Leadership, and Learning
PETLL ACT	Perpetuating Excellence in Teaching, Leadership, and Learning Activating Catalytic Transformations
PGES	Professional Growth and Effectiveness System
PLC	professional learning community
RTT-D	Race to the Top–District
SD	standard deviation
STARS	Students Transforming Appalachia with Real-world Solutions
STEM	Science, technology, engineering, and math

1. Introduction

In 2014, the Kentucky Valley Educational Cooperative (KVEC) launched the Appalachian Renaissance Initiative (ARI) with funding from the U.S. Department of Education’s Race to the Top–District (RTT-D) grant program. The RTT-D program is intended to support “bold, locally directed improvements in learning and teaching that will directly improve student achievement” (U.S. Department of Education, 2017). It offered autonomy in designing and implementing approaches that personalize learning for students, teachers, and principals, as well as the flexibility to continuously evolve over time.

KVEC, in collaboration with representatives from its member districts, developed an array of opportunities and activities intended to support and improve teaching and learning. The ARI focused on several key areas aligned with the federal program’s priorities: personalized learning, accessible data systems, college and career readiness, educator effectiveness, and next generation classrooms. KVEC also focused on two optional “competitive priority” areas: kindergarten readiness and health and wellness. When the ARI was launched, 17 school districts totaling 99 kindergarten–12th-grade schools volunteered to participate. District officials, principals, teachers, and students were able to choose the activities in which they participated; as a cooperative, KVEC could not and did not wish to mandate participation. Nonetheless, KVEC set the ambitious goal of ultimately serving all students and teachers in the participating districts (KVEC, 2013, p. 18).

RAND conducted the required independent evaluation. This report presents findings from the evaluation, including the ARI’s implementation over a four-year period and associated student outcomes. The findings provide recommendations and lessons learned for others who might be implementing similar programs, especially across a consortium of districts in rural areas. Another purpose is to better understand whether initiatives of this kind—which include an array of innovative activities that districts can voluntarily adopt, depending on their priorities and goals—can lead to real change for schools, teachers, and students. Lastly, we hope that this report might stimulate additional research and efforts on how to meet the needs of students in rural settings who may not have access to the same opportunities and supports as their counterparts in urban or suburban locales.

The report focuses on the following core research questions:

- What activities and opportunities constituted the ARI, and how were they communicated across districts? (Chapter 3)
- To what extent did districts and schools actively participate in the ARI, and what were some explanations for variation in participation? (Chapter 4)
- What changes in school and student outcomes are associated with the ARI? (Chapter 5)
- What elements of the ARI did stakeholders recommend sustaining? (Chapter 6)

In the remainder of this introductory chapter, we provide some additional background and context regarding the districts in KVEC’s service region and KVEC’s approach to innovating and supporting teaching and learning through the ARI. We also discuss our conceptual framework for understanding and tracking implementation and outcomes.

The Kentucky Valley Educational Cooperative and Its Member Districts

Founded in 1969, KVEC is one of eight educational cooperatives across the state of Kentucky that provide comprehensive educational services and programs to support member districts and schools in efforts to improve teaching and learning (Kentucky Department of Education [KDE], 2017). Authorized by Kentucky statute (KRS 160.290(3)), these nonprofit cooperatives were voluntarily formed by consortia of local school districts to “provide educational services for the mutual advantage of the students in the representative districts” and help achieve operational and fiscal efficiencies. Cooperatives are governed by the districts they represent. KVEC serves 22 rural school districts with over 50,000 students and roughly 3,000 district officials, principals, and teachers. These rural districts are in the geographically isolated Appalachian region of eastern Kentucky and serve students from some of the most distressed counties in the United States, in terms of poverty and employment (see Box 1).

Box 1. Context for Eastern Kentucky Educational Services

Census data from 2016 indicated poverty rates in nine Eastern Kentucky counties served by KVEC were among the 30 highest in the nation (U.S. Census Bureau, undated). Additionally, between 30 and 50 percent of individuals in Eastern Kentucky live in poverty. In 2014, eight of the 10 counties with the highest unemployment rates in the state of Kentucky were KVEC member districts (Education and Workforce Development Cabinet, 2015). The Occupational Outlook to 2024 in Eastern Kentucky reported that the greatest number of job openings would be in sales and related occupations, office and administrative support occupations, and food preparation and serving related occupations (Kentucky Center for Education Workforce Statistics, 2017). Many of these job openings are for positions that are not highly paid; the occupations with the largest projected openings are cashiers and combined food preparation and serving workers, including fast food (Kentucky Center for Education Workforce Statistics, 2017). Over the past decade, the population of counties in KVEC declined, as has enrollment in its member schools. Declining enrollment has resulted in declines in federal and state funding for schools. In response, many districts report having reduced the workforce and discontinued optional programming (KVEC, 2013, p. 6). KDE administrative data indicated percentages of special education students are somewhat higher in KVEC districts than in the rest of Kentucky, and nearly all the students KVEC serves are also eligible for the National School Lunch Program. There are no public colleges or universities in the KVEC service area.

KVEC serves its membership districts by providing additional opportunities and resources beyond what is available within the districts themselves. These may include additional capacity—in the form of expertise among KVEC staff—and training to build capacity among its member districts. It stimulates improvements to teaching and learning through activities like small grant programs and educator professional development, as well as coordination and funding for student programs ranging from entrepreneurial or art opportunities to software intended to accelerate students’ mathematics achievement. KVEC meets with district officials, school principals, and teachers to identify needs, goals, implementation approach, and programming. KVEC uses this collaborative approach because it cannot mandate changes in the districts it serves or require districts to participate in opportunities.

Although cooperatives like KVEC can receive membership dues from participating districts and state funding to support provision of services to their member districts, the extent of their support is enhanced by obtaining funding from external sources (e.g., state or federal grants or foundation support). In this case, KVEC secured federal funding of \$29 million for the four-year ARI initiative.

Through the ARI and other programming, KVEC has been pursuing programs and opportunities that are consistent with theories of place-based innovation, which are based on the idea that sustainable development and progress—particularly in rural areas—depend upon the enhancement and improvement of the local community’s unique and malleable assets and attributes (e.g., Maddock and Robinson, 2010; Salvia and Quaranta, 2017; Winterton et al., 2014). Research indicates that place-based innovations can work only through systematic communication and collaboration among all stakeholders. For example, Maddock and Robinson (2010) noted that communication and collaboration are at the heart of place-based innovation, and Salvia and Quaranta (2017) noted the importance of social ties in rural development and resilience. According to this research, specific assets and attributes within organizations that can be improved might include leadership capacity, community networks, social intermediaries, and civic governance. To that end, KVEC has sought ways to get input from the community and various community partners for its work, as well as creating social networks and intermediaries who can spread the work to others.

Understanding Implementation of Teaching and Learning Innovations in Schools

The ARI can be characterized as both a “top-down” and a “bottom-up” innovation. On one hand, KVEC designed and disseminated ARI activities to school districts. Although KVEC sought input from districts in designing those activities, they originated with KVEC rather than districts themselves, which suggests a “top-down” reform. On the other hand, school districts that are part of KVEC voluntarily elected to participate in ARI activities; principals, teachers, and students within a given district chose whether to participate in the activities that the district brought to their attention, and they were given a fair amount of latitude in how to undertake

some activities. For example, teachers propose ideas to KVEC to receive “Innovation Grants” to try something new in their classrooms. Thus, given that district officials and school principals make decisions about whether to engage in reforms and teachers choose specific ideas to explore, the ARI could be regarded as “bottom-up” in some ways. As with other bottom-up approaches to innovation, the central idea is that programs like the ARI work because districts, principals, and teachers can choose activities aligned with their context and priorities and shape them in ways that make sense for their context (Tichnor-Wagner, 2018). The advantages of bottom-up approaches—compared with top-down approaches—include the potential of more motivation and commitment on the part of those who elect to take up a given innovation and the possibility that such innovations will better address local needs of those on the ground (Rowan, 1990; Honig, 2004; Randi and Corno, 2005). On the other hand, Tichnor-Wagner et al (2018) have pointed out several downsides to bottom-up innovations, including the danger of cultivating “isolated islands of excellence” and a lack of evidence that what school districts have adopted actually leads to deep changes in teaching and learning.

Regardless of whether an innovation is top-down or bottom-up, research has pointed to multiple factors that matter for whether innovations actually lead to change. Three major factors, among these, include (1) channels of communication that effectively build awareness and encourage participation among those who are expected to implement innovations (Franco, Bennett, and Kanfer, 2002; Coburn, 2006; Durlak and DuPre, 2008; Hatch, 2001; Newmann et al., 2001); (2) buy-in among stakeholders, including evidence that a particular innovation is aligned with school goals and will lead to change (Bryk and Schneider, 2003; Roehrig and Kruse, 2005; Honig and Hatch, 2004); and (3) capacity, vision, and supports within particular district and school contexts to implement innovative reforms (Coburn and Russell, 2008; Knapp, 1997; Hatch, 2001; Newmann, King, and Youngs, 2000). Given their prevalence in the research literature, we use these factors throughout this report to organize our analysis of implementation success but acknowledge that other factors might contribute to implementation success. Next, we describe these factors in more detail.

Effective channels of communication to encourage participation. The way a particular reform or initiative is communicated and introduced has much to do with its success. In their review of research on the implementation of community-based programs (including those in schools), Durlak and DuPre (2008) emphasized that communication about a program’s existence and value is a key element of program diffusion. In their work in the health field, Franco, Bennett, and Kanfer (2002) note that clear communication about the rationale for a reform can help those charged with implementation to align their own goals and work with reform efforts. Several education researchers have particularly focused on the important role of principals in communicating reform efforts and making them relevant for teachers (Coburn, 2006; Spillane, Reiser, and Reimer, 2002).

Stakeholder buy-in and alignment with school goals. Various researchers have demonstrated that reform’s success hinges on the belief among implementers that reform activities will improve student outcomes (Datnow and Stringfield, 2000; Newmann et al., 2001;

Honig and Hatch, 2004). One key to administrator buy-in is that a given intervention or activity aligns with school goals (Forman et al., 2009; Greenberg et al., 2005). When external resources line up with schools' set goals and strategies, administrators will be more apt to take up those resources to forward their aims (Newmann et al., 2001; Honig and Hatch, 2004; Malen and Rice, 2004).

District and school capacity. Lastly, research suggests that there is no substitute for high capacity among district officials and school principals leading reform efforts. In particular, intensive professional development and training are key supports for change in response to reforms (Newmann, King, and Youngs, 2000; Guskey, 2002). In addition, implementers need opportunities to meet together regularly to collaborate and engage in intensive professional learning connected with school goals for change to occur (Coburn and Russell, 2008; McLaughlin and Mitra, 2001; Cohen and Ball, 2000; Garet et al., 2001).

In this report, we consider how KVEC's approach to innovation and educational improvement through the ARI has been implemented, with a particular focus on these three factors. In Chapter 2, we provide an overview of our research methods. The subsequent three chapters address each of the three main research questions of the evaluation. Chapter 3 provides an overview of the ARI, including all the activities it comprised during the years of our study. We also discuss communication about the ARI, which we regard as a key factor for successful implementation. In Chapter 4, we consider who participated in the ARI and their perceptions about it, including evidence regarding buy-in among district and school stakeholders, alignment of the ARI with school goals, and capacity challenges. Chapter 5 provides evidence of the effects of the ARI on student outcomes. Chapter 6 examines the sustainability of the ARI over time. Lastly, we discuss key conclusions and implications in Chapter 7.

2. Methods

We studied the implementation of the ARI over four years using multiple modes of data collection, including interviews with various stakeholders, surveys of principals and teachers, data regarding participation in particular professional development sessions (e.g., sign-in sheets), and program documentation. In addition, we gathered secondary administrative data from the state of Kentucky to assess the relationship between the ARI and student outcomes, including student achievement on statewide standardized assessments for tested grades. This methods chapter provides an overview of our sample, key data sources, and analysis.

Participating Districts

Table 2.1 provides some descriptive information about the 17 districts that participated in the ARI. In all, 99 schools participated in the first year of the study, the 2014–2015 school year. Districts were relatively small; the size of districts participating in the ARI varied from one to 19 schools. The population of students and teachers in each district was also small. In the largest district, there were roughly 9,000 K–12 students and 550 teachers. Across the ARI districts, 2,596 teachers served the roughly 40,000 students. In the majority of districts (15 of 17), over 90 percent of students were white. Most students (75 percent or more) qualified for free or reduced-price lunch in about half of the districts (10 of 17). The percentage of students eligible for free or reduced-price lunch was lower in independent school districts than the countywide districts. Graduation rates, as reported to the KDE by districts, exceeded 90 percent of students in most districts (14 of 17). Most districts (70 percent) were designated as rural, and the remaining 30 percent were located in towns more than 35 miles from an urbanized area.

Table 2.1. Participating Districts, 2014–2015 School Year (Study Year 1)

District	Urban-Centric Locale Designation	Number of Schools	Student Enrollment	Number of Teachers	White Students (%)	Students Eligible for Free or Reduced-Price Lunch (%)	Graduation Rate (%)
Breathitt County	Town: Remote	5	1,960	121	98	79	68
Floyd County	Rural: Distant	14	5,902	381	99	75	94
Harlan County	Rural: Fringe	9	3,953	256	96	81	88
Hazard Independent	Town: Remote	3	931	66	86	61	93
Jackson Independent	Town: Remote	1	376	21	96	61	96
Jenkins Independent	Rural: Remote	1	479	35	98	83	84
Johnson County	Rural: Fringe	8	3,681	240	98	68	96
Knott County	Rural: Remote	7	2,290	156	97	79	91
Lee County	Rural: Remote	4	984	60	98	77	95
Letcher County	Rural: Remote	9	3,097	215	98	70	93
Magoffin County	Rural: Remote	5	1,975	145	99	89	97
Middlesboro Independent	Town: Remote	3	1,248	79	88	73	91
Owsley County	Rural: Remote	2	728	52	98	86	90
Paintsville Independent	Town: Remote	2	788	53	95	44	98
Pike County	Rural: Distant	19	8,716	550	98	71	91
Pikeville Independent	Rural: Fringe	2	1,225	77	92	37	96
Wolfe County	Rural: Remote	5	1,304	89	97	81	91

SOURCES: U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), data set, 2015; 2014–2015 data from KVEC and KDE.

Data Collection and Analyses

Data collection was intended to include both implementation and outcomes data from 2014–2015 through the 2017–2018 school year. However, for reasons beyond the control of this study,

we were unable to carry out the research beyond December 2018.¹ Thus, achievement data for the 2017–2018 school year are not included in our analysis. The implementation study included all four years and drew on data from surveys fielded to teachers in the second and fourth year of the ARI, as well as principals in the fourth year of the ARI. However, our outcomes study included just three years of outcomes data (from 2014–2015 to 2016–2017).

Table 2.2 provides an overview of the data we collected. We describe each data source, in turn, following.

Table 2.2. Data Sources for the Evaluation

Implementation Study Data Sources		Baseline 2013– 2014	Year 1 2014– 2015	Year 2 2015– 2016	Year 3 2016– 2017	Year 4 2017– 2018
Participation data			X	X	X	X
Program artifacts			X	X	X	X
Interviews	ARI Leadership Team (KVEC)		X	X	X	X
	Teachers		X	X	X	X
	Principals		X	X	X	X
	Innovation Coordinators			X	X	X
Surveys	Principals					X
	Teachers			X		X

Outcomes Study Data Sources		Baseline 2013– 2014	Year 1 2014– 2015	Year 2 2015– 2016	Year 3 2016– 2017	Year 4 2017– 2018
Administrative data	Academic achievement	X	X	X	X	
	College and career readiness	X	X	X	X	
	Dropout and graduation rates	X	X	X	X	

Implementation Data Collection

Participation. To track teacher and leader participation in ARI activities, we collected sign-in sheets, participant lists at events, software usage reports, lists of staff designated to lead student activities at their schools, and other attendance documentation. Our participation database included all activities and systems that a principal or teacher could participate in over the four years of the ARI. The participation data aimed to capture adult participation in every activity and, in some cases, each session related to an activity. That said, we were unable to procure sign-in sheets or other documentation signaling principal and teacher participation for every event related to an activity, and teachers may not have signed in for some activities in

¹ KVEC received a one-year no-cost extension allowing the ARI to continue through December 2018. Initial indications from the U.S. Department of Education suggested that additional extension could be possible to enable this evaluation to examine Year 4 (2017–2018) outcomes data that would only become available late in 2018. However, KVEC and RAND learned in February 2018 that further extension beyond December 2018 would not be possible.

which they participated. Thus, participation data are limited and may be biased downward. Readers should exercise cautions in drawing conclusions from these data.

If a principal or teacher participated in any part of any activity (e.g., only a few sessions of a series), we counted that principal or teacher as a participant in the activity. We also counted this principal or teacher as a participant in the overall initiative that year. If a principal or teacher participated in more than one activity, that person was counted only once as a participant that year.

We calculated the percentage of participation to estimate the breadth of participation among all principals and teachers in districts agreeing to participate in the ARI. To calculate the percentage of participation, the number of individual participants in the ARI was divided by the number of certified principals and teachers in ARI districts as reported by KDE. All certified teachers in districts agreeing to participate in the ARI were eligible to participate in an activity in a given year. Our estimates suggest that between 3 and 20 percent of principals and teachers in ARI schools participated. That said, readers should keep in mind that the ARI did not intend for all teachers and principals to participate in all activities. In some cases, KVEC was limited in the number of participants it could support for a given activity; for other activities, only teachers of certain subjects or grades were encouraged to participate. We provide more details regarding expectations for participation in the next chapter.

Measurement of engagement with the communication structures designed for the ARI was less precise. For about half of the structures, we confirmed their presence by collecting artifacts that referenced total counts of participants or users, utilized or observed the structure, and conducted interviews that addressed participation at a high level. In the case of funds for technology, we knew districts purchased devices and, in interviews, learned how schools used funds. Data collection did not focus on which teachers or students received devices.

Program Artifacts. KVEC, as well as schools and districts, provided us with documentation related to particular activities that helped us better understand how those programs were implemented. For example, we collected information on school improvement plans associated with particular activities. In addition, we collected proposals that teachers submitted to KVEC to receive “innovation grants” to try out a new idea in the classroom (i.e., a strategy to improve student engagement or achievement), and we qualitatively coded nearly all of the proposals (about 100 in each year) to track teachers’ ideas and what sorts of ideas were funded by KVEC and enacted across the 17 districts.

Interviews. In each year, we interviewed a large number of stakeholders to better understand the ARI and its implementation. Those stakeholders included KVEC ARI leadership team staff, Innovation Coordinators (ICs) who were hired to serve as liaisons between KVEC and schools in supporting implementation of ARI activities, school principals, and teachers. Interviews with KVEC leadership team staff largely occurred in person or by phone. Interviews with ICs largely occurred by phone. Leader and teacher interviews were gathered through site visits to particular districts over the course of each year of the ARI. Interviews were typically conducted by one or

two researchers and audio recorded. Table 2.3 lists the interview participants, by position or role, in each year.

We visited 47 schools across the 17 districts over the course of our study, which was about half of participating schools. We visited 12 schools from seven districts more than once over the four years to assess whether various aspects of implementation had changed in those schools over time.

Although we asked site visit coordinators to let us interview a range of teachers—including those who participated in the ARI and those who did not—those coordinating our visits in some districts tended to set up interviews with participants more than nonparticipants. And, although we requested the opportunity to speak with school principals in all schools we visited, those principals were frequently unavailable for interview, and we therefore spoke to fewer school principals than we would have liked during site visits, particularly in Years 2 and 3. In addition, although we were able to interview a sample of participating and nonparticipating teachers in nearly all districts during our school visits, their responses may not be representative of all participating or nonparticipating teachers. Before each interview, RAND staff provided information about the purpose of the interview and the confidentiality of responses. Interviewees provided oral consent to proceed with the interview. Participants might have been embarrassed or experienced damages to their reputations if their interview responses were not kept confidential. Thus, interviews were conducted one-on-one in nearly all cases to minimize the risk of breaches in confidentiality.

Table 2.3. Interview Participants

Position	Number of Participants			
	Year 1 2014– 2015	Year 2 2015– 2016	Year 3 2016– 2017	Year 4 2017– 2018
ARI KVEC leader	12	14	17	14
IC	—	15	16	16
School principal	3	5	0	13
Teacher	9	42	76	48
Total	24	76	109	91

Surveys. Surveys were fielded to all principals across participating schools in Year 1 and Year 4, and to a subset of ten randomly selected teachers per school across participating districts in Year 2 and Year 4. Principals who completed surveys received a \$100 gift card for the Year 1 survey and a \$50 gift card in Year 4 for their participation. Teachers received a \$20 gift card. Table 2.4 provides an overview of the response rates for each survey.

Table 2.4. Survey Response Rates

		Respondents	Total Surveyed	Response Rate (%)
Teacher survey	Year 2	366	972	38
	Year 4	483	823	59
Principal survey	Year 1	59	101	58
	Year 4	80	91	88

NOTE: Between the first and final year of the ARI, some schools were closed or consolidated in districts participating in the ARI. As a result, the number of participating schools and principals of these schools decreased from 101 in Year 1 to 91 in Year 4. The number of teachers also decreased for this reason but could also have decreased for other reasons (i.e., hiring freeze for retirement vacancies).

Both the interview protocols and surveys were developed to gather data related to the implementation factors noted in the introduction to this report. Specifically, the questions addressed (1) channels of communication for spreading knowledge and encouraging participation in the ARI; (2) buy-in among stakeholders regarding the extent to which the ARI was aligned with school goals and the belief that ARI activities could lead to improvements in instruction, student engagement, or student achievement; and (3) the capacity, vision, and supports within particular district and school contexts to implement ARI activities. These areas were the focus of interview questions in each year, as well as spread to nonparticipants. Interviews were semistructured to allow interviewers to probe on particular responses and gather additional information as appropriate. The RAND Corporation Human Subjects Protection Committee reviewed and approved all consent statements and processes for the site visits and interviews, as well as consent statements and survey protocols.

Implementation Analysis

Qualitative coding of interview and innovation grant data. Interviews were coded thematically using Dedoose.² A code structure was developed by the research team based on the research questions, implementation factors noted previously, and knowledge of the ARI. Coders worked together to ensure reliability before proceeding to code independently. Specifically, in Year 1, the team coded several interviews together and discussed the rationale for the ratings to establish consensus on the codes. The team then independently coded approximately five interview transcripts, then met as a team to discuss uncertainties in the coding and to establish consensus regarding the codes. The remaining 19 interviews were coded by one coder. In Year 2, the research team double-coded half of the interviews and met several times to arrive at consensus on all the double-coded interviews. In Year 3, the research team double-coded 30 percent of the interviews together and met several times to arrive at consensus for all the double-coded interviews. After the initial coding each year, we added additional codes and subcodes to capture important emergent themes (Lincoln and Guba, 1985; Strauss and Corbin, 1998).

² Dedoose Version 7.0.23, a web application for managing, analyzing, and presenting qualitative and mixed method research data (2016).

We coded ARI KVEC Leader interviews at the individual level within each implementation year. Most ARI KVEC Leaders (72 percent) held leadership positions for more than one year and roughly half held leadership positions all four years of the initiative. Analysis of IC interviews mirrored that for those of KVEC Leaders. We examined data across participants by year. Nearly all ICs served in the role for their district in more than one year.

Although we interviewed approximately 20 percent of teachers and principals more than once over the four years of the ARI, we treated responses as independent. For example, if they indicated not knowing about activities that were part of the ARI in one year, and then said that they knew about them in the following year, we treated those as two independent responses, assuming that both are valid and important reactions to capture. Treating responses from principal and teacher interview participants more than once over the four years as independent may have some effect on the results (e.g., responses from one year to the next could be related and thus signal fewer overall differences than are actually present across participating districts).

To code the content of innovation grants (described in Chapter 3), we started with the rubric that the KVEC leadership team used to score the grants and refined categories of the rubric to capture additional content within the grants as aligned with our conceptual framework and research questions. We were unable to code 3 percent of Year 1 and 2 grants because files became corrupted after KVEC's review and could not be recovered. Of the readable proposals, at least one-third were double-coded each year to establish and maintain interrater reliability, using similar procedures as described for interviews. We conducted a thematic analysis for interviews and the innovation grants, then prepared analytic memos that addressed each of the research questions and conceptual framework for the initiative. These memos informed the final report.

Outcomes Data Collection

KDE administrative data. We used publicly available data sets that provided schoolwide averages for state-administered standardized academic achievement tests, dropout and graduation rates, and indicators of college and career readiness defined by the state for accountability purposes. These statewide data sets provide comparison data for schools outside of the ARI that are used in our analyses, described subsequently. Data were obtained for 2013–2014, as a baseline before the project started, and for the 2014–2015, 2015–2016, and 2016–2017 academic years after implementation commenced. The latter constitute Years 1 to 3 of implementation.

Outcomes Analyses

To estimate effects of the ARI on student outcomes, we examine how each outcome variable changed over time: from the baseline year to Year 3 of the project. If we had focused only on how those variables changed within ARI schools, it would have been impossible to determine whether changes were caused by the ARI or by other factors that may have been changing, such as evolving state and national policies or changes to the tests and other measures. Therefore, to improve our ability to isolate the effects of the ARI from these other possible factors, we compared change within the ARI to change in non-ARI schools throughout Kentucky (the

comparison group) over the same time period. Schools in other parts of the state might be operating in very different contexts and not be comparable to ARI schools. To address that, we used a weighting method, where schools more similar to ARI schools received greater weight and schools less similar received less weight. The variables we used to evaluate similarity were school size, Title I eligibility and provision of Title 1 services, poverty as measured by the eligibility for free or reduced-price lunch, race/ethnicity, rurality, student-computer ratio, spending, average years of teaching experience of the staff, academic achievement scores, dropout and graduation rates, and college and career readiness indicators. The weighted average of the comparison schools on each of these variables was very close to the average in the ARI schools. Next, we used the weighted comparison group in statistical models to estimate the effect of the ARI on the student outcomes. These statistical models also included the same baseline variables as “statistical controls.” The more formal description for this process is a quasi-experimental matched comparison group design. The appendix contains additional technical details about the methods and how similar the weighted comparison group was to the ARI.

Limitations

A few issues may limit the inferences and conclusions that can be drawn from the data. First, our implementation data may be biased toward those who participated in the ARI or were more enthusiastic about reforms. Response rates for surveys were somewhat low, particularly among teachers in Year 2 of the project, although they are on par with or higher than response rates on other web-based surveys generally, including those aimed at teachers.³ Respondents may not be representative of all principals and teachers in the Kentucky districts we studied. Those who were motivated enough to respond to our surveys and participate in interviews may have been more enthusiastic about the ARI or apt to participate in activities in general.

The evaluation was of a continuously changing set of activities. RTT-D supported the continuous quality improvement process that KVEC used to design and refine the activities. This creates challenges in defining the activities or creating indexes for dosage and fidelity of implementation. By and large, ARI activities were locally developed; activity participants designed, implemented, and “evaluated” personalized solutions to specific problems of practice. There was variation in principals’ and teachers’ solutions (e.g., goals or strategy) within the same activity.

We also strove to capture participation in the ARI through multiple types of data. For example, we gathered participation data through our principal and teacher surveys, as well as through ARI activity sign-in sheets. However, as mentioned earlier, the participation data are sometimes limited because we were unable to collect sign-in sheets for every activity.

³ Nulty (2008) found that responses to web-based surveys ranged between 20 and 47 percent. Similarly, Cook, Heath, and Thompson (2000) found an average 40-percent response rate among nearly 50 national survey studies. Among teachers in the RAND American Teacher Panel, a nationally representative survey panel, response rates range from roughly 50 to 65 percent (e.g., Kaufman et al., 2018).

Participation data may be biased downward. Readers should exercise cautions in drawing conclusions from these data.

The data available for assessing effects on outcomes are at the school level, which limits statistical power, especially for high schools because there are substantially fewer high schools than schools serving lower grade levels. Using school-level data also limits the ability to detect effects where there is implementation variation within schools. For example, if particular teachers had strong participation that affected student outcomes, those may have been diluted by weaker participation throughout the rest of the school. Thus, our estimates of average effects of the ARI on student outcomes may not detect pockets of success where the ARI may have influenced outcomes for small groups of students within schools. Moreover, the matched comparison group design, like all studies using this method, may be vulnerable to selection bias and does not enable strong confidence that the estimated changes in student outcomes were definitely caused by the ARI.

In addition, we are unable to directly connect survey and outcomes data for analytic purposes. As noted earlier in this section, changes to the timeline for this project prevented us from collecting outcomes data for the fourth year of the ARI, although we do have implementation data from that fourth year. In particular, this report focuses on findings from surveys fielded to principals and teachers in the fourth year of the ARI, although it utilizes findings from interviews conducted over all four years of our evaluation. While these implementation data do offer some potential explanations for the findings from our outcomes analyses, the lack of survey data from the third year of the ARI, which is the year on which our primary outcomes analyses were based, limits the explanatory power of these survey data.

Finally, the report does not address the cost of the overall initiative or its individual components, although it provides some general information on costs.

3. What Was the ARI and How Was It Enacted?

In this chapter, we provide an overview of the ARI, beginning with the communication plan about the initiative espoused by KVEC. Then, we examine what principals and teachers said they knew about the ARI and how they heard about it. We use survey and interview data from principals and teachers to consider whether the ARI was enacted as it was intended. According to our research, most principals and teachers in participating districts knew at least something about the ARI by the end of the initiative, although knowledge varied across districts. Communication strategies for providing information about the ARI appeared to evolve over the course of the initiative.

Purpose and Design of the ARI

RTT-D, which funded the ARI, aimed to support “bold, locally directed improvements in teaching and learning that will directly improve student achievement and teacher effectiveness” (U.S. Department of Education, 2012, p. 1). Rather than prescribing an approach to accomplish this goal, RTT-D provided flexibility for applicants to design “strategies, systems and structures” that personalize learning for students, teachers, and principals, with the intention to raise student achievement, decrease the achievement gap, and increase the rates at which students graduate from high school prepared for college and careers. The grant program offered four years of funding that overlapped with three complete school years. A fourth full year of implementation was possible with a no-cost extension. While the grant program called for ambitious goals for improving student outcomes, the term of the program and its funding may have been too short to achieve these goals. The National Implementation Research Network (undated) reports that most programs and innovations require two to four years to reach full fidelity of implementation. Changes in outcomes during the initial implementation phase, largely the years supported by RTT-D, may thus be less likely.

As part of the RTT-D proposal process, KVEC met with superintendents, principals and other school leaders, and teachers to conduct a needs assessment. KVEC members asked these stakeholders about assets and challenges, goals, and planned supports at the district and school levels. They also queried for perceptions of what education may look like in the future. Discussions focused on needs for school principals, teachers, and students. KVEC staff used information gathered in conversations with teachers across the region to design the strategies, systems, and structures of the ARI. Strategies, referred to as the ARI *activities*, focused on delivering personalized training and support to teachers, principals, and students. The ARI *systems* focused on the development of communities of practice for teachers and students. The ARI *structures* emphasized building a collaborative network—in person and online—to

disseminate the strategies and systems. In their proposal, KVEC organized the activities, systems, and structures according to five key priorities aligned with the priorities of RTT-D:

- **Personalized learning environment** focused on students, as well as teachers and principals. The ARI planned “a blended approach to learning that combines the delivery of education both within and beyond the traditional classroom environment . . . that designs a tailored learning program for each student according to the needs and interests of each individual student” (KVEC, 2013, pp. 18–19). For teachers and principals, personalized learning involved “regional Communities of Professional Practice and job-embedded capacity building professional development to empower teachers with the most current research-based strategies that positively impact learning in the classroom” (KVEC, 2013, p. 19). Personalized learning for teachers and principals departed from a one-size-fits-all model of professional development to one driven by content area, interest, and need.
- **Next generation classrooms**, because “an essential component of a Personalized Learning Environment—especially in a rural region—is access to technology that expands curricular content and increases opportunities for diverse and rigorous student learning.” In the RTT-D proposal, KVEC noted that the “ARI will create a cross-district network of ‘next generation classrooms’ utilizing technology that will enable teachers and learners to connect with other classrooms across the region, the state, and the country” (KVEC, 2013, p. 24).
- **Accessible data systems** aimed to develop a data warehouse that would serve as a “regional Community Web Portal enabling access to a wide range of data and information intended to increase transparency and effective ‘user-friendly’ access by multiple role groups. . . . The Data-Warehouse will contain information and links to all ARI partner institutions and service/support entities in the region. The Data-Warehouse will be a one-stop access point” (KVEC, 2013, pp. 28–29).
- **Educator effectiveness** focused on developing capacity of teachers, principals, and district leaders. According to the proposal, “The vision for the ARI is for every student to be taught by an effective teacher, every school led by an effective principal, and every district guided by an effective superintendent.” The proposal noted that the ARI would include “cross-district Communities of Professional Practice” that would be intended to help teachers “acquire and refine skills and new learning necessary to develop a high-functioning and systemic personalized learning environment for every student every day” (KVEC, 2013, pp. 30–31).
- **College and career readiness** aimed to increase students’ career awareness beginning in middle school and continuing through high school graduation. As explained in the proposal, “using a personalized electronic counseling tool, students will have hands-on opportunities for in-depth career exploration. With further exploration, students will

develop better insight on their personal career interests and learn how to achieve their career goal” (KVEC, 2013, p. 35).

KVEC intended for the personalized learning opportunities of the ARI—activities, systems, and structures organized by the five key priorities—to improve the performance of students, teachers, and schools. According to the proposal, the ARI would result in numerous successful outcomes, including “high student achievement, reduction of learning gaps, a turn-around in low performing schools, increased graduation rates, higher college enrollment and post-secondary completion” (KVEC, 2013, pp. 3–4).

The student-directed aspects of these priorities echo a goal that has become popular throughout the U.S. K–12 education system: to harness technology and data systems to create more-personalized learning experiences for students. Despite the popularity of the concept, there is not yet consensus on exactly how to accomplish personalization, nor sufficient evidence on effectiveness for improving student outcomes (Pane, 2018). Studies by Pane et al. (2017) are often interpreted as evidence of promise because they found modest positive effects on average across a set of schools implementing a diverse set of personalized learning models; however, the studies also found negative effects in about one-third of the individual schools in the sample, suggesting that the details of context or how personalized learning is implemented may be critical to success. Gross and DeArmond (2018) found considerable enthusiasm for personalized learning among educators, but also found that guidance, support, and materials were often insufficient to ensure consistent and rigorous implementation. To our awareness, the evidence base has also not yet caught up with a parallel enthusiasm for applying personalization concepts toward educator professional development, a theme also echoed in the ARI priorities.

Enacted Elements of the ARI

When KVEC received the RTT-D award for the ARI, it reconvened meetings with superintendents, principals and other school leaders, and teachers to update the needs assessment conducted for the proposal. KVEC staff also reviewed state policies and priorities to identify the fit of the ARI with the requirements placed on schools, school principals, teachers, and students. Information gathered in these conversations and reviews served as key inputs to redesign the strategies, systems, and structures of the ARI. They were also used to reexamine the landscape of services—professional development as well as resources—available from external providers to assess whether specific services named in the proposal best met the evolving needs of schools. A final consideration in selecting providers and resources was cost. RTT-D provided significant funding, but there were cost considerations in providing the strategies, systems, and structures as intended in the proposal. All modifications to the proposed programs were approved by KVEC’s RTT-D program officer.

Throughout each year of the ARI, KVEC collected feedback on the effectiveness and alignment of ARI activities, systems, and structures. Using this continuous quality improvement process and KVEC staff reflections, KVEC revised, discontinued, and designed new components

to align ARI activities with the needs of the majority of participating districts. This approach reflects the purpose of cooperatives in the state of Kentucky and the spirit of RTT-D.

While personalized learning was one of five factors that was a priority in the application, it was also an overarching approach to the provision of learning activities intended to improve outcomes for both teachers and students in the region. One member of KVEC described the ARI by saying,

ARI is an integrated framework designed to achieve deep systemic change in our school districts and the community systems that work together to improve lives. ARI provides us an opportunity to build on those things we do well and replicate them. . . . We won't solve the complex challenges we face today (or will face tomorrow) without creativity, innovation, and engaged learning.

The initiative offered a menu of personalized opportunities to principals, teachers, and students across the region over the four years of our study. The following section provides a brief overview of the distinct components of the initiative, each categorized as ARI activity, system, or structure. For each component, we list which of the five priorities of the ARI it related to. Some activities evolved over the course of the initiative, so we therefore note the years in which each activity was offered.

Activities

Strategies, also referred to as activities, of the ARI focused on delivering personalized training and support to principals, teachers, and students. Table 3.1 provides an overview of the ARI activities. Eight activities focused on creating personalized learning opportunities for principals and teachers, while five delivered personalization to students.

The following is a brief overview of the ARI activities for educators (i.e., both principals and teachers):

The **Teacher Scholarship Program** provided current teachers with tuition to support graduate coursework in eligible content areas, with a goal to increase the number of National Board Certified teachers and increase expertise in hard-to-fill content areas. The ARI funded coursework for 25 teachers delivered by higher education institutions and National Board Certified teachers each year. In addition to completing coursework at no personal cost, teachers who earned certification received salary increases.

Table 3.1. Activities, Grouped by Audience, Priorities, and Years Offered

Audience	Activity	KVEC Proposal Priority	Years Offered			
			Year 1 2014– 2015	Year 2 2015– 2016	Year 3 2016– 2017	Year 4 2017– 2018
Educators	Teacher Scholarship Program	Personalized learning; next generation classrooms; accessible data systems; educator effectiveness	X	X	X	X
	Learning Innovation Grants	Personalized learning; next generation classrooms; accessible data systems; educator effectiveness; college and career readiness	X	X	X	X
	iCurio	Personalized learning; next generation classrooms; accessible data systems; college and career readiness	X	X	X	X
	MILL	Personalized learning; accessible data systems; educator effectiveness		X	X	
	STEM Library	Personalized learning; accessible data systems; educator effectiveness			X	
	STEM Preschool	Personalized learning; accessible data systems; educator effectiveness			X	
	STEM Unit Rotations	Personalized learning; educator effectiveness; college and career readiness				X
	Summit Learning Platform	Personalized learning; accessible data systems; educator effectiveness				X
Students	C3R Initiative	Personalized learning; next generation classrooms; college and career readiness	X	X	X	X
	Distance Learning Opportunities for Students	Personalized learning; next generation classrooms; college and career readiness	X	X	X	X
	WIN Mathematics	Personalized learning; next generation classrooms; college and career readiness		X	X	
	ATI	Personalized learning; next generation classrooms; educator effectiveness; college and career readiness		X	X	X
	Build It Forward	Personalized learning; college and career readiness			X	X

SOURCES: Activities derived from interviews with KVEC staff and review of ARI documentation or artifacts.

Learning Innovation Grants offered \$1,000 to teachers to support an innovative approach in the classroom. Proposed grant activities were to be framed around “action research” (i.e., teacher-conducted research where teachers themselves monitored progress and outcomes of their innovation and shared their learning with other ARI educators). Innovation Grants aimed to foster innovative or creative solutions to local problems. Innovation Grants were not intended to encourage “tried and true” practices. Rather, the intent was to “start developing an evidence base so that over time these interventions can be held up to review and demonstrate their effectiveness.” Overall, the intent of Innovation Grants was to create opportunities for teachers to develop a solution to a local challenge. Principals and teachers applied for Learning Innovation Grants. A panel of selected educators conducted a blind review of Innovation Grants using an evaluation rubric. Approximately 100 grants received funding each year.

iCurio by KNOVATION was an online repository of educator-curated, standards-aligned resources and training on their use. Teachers curated standards-aligned resources for their students. In practice, teachers curated resources for students and assigned students to use the same activities or allowed students to select resources based on personal interest. KVEC purchased licenses on behalf of schools; all teachers in schools participating in the ARI had access to iCurio.

Mobile Inquiry Learning Lab (MILL) was a trailer, equipped with resources and materials for lesson units designed for deep student engagement, which visited schools for typically about one week. Teachers received some planning materials in advance and then could make the MILL’s resources available to students while it was present at their school. Principals and teachers could request the MILL; it was largely intended for teachers who taught science, technology, engineering, and math (STEM)-related content.

STEM Unit Rotations were fully developed STEM units, including curriculum, materials, and technology, available for teachers to use on a rotation basis. Each STEM unit was used in a school for half a semester and then rotated to a different school. Principals could request the rotations for their school, or teachers of STEM classes could reserve the units. This activity was also available for principals and teachers hosting STEM clubs or out-of-school activities.

STEM Library made STEM materials, such as educational robotics toys and accompanying lesson plan ideas, available for checkout by teachers to use in the classroom. As with the STEM Unit Rotations, principals could request the rotations for their school, or teachers of STEM classes could reserve the units. The library was also available for principals and teachers hosting STEM clubs or out-of-school activities.

STEM Preschool provided focused supports to early childhood classrooms to emphasize STEM concepts in the curriculum. This was available to schools serving preschool students or schools planning to serve preschoolers in the future. Schools requested this support from KVEC.

Summit Learning Platform was an online platform designed to support personalized learning instruction. KVEC disseminated information about the Summit Learning Platform to all schools; schools that adopted the platform were also provided with personalized, local support from KVEC.

An overview of personalized learning opportunities for students follows. Although these activities were intended to deliver supports directly to students, a principal or teacher was responsible for coordinating students' schedules, integrating the opportunity with the standard curriculum, and supervising the activity when students in a school participated.

Creating College and Career Readiness (C3R) Initiative provided mentoring and an online counseling tool from WIN Learning to encourage struggling students to begin exploring career options in middle school. Courseware allowed students to explore careers that aligned with their interests, understand the job market for these careers, and learn about postsecondary pathways to prepare for those careers. The software supported students as they developed and refined their Individualized Learning Plan, a transition plan required by the KDE for every student. All students had access to the Creating College and Career Readiness Initiative.

Distance learning opportunities for students provided access to remote courses taught by teachers with specialized content area qualifications when such courses were not available locally. As an example, The Virtual Art Gallery provided students an opportunity to take an art course with an illustrator virtually and in person. Students published their work virtually on the Holler (described subsequently) and, in later years, in books. Distance learning also provided students an opportunity to take Spanish taught by a teacher in another ARI district and enroll in college courses. The distance learning for students activities expanded the limited funding for dual enrollment provided by the KDE to create opportunities for all students. Students opted into one or several of the distance learning activities in a given year.

WIN Mathematics was a middle school–focused online mathematics program, designed to be personalized, project-based, and connected to career opportunities. This activity was available to all schools serving middle school students for one year. As part of the Continuous Quality Improvement process, KVEC gathered feedback from teachers and principals who used this software to assess whether the product met their needs. The activity was discontinued based on reports from teachers and principals. KVEC focused on building capacity of teachers through Professional Action Networks (PANs) in mathematics and STEM, described later.

Appalachian Technology Institute (ATI) was a virtual hub through which teachers were independently contracted to teach courses that were not typically offered, such as aviation, aerospace engineering, and coding, and other growing employment pathways in the state. When students expressed interest in courses and teachers offered to contract for the courses, schools often built ATI courses into the master schedule. If teachers delivering the courses were in the same building as students, courses were in person. If teachers were not in the same building as students, courses were delivered largely virtually with some in-person lessons from the teacher. ATI was available to all students in ARI schools.

Build It Forward allowed ARI high school students to form teams to design and build tiny houses with the support of teachers. These were displayed at the ARI's semiannual summit and then sold to fund another building project the next year. Schools—high schools and/or Area Technical Centers—submitted an application that included a project plan and budget. A review

panel evaluated and selected schools for grants. Three schools were selected in the third year of the ARI, and five received Build It Forward grants in the final year of the ARI.

Systems

The systems element of the ARI focused on developing communities of practice for educators (here and elsewhere, we use the word *educator* to include both principals and teachers) as well as students (Table 3.2). Overall, communities occurred at the school, district, and regional levels. They were intended to break down the silos of 17 independent districts and create a community focused on similar goals.

An overview of the eight systems focused on principals and teachers follows.

Perpetuating Excellence in Teaching, Leadership, and Learning (PETLL) (Hawkins and Webb, 2012) and Perpetuating Excellence in Teaching, Leadership, and Learning Activating Catalytic Transformations (PETLL ACT) promoted schoolwide systematic processes using tools adapted from the Center for Improving School Culture to identify improvement goals and Rutherford “Artisan Teacher Talents” (Rutherford Learning Group, undated) and to obtain feedback from regional stakeholders (e.g., principals from other districts or schools, teachers, KVEC, higher education faculty). In Year 4, PETLL ACT added foci on community engagement and problem-solving. Each district and school received an application for PETLL and PETLL ACT. Principals, with an endorsement from district leaders, committed to lead this work with a team of teachers. All PETLL and PETLL ACT schools met throughout the year; schools engaged in PETLL tasks between regional meetings.

Support for Educator Effectiveness (Professional Growth and Effectiveness System [PGES])/Personalized Professional Learning activity provided professional development that expanded on brief trainings provided by the KDE on instructional content and pedagogy related to the PGES for principals and teachers. Professional development trainings in this category also focused on disseminating various instructional strategies, such as the Question Formulation Technique (Right Question Institute, undated). This component of the ARI had the broadest range and reach of participants. Each training was intended for a subset of educators throughout the region, but there was a training for nearly all principals and teachers in a given year. As an example, trainings that provided support for principals during the validation process for the state’s teacher evaluation system were relevant for all principals, whereas trainings focused on elementary practices were not applicable for middle and high school principals. Superintendents and principals may have required or mandated that all teachers participate in trainings about aspects of the state evaluation model; principals tended to request that these trainings occur at their school building so all teachers could attend.

Table 3.2. ARI Systems, Grouped by Audience, Priorities, and Years Offered

Audience	Activity	KVEC Proposal Priority	Years Offered			
			Year 1 2014– 2015	Year 2 2015– 2016	Year 3 2016– 2017	Year 4 2017– 2018
Educators	PETLL	Personalized Learning; Accessible Data Systems; Educator Effectiveness	X	X	X	
	PETLL ACT	Personalized Learning; Accessible Data Systems; Educator Effectiveness				X
	PGES Support for Educator Effectiveness/ Personalized Professional Learning	Personalized Learning; Next Generation Classrooms; Accessible Data Systems; Educator Effectiveness; College and Career Readiness	X	X	X	X
	Next Generation Leader and Teacher Academy or Renaissance Academy	Personalized Learning; Next Generation Classrooms; Accessible Data Systems; Educator Effectiveness	X	X	X	X
	Next Generation Classrooms	Personalized Learning; Next Generation Classrooms; Accessible Data Systems; Educator Effectiveness; College and Career Readiness	X	X	X	X
	1-to-1 Digital Learning Program	Personalized Learning; Next Generation Classrooms; Educator Effectiveness; College and Career Readiness	X	X	X	X
	ALL	Personalized Learning; Next Generation Classrooms; Accessible Data Systems; Educator Effectiveness; College and Career Readiness	X	X	X	
	PDAS	Personalized Learning; Next Generation Classrooms; Accessible Data Systems; Educator Effectiveness		X	X	X
	PANs	Personalized Learning; Next Generation Classrooms; Accessible Data Systems; Educator Effectiveness		X	X	X
Students	Student Senate	Personalized Learning; Next Generation Classrooms; Accessible Data Systems; College and Career Readiness	X	X	X	X
	STARS	Personalized Learning; Next Generation Classrooms; Accessible Data Systems; College and Career Readiness	X	X	X	X
	Entrepreneurial Program	Personalized Learning; Next Generation Classrooms; Accessible Data Systems; College and Career Readiness	X	X	X	X
	Other student agency projects	Personalized Learning; Next Generation Classrooms; Accessible Data Systems; College and Career Readiness	X	X	X	X

SOURCES: Systems derived from interviews with KVEC staff and review of ARI documentation or artifacts.

Next Generation Leader and Teacher Academy or Renaissance Academy trained and supported teachers and school principals to implement next generation approaches to instruction

and school environment, including integrated technology, blended instruction, and project-based learning. Experts from local universities and other organizations partnered in this effort. The Next Generation Academies design changed at the end of the third year, and KVEC renamed the activity the Renaissance Academy. A principal or assistant principal from each school participated in the Leader Academy. One or two teachers from each school participated in the Teacher Academy; principals selected the teachers that represented their school. Regional academy meetings occurred at least four times per year.

Next Generation Classrooms enabled one classroom in each participating school to receive technology devices and software, as well as training and support for the teacher. The goal was to exemplify a 21st-century classroom model in each school. Schools that participated as Next Generation Classrooms were also required to participate in the Next Generation Leader and Teacher Academy/Renaissance Academy.

1-to-1 Digital Learning Program provided seed money to increase access to digital devices for individual students. The program established a per-pupil allocation of funding to purchase technology; each district received this per-pupil allocation for students enrolled in the district each year. Districts could decide what devices to purchase and how to distribute them in schools, and schools determined how to integrate them into instruction. KVEC coordinated trainings—virtual and in person—for principals and teachers on usage and integration of technology in instruction.

Appalachian Leadership Lab (ALL) was a program for teachers, school administrators, and staff to work jointly on challenges within their districts with the broader goal of developing a robust pipeline of strong future leaders. ALL was designed for a school team, and participation was limited to ten to 14 teams. There was an application and selection process for ALL.

PANs were professional learning communities of teachers across districts that met virtually and/or in person to acquire and share skills and to generate instructional tools and processes in their focus areas (i.e., content areas and standards, grade levels, or strategies such as blended learning). As an example, the Inquiry Fellows PAN supported teachers from across the ARI to work together in developing instructional units based on the Inquiry Design Model, and to share them with peers across the region. Five to eight “high quality” teachers from across the region were invited to participate in a PAN in a given year; some teachers participated in a PAN for more than one year. The number of PANs and their foci varied each year.

Perpetual Data Analysis System (PDAS) encouraged development of sustainable school-level data teams to continuously analyze data for improvement plans, to support personalized learning, and to improve student achievement. PDAS, an adaptation of Bernhardt’s Continuous School Improvement work (2013), was designed for a school team of five to eight educators. PDAS teams convened for two-day meetings across the region five times per year; teams engaged in work at their schools between regional meetings. This opportunity was extended to all schools. Principals committed to PDAS with support from the district superintendent.

Systems for students required an educator from the school or district to sponsor students. Thus, at least one principal or teacher participated in each of the student-focused components outlined here:

Student Senate was a leadership program in which high school students tackled local issues in their school, district, or community, with a particular focus on school culture and climate. Each district appointed two students to serve on the regional Student Senate. In all, 34 students served in this district leadership role each year. Student Senators met online and in person throughout the school year to tackle regional challenges.

Students Transforming Appalachia with Real-world Solutions (STARS) allowed teams of students, coached by a teacher or principal, to identify and create solutions to community problems. Student teams showcased their solutions at the ARI's semiannual summit and had the option to participate in the Kentucky Governor's Cup Competition. Although all students had the opportunity to participate in STARS, it largely targeted middle and high school students. There was an application process for student teams.

Entrepreneurial Program allowed school-based student teams to receive instruction in business plan development and then develop a business plan for a product or service. Teams competed in local and regional competitions and presented at the ARI's semiannual summit. This was part of STARS and, therefore, designed for middle and high school students. Student teams applied for this opportunity.

Other student agency projects were job shadowing opportunities, mentoring, and various art and creative opportunities aimed at increasing student agency. As an example, the FIREShare Fellows provided an opportunity for students to work closely with the Holler to develop content that highlighted personalized learning implemented in their schools.

Structures

Prior to the ARI, KVEC worked directly with districts and schools to provide education services. Its small staff supported a wide range of services for more than 100 schools across 19 districts. Each KVEC staff member supported all schools in his or her area of expertise, certification, and accreditation (e.g., Kentucky Education Professional Standards Board). KVEC staff met with superintendents at least once a month for board meetings, and staff members met with principals and teachers as requested and at regional or statewide professional development events.

According to many interviewees, school principals and teachers in the region did not have time or space to collaborate or communicate with one another prior to the ARI. KVEC staff thus envisioned structures of the ARI as a way to bring districts out of their silos and into a more collaborative community. To support this collaboration, KVEC developed multiple structures to foster communication and a collaborative network, discussed in more detail further on, including dedicated staff positions and tools. KVEC envisioned eight tools for communication with leaders and teachers, which were present in all four years of the ARI (from 2014–2015 to 2017–2018): the ARI Leadership Team (KVEC); the IC; the Finding Innovation in Rural Education Summit

(FIRESummit); the Holler and Holler staff; FIRECast/FIREShare; MondoBoards; and the Appalachian Higher Education Consortium (AHEC) and Advisory Council. Each of these is described in more detail here.

Structures to Build the Infrastructure for a Collaborative Network

The ARI Leadership Team (KVEC). To design the ARI and its activities, the KVEC Board of Superintendents and KVEC leadership created an ARI Leadership Team of well-respected veteran educators (i.e., leaders and teachers) from across the region. A few of these educators were KVEC staff prior to the ARI, while others had worked in districts and schools. This team was established to manage and implement the initiative at the regional level. Different members oversaw design and implementation of various activities each year, serving as liaisons with the leadership of one or more districts, recruiting educators and students to participate, and disseminating information. Leadership Team members were full time and on loan from their home districts. Although the Leadership Team did not include all KVEC staff, superintendents, principals, and teachers in the region referred to this team as KVEC. We adopted the same convention, referring to the ARI Leadership Team as KVEC and the members of the team as KVEC staff.

IC. An IC was appointed in each ARI district to “serve as the liaison to the greater KVEC team and serve to communicate and implement ARI initiatives and programs district-wide” (KVEC, 2013, p. 1) and across the region. The ARI covered the full-time salaries of the ICs—veteran teachers, principals, or district leaders—though districts had full autonomy in recruiting, hiring, and evaluating performance. KVEC and ICs met monthly for half- or full-day meetings.

FIRESummit. The ARI hosted daylong regional learning summits twice each year, one in the fall and one in the spring. Each summit was intended to serve “as a catalyst for energizing and accelerating strategies to improve the quality of education for learners everywhere” (KVEC, undated-b). The fall summit focused on previewing activities and systems developed by principals, teachers, and students that they would engage in during the year. In the spring, teachers, principals, and students shared lessons learned from their experiences and recommendations for others who might be interested in replicating their work. Teachers and students who participated in ARI activities were required to attend the summits and make presentations; transportation and substitute teachers were provided as necessary. Nonparticipants and administrators were also welcome to attend in person or via live broadcast or archived recording.

The Holler and Holler staff. The Holler was a place-based social learning network “designed to establish an open conversation of technology and learning in the Central Appalachian region, as well as a delivery tool for open coursework and learning initiatives” (KVEC, undated-a) for the initiative. The platform enabled the sharing of ideas, resources, and practices in specific topic areas and served as a repository for self-paced online courses. Content was developed by KVEC, principals, teachers, and students across the region. ARI activities and structures required participants to post content, such as stories and photos of their experiences in

activities or lessons learned. Holler staff with technical expertise (e.g., programming, video content) worked full time to develop content and support principals, teachers, and students as they developed content. **FIRECast** (podcasts) and **FIREShare** (videos) were developed by principals, teachers, and students in the region with support from Holler staff to highlight “creative and determined educators building their classrooms into one of a kind experiences. The goal [of this communication approach] is to showcase these classroom innovations and inspire others” (KVEC, undated-c). As a regional resource, the Holler was intended to provide a personalized learning dashboard, details on how personalized learning was implemented, contact information for principals, teachers, and students involved in personalized learning, and a mechanism to communicate about their experiences. Overall, the Holler served as a virtual network for collaboration.

MondoBoards were large-screen, free-standing computers with a camera for video conferencing, intended to enable educators throughout the region to meet one-on-one or in larger professional learning communities. Classroom sets of compatible tablet-like devices also enabled virtual field trips and other classroom learning opportunities. These resources helped to relieve problems related to the geography of the region and travel. This technology was also part of the Next Generation Classroom.

AHEC, a partnership with the Kentucky Department of Education, Educational Professional Standards Board, Council for Post-Secondary Education, and leaders from the universities and colleges of the region, focused on designing higher education programs to address “specific needs of participating rural districts” (KVEC, 2013, p. 32) and foster innovation or personalized learning efforts. AHEC closely aligned with the Teacher Scholarship Program of the ARI. The consortium met several times each year over the four years of the initiative. A KVEC staff person participated in AHEC; this was not intended for school principals and teachers.

The ARI **Advisory Council**, which included the Appalachian Innovation Collaboration, had nationally recognized experts in education and rural communities. The advisory council met bi-annually in person and as needed virtually or by phone to advise KVEC on the ARI. This system supported KVEC in designing, implementing, and monitoring the initiative.

Other Elements of the ARI

KVEC designed three elements of the ARI that were not competitive priorities of the RTT-D grant program but were intended to personalize opportunities for the community: wellness, school readiness, and parent/guardian engagement. **Wellness** efforts were aimed at creating a collaborative of health care providers, educators (district leaders, school principals, and teachers), and other service providers to discuss regional challenges, such as the opioid epidemic. The initiative also supported school districts as they partnered with health care agencies to implement school-based clinics and offer telehealth services in all schools. **School readiness** activities provided early childhood education resources, including professional development opportunities for teachers and families, as well as connections to the Imagination Library, a book gifting program. School principals and teachers could participate in this system. The **parent and**

guardian engagement activity convened meetings to discuss education topics (i.e., school readiness, Every Student Succeeds Act standards; college and career readiness) and regional opportunities with families. Meetings occurred in person and online; resources were continuously posted on the Holler for families. School principals and teachers were intended to be active participants of this system.

Box 2. Innovation Grants

The ARI Innovation Grants program was one of the ARI's more prominent activities. Each year, teachers applied for up to \$1,000 to develop an innovative activity intended to support teaching and learning. Teachers who received grants would present their preliminary ideas at the ARI's fall summit and then discuss how they implemented those ideas at the spring summit. According to KVEC, the goals of Innovation Grants were to (1) create opportunities for innovative, rigorous, and personalized learning for teacher and students and (2) share learning from the grant and action research results with colleagues. The application itself defined the mission of the ARI and, in turn, Innovation Grants as “identify[ing], support[ing] and promot[ing] innovative practices in education—and as importantly—support and promote those educators and their students who are daring to be great” (KVEC, 2016). KVEC aimed for grants to foster innovative or creative solutions to local problems. Innovation Grants were not intended to be “tried and true” practices. Rather, KVEC expected Innovation Grants to “start developing an evidence base so that over time these interventions can be held up to review and demonstrate their effectiveness.” Overall, the intent of Innovation Grants was to create opportunities for teachers to develop an innovative solution to a local challenge.

Taken together, this was an extensive set of activities, systems, and structures made available to districts that had previously not had access to this level of support and guidance. While not all ARI activities were offered to everyone, many were available to those who indicated an interest. As noted in the introduction to this report, this approach of offering a large set of options, including activities like the Innovation Grants and communities of professional practice that enabled teachers to pursue innovative work of their choosing in their own classrooms, was intended to support teachers and students within their specific contexts. This approach stands in contrast to more-prescriptive school improvement approaches that focus on specific academic areas that require principals and all teachers of those academic areas to participate in an effort to boost student achievement (e.g., comprehensive school reform approaches like those described in Correnti and Rowan, 2007, and Borman et al., 2003). While more-prescriptive academic reform efforts could potentially boost student achievement, they might not meet the individual needs of teachers and students across the region.

Perceptions and Understanding of the ARI in Districts

Structures of the ARI were critical in building awareness of the initiative in the region. As discussed earlier, districts operated as silos prior to the initiative, and KVEC needed to build a communication network in the region to foster knowledge of the ARI and, in turn, participation. KVEC designated people to communicate about ARI activities and systems and provided structures intended to facilitate communication. The ARI included funding for an IC in each district who would serve as a liaison between KVEC and district/school staff to provide information on the ARI. When principals and teachers received information about the ARI, it was intended that they would share that information with their colleagues. KVEC assumed that awareness about ARI activities in a school district would help district officials, principals, and teachers determine the extent to which they wished to participate.

In addition, KVEC staff, ICs, district leaders, school principals, and teachers were to utilize various mechanisms to communicate about the ARI, including meetings; scheduled or chance interactions with district and school principals, individual faculty, and professional learning communities; and emails, flyers, and brochures. Communication structures created by the ARI were also expected to serve as a network for disseminating other key information about work in the region related to the ARI (e.g., policy updates for early childhood education, community events to discuss College and Career Readiness standards). In this section, we examine the extent to which principals and teachers received communication about the initiative.

KVEC developed a theory of action for disseminating the activities and systems of the ARI that was broadly aimed at fostering widespread engagement and adoption among nonparticipants. The initial participants were intended to be the principals, students, and leaders across ARI schools who would describe themselves as already innovative and attempting to personalize instruction or those interested in trying to do things differently but lacking access to supports (e.g., financial resources, network of similar leaders and teachers) to implement new approaches. It was anticipated that initial participants in the ARI would discuss their ARI experiences at their school or district meetings and in their personal social circles. Participants in activities were also required to post about their experiences on the Holler to build a virtual collaborative network focused on personalizing learning for principals, teachers, and students. The Holler would serve as a mechanism for participants to contact each other, as well as a way for those interested in learning more about personalized learning to gather information from others in the region. Early adopters would share what they learned through the initiative and the effectiveness of their approach, which, in turn, would encourage others to participate the following year—or provide information necessary for nonparticipants to implement practices outside of the ARI.

Principals and Teachers Linked the ARI with Technology and Innovation, but Many Teachers Did Not Know Its Purpose

Perceptions of the purpose of the ARI were derived from explanations provided by interviewees to an open-ended question about how they would describe the ARI’s purpose. If a participant provided more than one purpose in a single interview, each was counted.

In interviews, all principals and nearly all teachers said that they had heard of the ARI. When asked about the purpose of the ARI in interviews over its four years, principals and teachers gave a range of responses. Roughly 35 percent of teachers reported no knowledge of the purpose of the ARI (Table 3.3). About one-third of teachers who reported some awareness of the ARI associated its purpose with providing schools with technology. As described by one teacher, “I think this is a grant, so teachers can incorporate more technology into their classrooms and let kids be more hands on and let teachers order technology.” Similarly, when asked about the purpose of Innovation Grants—which were intended to give teachers a source of funding for innovative teaching and learning ideas—teachers identified the primary purpose of the grants as providing teachers with technology. Nearly one-third of teachers also reported the purpose of the ARI as providing “opportunities” for teachers to “try something new and different” and funding for educators and students in the region to try different approaches (Table 3.3). Interview participants—principals and teachers—largely described the ARI as an initiative aimed at providing teachers with access to technology and funding needed to “teach outside of the box.”

Table 3.3. Purpose of the ARI, According to Interviewed Principals and Teachers (N = 196)

Purpose of the ARI	Percentage Reporting
I don't know	35
Provide technology	33
Provide opportunities	30
Provide funding	30
Aware of one activity but no broader knowledge	23
Support innovation	15
Advance Appalachia	15

NOTE: Percentages do not sum to 100 due to multiple interviews of some teachers.

By the End of Year 4, Most Principals Were Aware of Most ARI Activities; Teachers Were Less Knowledgeable

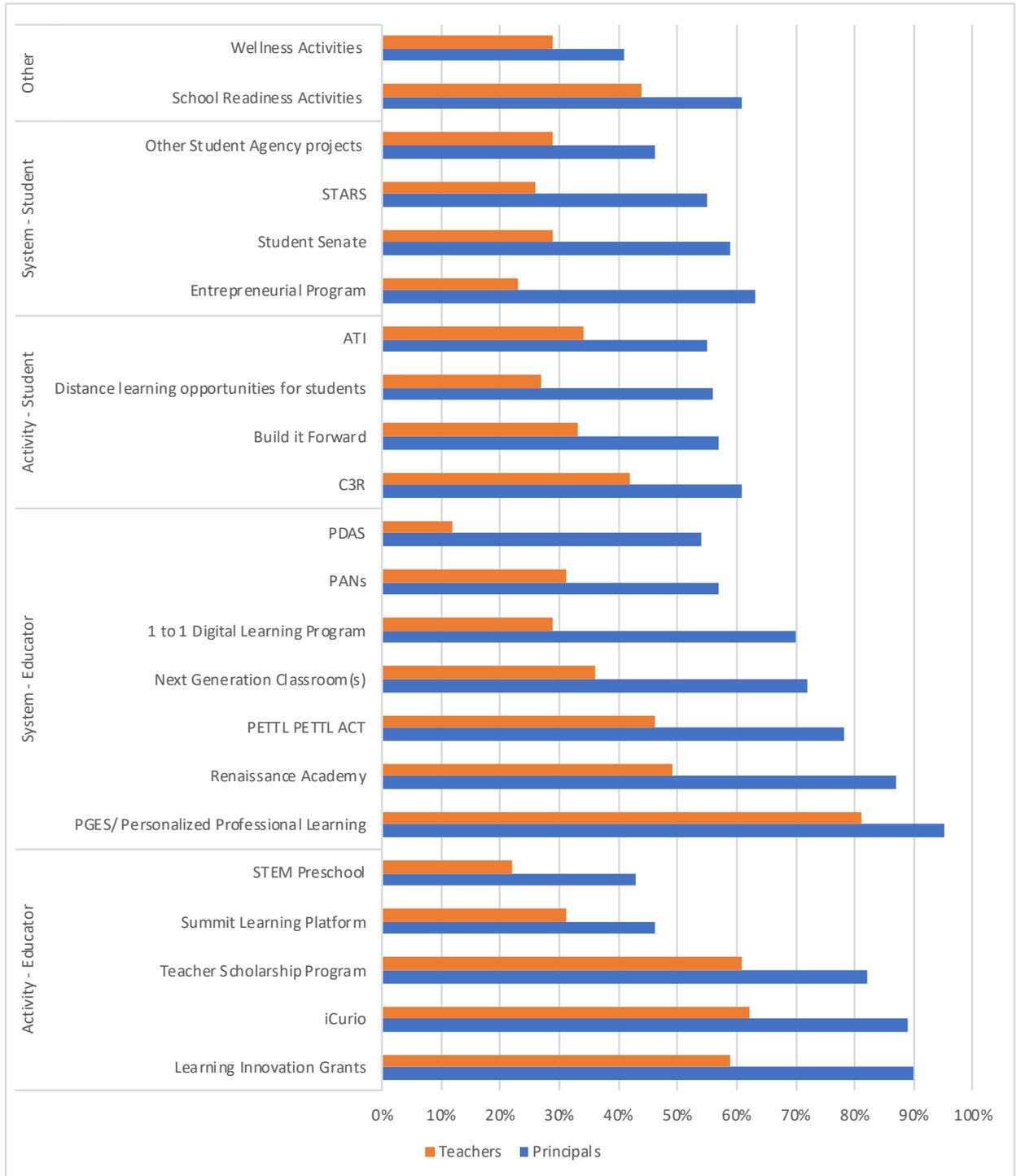
Our assessment of awareness of ARI activities and systems was derived from survey responses. The survey included the elements of the ARI offered to principals and teachers in the school year it was conducted. Thus, activities and systems that were not available during Year 4 (e.g., WIN Mathematics) were excluded from the survey. Systems of the ARI in which principals and teachers were not intended to participate, such as the AHEC and Advisory Council, did not appear on the survey. Additionally, KVEC, ICs, principals, and teachers applied the term

activities when talking about the activities and systems elements. For consistency, we also used the term *activity* on the survey and interviews.

By Year 4, according to survey data, nearly half of principals ($N = 80$) heard about most of the ARI activities offered that year (Figure 3.1). Compared with principals, teachers were less knowledgeable of ARI activities. Specifically, on average, 59 percent of principals indicated having heard about at least one ARI activity, compared with about 34 percent of teachers. The activities familiar to the majority of both teachers and principals included PGES Learning Innovation Grants and iCurio; each of these activities was available to all principals and teachers. In addition, majorities of principals and teachers reported having heard of the teacher scholarship program that allowed teachers to receive their certification from the National Board of Professional Teaching Standards or teaching certification from the state of Kentucky in difficult-to-fill vacancy areas (e.g., STEM) at no personal cost. The PGES activity may have been the most familiar to principals and teachers because professional development sessions focused on KDE's evaluation system and building capacity in areas rated by the state. A subset of trainings directly linked to requirements of KDE for a particular position, such as certification on the classroom observation system for principals. In general, both principals and teachers reported having somewhat less knowledge of the activities and systems designed for students than those for educators. Elementary principals and teachers, in particular, would be expected to have less knowledge about student activities because most of those activities focused on middle and high school students.

We also surveyed teachers in Year 2 regarding the activities they heard about. Among the 17 activities asked about in Year 2 and Year 4—a subset of the overall activities offered each year—teachers had slightly more knowledge of activities in the later year of the initiative. On average, about 32 percent of teachers had heard about an ARI activity in Year 2, compared with 40 percent in Year 4. However, given the low response rate for the Year 2 survey, we cannot say definitively if teachers' knowledge of the ARI grew between Year 2 and Year 4.

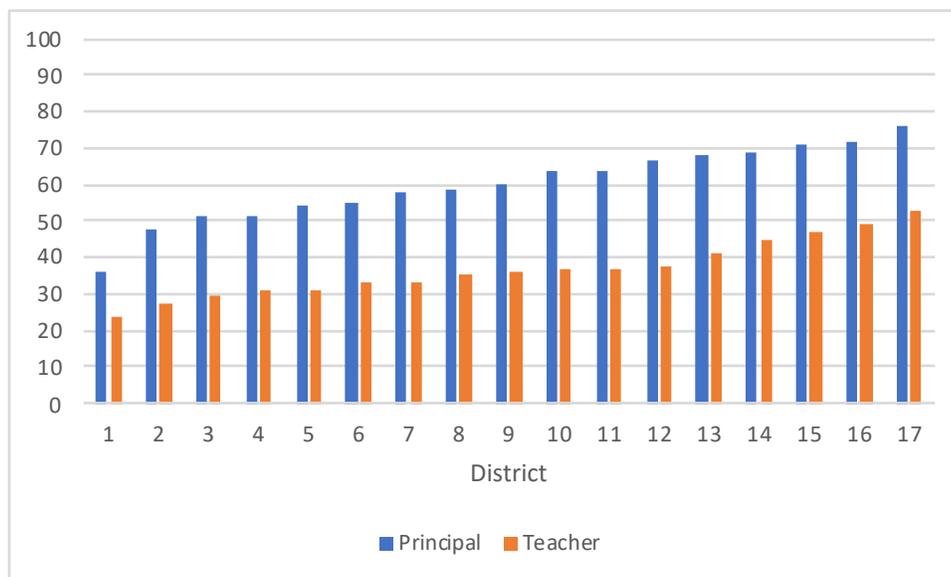
Figure 3.1. Percentage of Principals and Teachers Who Heard About an ARI Activity, Year 4



NOTE: Survey item: "Please indicate whether you have heard of any of the ARI activities listed below." Possible responses: Have not heard of this activity/Heard of this activity. Each activity was asked about separately in the survey. Principal survey $n = 80$; teacher survey $n = 483$.

There was also variance across districts in both principals’ and teachers’ knowledge about ARI activities. For example, principals in one district reported knowledge of only about one-third of the activities, on average, compared with principals in three other districts who had knowledge of more than 70 percent of ARI activities. Similarly, in one of the 17 districts, teachers reported knowledge of about one-quarter of the ARI activities, on average, whereas in another district teachers had heard about half of the activities. We did not identify any clear trends regarding the demographics or size (number of schools) of the districts where teachers had greater knowledge of activities (e.g., districts with lower or higher free and reduced-price lunch percentages, larger or smaller districts; elementary or secondary schools). However, as noted in Figure 3.2, districts where principals had more knowledge about the activities, on average, tended to be the same districts where teachers had more knowledge about the activities. These data underscore that the district itself, and staff within a district, likely played an important role in communicating information about the ARI to the schools.

Figure 3.2. Average Percentage of Activities That Principals and Teachers Reported Hearing About, by District, Year 4



NOTE: Principal survey $n = 80$; teacher survey $n = 483$.

Sources Through Which Principals and Teachers Heard About the ARI

The sources through which principals and teachers heard about the ARI might indicate the most meaningful pathways for providing information about large initiatives in rural districts. The communication plan proposed a variety of mechanisms to build knowledge and awareness of the ARI. Some of these mechanisms were more traditional approaches (e.g., email and personal conversations), while others were newly developed for the initiative (e.g., the Holler, summits). In interviews, KVEC members reported communicating with ICs, district leaders, school

principals, and teachers largely through email and personal conversations (electronic or in-person), at ARI and other KVEC events, and through the Holler. In this section, we further explore what principals and teachers reported via surveys and interviews about how they heard about the ARI and how frequently they received information about ARI activities. Some aspects of KVEC’s communication plan were reflected in the communication approaches that principals and teachers reported, whereas other aspects were not.

Principals Reported Hearing About the ARI Through KVEC; Teachers Reported a Variety of Sources

Our survey data suggest that KVEC, ICs, and administrators (district officials or school principals) were all important sources of information about the ARI. When asked how they heard about ARI activities, 67 percent of principals identified KVEC as the most frequent source of communication (Table 3.4), followed by the IC. Teachers reported hearing about ARI activities more frequently from school administrators and KVEC (37 and 31 percent, respectively; Table 3.4). On average, 23 percent of teacher survey respondents acquired knowledge about the ARI from another teacher. Eighteen percent of teachers indicated hearing about an activity from ICs.

Table 3.4. How Did Survey Respondents Hear About ARI Activities? Average Percentage Indicated Through Each Source, Year 4

	KVEC	IC	Administrator (District or School)	Teacher	Someone Else	Don't Remember
Principals	67	40	11	10	9	5
Teachers	31	18	37	23	13	10

NOTE: Survey item: “Of the ARI activities you heard about, please indicate from whom you heard about it.” For each activity, principals and teachers were asked their source of information. All the sources from whom principals or teachers reported hearing about an activity exceed 100 percent because they could have heard about a given activity from multiple sources. Principal *n* = 80; teacher *n* = 483. The number of teacher and principal survey respondents was different for each source, conditional on whether they indicated hearing about that activity (as noted in Figure 3.2).

Teachers reported hearing about KVEC from nearly all of the sources intended in the communication plan on the survey and in interviews. However, teachers reported hearing about the ARI from ICs much less frequently on the survey (18 percent) than in interviews. As noted in Table 3.5, 57 percent of interviewed teachers who heard of an ARI activity learned of it from the district IC. We attribute the difference in survey and interview responses to the various roles that ICs held in their districts prior to and during the ARI. Twelve of 17 ICs reported official district roles in addition to IC (e.g., Instructional Supervisor); a few held multiple other titles. For interview responses, we coded names of people who communicated about the ARI to roles. It may be that teachers did not recognize the “Innovation Coordinator” title in the survey and instead thought of their IC as a district administrator. Teachers who had previously participated

in an ARI activity were the next most common source of communication among teacher interviewees.

Table 3.5. Source of Information About the ARI as Reported in Interviews of Teachers (N = 196)

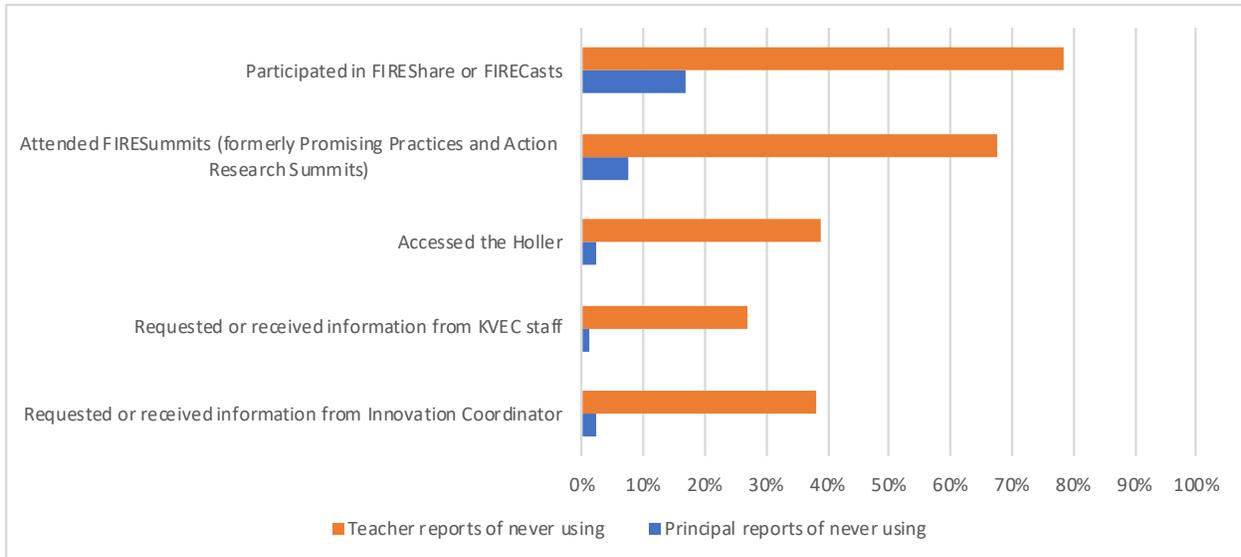
Source of Information About the ARI	Percentage Reporting
IC	57
ARI-participating teachers	38
Principal	14
KVEC	12
Other	1

NOTE: Percentages do not sum to 100 because they are not adjusted to account for multiple interviews of some teachers.

Principals Were More Optimistic About Teachers Gaining Awareness of the ARI Through Various Structures Than Were Teachers

Between one-third and one-half of surveyed principals reported that most of their staff received information about the ARI through ICs and KVEC. A majority of teachers also reported receiving ARI information through these sources. There were notable differences in principal perceptions of the frequency with which they and their teachers used structures of the ARI to get information and teacher reports (see Figure 3.3). Principal reports would suggest that nearly all teachers received at least some information about the ARI from ICs, KVEC, the Holler, FIRESummits, and FIREShare or FIREcasts posted on the Holler (see Figure 3.3). When asked how teachers received information about the ARI, very few principals indicated that “no one” received information through from these structures. In contrast, as noted in the figure, between one-quarter and three-quarters of teachers surveyed indicated that they never received information through the listed sources. Principals appeared to have thought that teachers engaged with the Holler, FIRESummits, and FIREShare and FIREcasts structures more than they did.

Figure 3.3. Average Percentage of Teachers Who Indicated Never Hearing About the ARI from a Given Source, Compared with Principal Reports of Whether Teachers Heard About the ARI Through That Source, Year 4



NOTE: Principal survey item: “Please indicate whether you or—to your knowledge—your staff utilized any of the following mechanisms to learn about ARI this year (2017–18).” Possible responses: A few staff at my school/Several staff at my school/Most or all staff at my school/No one, as far as I know/Unsure. Teacher survey item: “Please estimate the frequency with which you have utilized any of the following mechanisms to learn about the ARI this year (2017–18).” Possible responses: Never/1–2 times/3–4 times/More than 5 times/Unsure. Principal $n = 80$; teacher $n = 483$.

Approximately Half of Interviewed Teachers Thought They Received Sufficient Communication About the ARI

About half of the teachers we interviewed said that communication about the ARI was adequate and informative enough. One teacher noted, “I always keep in touch by using the Holler . . . [the IC] is very good about sending emails, but not just her, everyone at KVEC, and so there’s a lot of communication that goes along, a lot of meetings—you’re being informed.” Similarly, another teacher noted,

Well, we get emails from ARI as a grant recipient. We get information from [our IC] whenever he gets information, he sends some of it to all the faculty and others to just the faculty that have the grants or are involved. It’s been easy to feel like I was informed, and then it was also easy to ask questions about “what am I supposed to do” for my part of it.

The other half of the teachers we interviewed said there was not enough communication, a finding consistent with teacher survey responses. One teacher who participated in ARI events reported,

I think exposure is one of the big issues. That just a few people are getting it but it’s not really going any farther than that. Because, you know, you hear all these great ideas when you’re actually there [at ARI-related events]. But then you

come back to the grind the next day and then you're just like—you're just into what you're doing and nobody else really gets the word.

Another teacher commented that s/he gets emails but is often unsure how to act on them:

I feel almost like if there was one person that kind of came around or were in a thing and was like, "Here's your packet. Here's some ideas." . . . So, maybe if there was like a list of ideas of, "You could write this grant for a classroom redesign or for tablets" or just the various things that could be it might trigger an idea.

In interviews, teachers said email was a particularly ineffective channel for learning about the ARI. Teachers reported receiving so many emails that it was difficult to track opportunities communicated using only this method. Some teachers with little awareness of activities said they probably received information about ARI activities in emails from district or school staff, but they did not remember.

Teachers Who Participated in the ARI Shared Their Experiences in Most but Not All Cases

KVEC's communication plan intended for staff to share their experiences in ARI activities with others, expecting this to (1) increase support to implement new and different ("innovative") approaches in classrooms, (2) increase participation in ARI activities, (3) expand use of new and different approaches in classrooms without financial support, and (4) sustain the ARI over time. Some evidence suggests that this happened. Of those we interviewed who had participated in ARI activities ($N = 82$), nearly all (93 percent) reported sharing what they had learned with colleagues. One teacher described the opportunity to share what she had learned as part of the culture at her school:

I kind of took it as my responsibility to learn it and show the others how to do it, and I have. I have been perfectly willing to help somebody else fight through the battles of the technology and learn how to do them because I see the benefit. So that's kind of how we work in this building. We pass things on.

This finding is consistent with teacher survey responses from Year 4. The vast majority (96 percent) of teachers who participated in the ARI reported sharing their experiences with their colleagues. The teacher survey also asked ARI participants how they shared their experiences. As shown in Table 3.6, teachers tended to use personal approaches like in-person conversations (16 percent), school meetings, or professional learning communities (PLCs) (14 percent) to communicate with their colleagues. Notably, ARI participants were required to present at FIRESummits and post information on the Holler, but very few teachers reported using these approaches to communicate about their experiences: 2 percent and 1 percent, respectively. This may suggest that participants in the ARI did not expect principals and teachers who were not involved in the initiative to use these communication structures.

Table 3.6. Average Percentage of Teachers Sharing Their Experiences in the ARI with Colleagues, By Communication Mechanism, Year 4

Communication Mechanism	Percentage Reporting
Personal conversation	16
School meeting, PLC, or professional development	14
Email	6
FIRESummits	2
The Holler	1
Other	1
I have not yet shared my experiences with colleagues	4

NOTE: Survey item: “Of the ARI activities that you have participated in this year (2017–18), please indicate how, if at all, you have shared your experiences with colleagues.” Possible responses: Email/School meeting, PLC, or Professional development/Personal conversation/FIRESummits/Holler/Other/I have not yet shared my experiences with colleagues. Principal $n = 80$; teacher $n = 483$.

ICs Transitioned to Personal Communication, Which They Came to Perceive as a More Effective Approach

IC interview responses across years of the initiative suggested that they communicated more broadly about activities (e.g., through emails to all staff) in the first few years of the ARI and shifted to more targeted and personal communication strategies in later years. Overall, ICs reported that personal and in-person communication strategies between the IC and school staff, or between school principals and teachers, were most effective. For example, one IC noted, “I don’t send mass emails any more. I write personal notes with forwarded emails to teachers who might really be interested.” Similarly, another commented, “I have a few teachers I know aren’t afraid to try to new things. I contacted them personally. I’m pushy—but when there’s something I know will benefit students, I try to encourage it.” In addition, several ICs noted that in-person visits were far more useful for engendering interest and support than emails. ICs knew which ARI activities were a fit for each principal and teacher; thus, ICs implemented a more targeted communication approach. This approach may have been perceived as more effective because it considered the design of activities (e.g., subject area, interest, and grade level) for each teacher.

Some ICs said they focused on sharing information with individuals they considered “cheerleaders” for the ARI. Those individuals, in turn, were expected to disseminate the information to others in the building. A few ICs also shared information about the ARI at school board meetings, posted ARI activities or key dates on school calendars, and invited print and radio media to attend events. Overall, ICs enacted all of the traditional communication mechanisms (e.g., emails) outlined in the communication plan.

Summary

As proposed, the ARI was intended to provide activities, systems, and structures to personalize learning for teachers and students through a range of activities identified through a needs-assessment conducted by KVEC as part of the RTT-D proposal process. These prioritized personalized learning environments, accessible data systems, next generation classrooms, educator effectiveness, and college and career readiness. Over the four years that were studied through this evaluation, KVEC offered an enormous menu of personalized learning opportunities to principals, teachers, and students, including activities intended to spark innovation and learning among educators (e.g., Teacher Scholarship Program and Learning Innovation Grants) and students (e.g., mentoring courseware and distance learning opportunities). In addition, it provided numerous large-scale activities that grew communities of practice for educators across the region, as well as activities meant to cultivate leadership and communities of practice among students. Lastly, KVEC created several structures to ensure capacity to deliver these programs and communicate them to educators in districts, including the ARI Leadership Team, a full-time IC in each district, bi-annual summits where educators shared ideas and personalization practices, and an online network.

Overall, evidence suggests that the communication plan was effective in informing principals and teachers throughout the region that the ARI was available. Nearly all of those with whom we spoke within districts (i.e., district leaders, school principals, and teachers) reported that they knew about the ARI, but they gave some varied responses on their perceptions about its purpose. About one-third of the principals and teachers with whom we spoke reported that they did not know what the purpose of the ARI was; its broad set of activities and structures may have contributed to varied perceptions about its purpose.

By the fourth year of the grant, most principals had knowledge of the majority of ARI activities, although this was less true for teachers. For both principals and teachers, knowledge of ARI activities ranged considerably from district to district. Principals tended to report hearing about the ARI directly from KVEC. Teachers, in turn, listed their principal or another local administrator as the most common source for hearing about the ARI. Teachers had less knowledge of specific activities than principals. However, more activities of the ARI were relevant for school principals than teachers (i.e., activities intended to attract a targeted number of teachers or students within a school). From the perspective of ICs, principals, and teachers, personal communication approaches like personal conversations were more effective in disseminating information and garnering interest in the activities than mass emails. The Holler was used by teachers and leaders who participated in activities; teachers and students were required by KVEC to post about some of their work related to ARI activities (e.g., Innovation Grants). By the end of the initiative, the Holler was a communication network used by ARI participants throughout the region but was not described as the primary or prevalent source of information about the ARI across the region. Widespread adoption of a new structure like the Holler may require time beyond our period of study, given prior research on spread and adoption of innovations.

4. ARI Participation and Factors Related to Participation

This chapter reports on participation in the ARI, gathered from the sign-in sheets at activities and reported by principals and teachers in surveys. We also present findings from surveys and interviews about what principals and teachers said encouraged them to participate, as well as the barriers to participation. Our research indicates that all participating districts engaged in some activities, although on average only about one-third of principals and 15 percent of teachers reported participation in at least one ARI activity, and there was limited spread to colleagues who did not participate. While communication and free resources may have encouraged participation and spread, issues related to buy-in and capacity may have limited the extent to which schools and teachers engaged.

Participation

As noted in Chapter 2, KVEC did not intend for everyone in all schools to directly participate in every ARI activity, given the personalized nature of the activities and limited capacity to serve everyone through every activity. However, KVEC did expect the program to spread to ultimately serve all teachers and students in the region (KVEC, 2013, p. 18), through both accumulated participation and the spread of the initiative from participants to colleagues within their schools and districts. The ARI would create a network of regional collaborators focused on improving outcomes for teachers and students that would result in widescale personalization. Overall, KVEC aimed for full participation in the activities and systems offered each year and hoped this would spur widespread adoption of personalized practices through a regional network focused on collaboration. Yet, KVEC recognized that large-scale adoption was a lofty goal, the attainment of which would be challenging due to its nature as a regional service agency with limited authority to compel change within the participating districts. Ultimately, KVEC could offer activities, recruit participants, and create the systems for the initiative to spread through the regional network.

Participation Goals Set for the ARI Were Met Each Year

Table 4.1 provides an overview of the activities of the ARI, organized by element and audience. It states the participation approach and goal(s), then assesses whether KVEC met the intended participation goal for the respective activity each year of the initiative. Activities with set targets for the number of participants appear in italics. We used sign-in sheets, software usage reports, program artifacts, and interview data to describe the type of participation goal and assess whether the goal was attained.

Four activities specified participation goals for principals, teachers, and students: Teacher Scholarship Program, Learning Innovation Grants, Next Generation Leader and Teacher

Academies or Renaissance Academy, and Student Senate. The targeted number of participants was achieved each year for these activities. In addition, the ARI had activities that specified the number or amount of resources that KVEC would deliver to districts and schools. Specifically, the aim was for each district and school to have a “Next Generation Classroom,” including a MondoBoard and other technology/training; funds for 1-to-1 Digital Learning; and funding for an IC. Each district and school received those resources. KVEC also successfully recruited principals and teachers to participate in activities like the PANs. Schools also submitted applications to participate in systems aimed at building capacity each year they were available (e.g., PETLL, PETLL ACT; ALL). Finally, for activities without participation constraints (e.g., iCurio and C3R), at least some principals, teachers, and students throughout the region participated.

Table 4.1. Attainment of ARI Participation Goals, by Element and Audience

Element	Audience	Name	Participation Approach and Goal(s)	Evidence That Goal Was Met
Activity	Educators	Teacher Scholarship Program	25 teachers per year; applications	√*
		Learning Innovation Grants	Application process open to all principals and teachers; funded approximately 100 grants annually	√*
		iCurio	Licenses available to all principals, teachers, and students; all principals and teachers received training; school or individual decision to participate	√
		MILL	MILL built by KVEC; activities/curriculum developed by invited teachers from across the region; available to all schools	√
		STEM Library	Developed by invited teachers from across the region; available to all schools	√
		STEM Preschool	KVEC staff member available to work with schools offering preschool to emphasize STEM in the curriculum; schools requested support	√
		STEM Unit Rotations	Cohort of invited teachers build STEM units; units available for use by schools	√
		Summit Learning Platform	KVEC staff trained in Summit Learning Platform supported schools implementing the platform; schools requested support	√
	Students	C3R Initiative	Licenses available for schools; principals and teachers assigned software or informed students it was available for use outside of school	√
		Distance learning opportunities	KVEC provided the structures and technology (Next Generation Classrooms) as well as network (AHEC and ICs) for students to virtually enroll in classes not offered in their school; students enrolled in classes as needed or interested	√
		WIN Mathematics	Licenses available for schools; principals and teachers assigned software or informed students it was available for use outside of school	√

Element	Audience	Name	Participation Approach and Goal(s)	Evidence That Goal Was Met
		ATI	Developed curriculum and a network of teachers delivering courses in emerging employment pathways (e.g., coding and aviation); teachers and students participated in classes based on personal interest	√
		Build It Forward	School teams applied for funding to build a tiny house	√
Systems	Educators	PETLL	District officials and school principals received information; schools applied if interested	√
		PETLL ACT	District officials and school principals received information; schools applied if interested; 5-to-8-person teams from each school	√
		PGES/Personalized Professional Learning	KVEC disseminated information about available trainings to district officials, school principals, and teachers; educators participated as interested, needed, or mandated by district officials or school principals	√
		Next Generation Leader and Teacher Academy or Renaissance Academy	Principal and at least one teacher from each school required to participate in trainings throughout the year	√*
		Next Generation Classrooms	Each school received a MondoBoard and other technology to create a Next Generation classroom; principal and at least one teacher from each school received training on the technology; other training as requested	√
		1-to-1 Digital Learning Program	Each school received a per-pupil allocation to purchase technology that enables personalized learning each year	√
		ALL	District officials, school principals, and teachers received information; individuals applied if interested	√
		PANs	Invited principals and/or teachers participated in individual professional learning communities; each PAN was limited to between 5 and 8 teachers	√
		PDAS	District officials and school principals received information; schools applied if interested; the size of school teams was limited	√

Element	Audience	Name	Participation Approach and Goal(s)	Evidence That Goal Was Met
	Students	Student Senate	Two high school students from each district participated each year	√*
		STARS	Student teams applied based on interest	√
		Entrepreneurial Program	Student teams applied based on interest	√
		Other student agency projects	Students enrolled or participated based on personal interest	√
Structure		KVEC staff	KVEC staff member led each activity, system, or structure	√
		IC	IC appointed from each district	√
		FIRESummits	Two per year required for principals and teachers participating in ARI activities or systems; open invitation for others	√
		The Holler and Holler staff	Build a data warehouse of information about personalized learning throughout the region that provides opportunities for virtual collaboration and networking; hire staff with skill set required to build and manage the platform	√
		MondoBoards	MondoBoard and related technology for Next Generation Classroom in each school	√
		AHEC	KVEC staff participates in meetings and disseminates information to KVEC staff responsible for related activities and systems	√
		Advisory Council	Build a council of national experts; invite to in-person meetings and contact throughout the year as needed	√

* Activity with a specified participation goal.

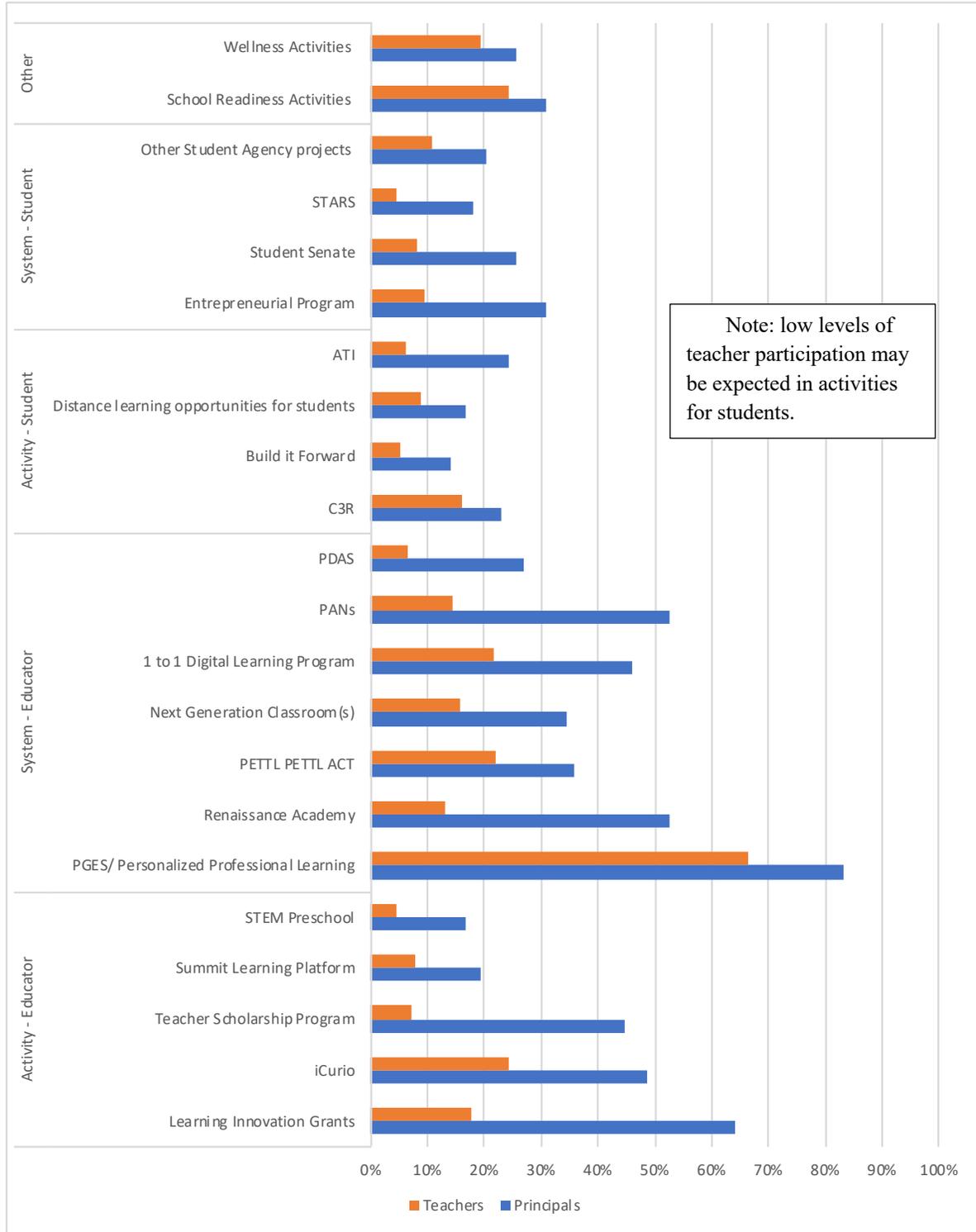
As Expected, Participation in any Particular ARI Activity Varied

Data on participation in ARI activities and systems were derived from survey responses. The Year 4 surveys asked principals and teachers about their participation in ARI activities during the 2017–2018 school year (see Figure 4.1). The surveys included only ARI activities offered to principals and teachers in that year. Activities and systems not offered in Year 4 (e.g., WIN Mathematics) were not covered. Also not covered were systems of the ARI in which principals and teachers were not intended to participate, such as the AHEC and Advisory Council.

For each activity, principals were asked whether they, teachers, or students in their schools participated, while teachers were asked about their own participation and that of their students. Thus, the survey was measuring breadth of participation rather than intensity.

Thirty-one percent of principals reported participation in any one activity, taking into account only the activities of the ARI that principals, teachers, or students could participate in during that school year. However, reports of participation ranged widely depending on activity, from 83 percent of principals reporting participation in PGES (an activity that was aimed at all schools in the region) to just 14 percent indicating participation in Build It Forward (an activity that was aimed at the high school career and technical education students). Majorities of principals also reported participation in Learning Innovation Grants, PANs, and Renaissance Academy activities. Similarly, the average percentage of teachers who reported participation in any one activity was 15 percent and ranged from as high as 66 percent in PGES to as low as 4 percent in STARS and STEM Preschool. Twenty percent or more of teachers also reported participation in PETLL ACT, iCurio, 1-to-1 Digital Learning, and School Readiness.

Figure 4.1. Percentage of Principals and Teachers Who Reported Participation in Each ARI Activity, Year 4



NOTE: Survey item for principals: “Please indicate whether you, other staff at your school, and/or students at your school have participated in any of the ARI activities listed below this year (2017–18).” Possible responses: Yes/No. Survey item for teachers: “Please indicate whether you or your students have participated in the ARI activities listed below this year (2017–18).” Possible response: Participated in this activity. Principal $n = 80$; teacher $n = 483$.

Table 4.2 provides data on average participation for activities of each type (i.e., activities for educators, activities for students, systems for educators, systems for students, and other). As noted in Table 4.2, nearly half of principals (47 percent) and nearly one-quarter (23 percent) of teachers—on average—reported participating in any one system activity designed for educators. Just under 40 percent of principals and 12 percent of teachers reported participating in other non-system professional learning activities targeted at educators. Roughly one-quarter of survey respondents reported participation in the wellness or school readiness activities in the other category. We did not find a notable difference in participation—according to survey data—between teachers with different school or district-level demographics (e.g., school-level free or reduced-price lunch percentages or more versus fewer rural schools). Lower percentages of teachers reported participation in student activities, which is not a surprise because teachers would only participate insofar as they acted as the mentor or lead for a group of students in their school.

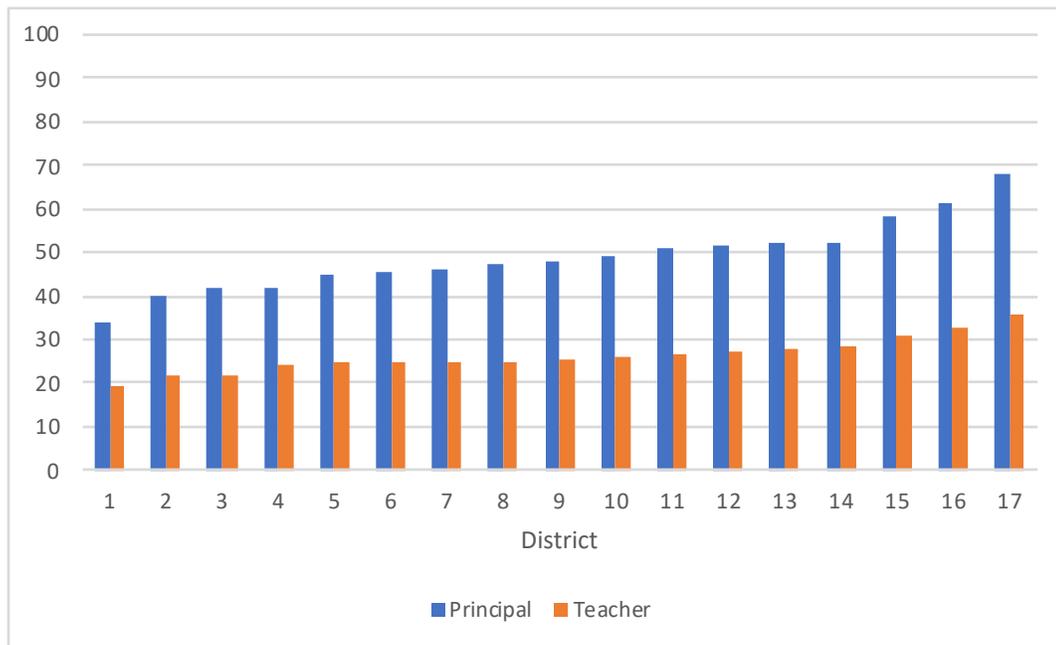
Table 4.2. Average Percentage of Survey Respondents Who Participated in the ARI, by Activity Category, Year 4

Category	Principal	Teacher
Activity–educator	39	12
System–educator	47	23
Activity–student	20	9
System–student	24	8
Other	28	22

NOTE: Participants responded for only the activities in which they had participated (as noted in Figure 4.1). We collapsed activity responses by category and averaged the categories.

Figure 4.2 displays the average percentage of principals and teachers who reported participation in each ARI activity by district. Like the pattern seen in Chapter 3 regarding awareness of the ARI, participation varied by district, ranging from 34 to 68 percent of principals and 19 to 36 percent of teachers participating in at least one activity.

Figure 4.2. Average Percentage of Principals and Teachers Who Participated in an Activity, by District, Year 4



NOTE: District number assignment is consistent from Chapter 3.

Principals and Teachers Participating in the ARI Typically Participated in More Than One Activity per Year

Survey data indicated that teachers who did participate in ARI activities tended to participate in multiple activities. For example, in Year 4, roughly 75 percent of teachers who participated in any ARI activities participated in more than one activity, according to survey data, with teachers participating in an average of three activities. On the survey, principals reported that they or their staff participated in an average of eight activities in Year 4. Principals and teachers who participated in the ARI engaged with multiple activities.

While KVEC met its participation goals for the ARI, the overall percentage of principals and teachers in the region participating in ARI activities and systems did not exceed 20 percent in any given year (Table 4.3). Activity sign-in sheets and participant lists for activities and systems offer this broader perspective on participation. These participation data consider each principal and teacher in the region, as opposed to the teachers sampled for surveys and who chose to respond to the survey. We excluded structures from this analysis because activities within the structure element focused more on communication and networking than building capacity of principals, teachers, or students. Consistent with survey findings, the data from the participation database (i.e. sign-in sheets) indicated variation by activity. Participation was greatest in the Professional Growth and Effectiveness/Personalized Professional Learning activity, an activity available and relevant to all principals and teachers. The relatively low percentage of principals and teachers participating in activities and systems is not surprising, given the opt-in approach for many ARI activities and constraints on the number of participants for other activities. As an

example, any principals and teachers could submit an Innovation Grant application, but the ARI could fund roughly 100 per year; about twice that number of proposals were submitted in a given year.

Table 4.3. Percentage of Principals and Teachers Participating in at Least One ARI Activity, by Year

	Percentage
Year 1 2014–2015	20
Year 2 2015–2016	20
Year 3 2016–2017	13
Year 4 2017–2018	5

NOTE: We estimate that participation was approximately 661 of 3,170 educators in Year 1, 628 of 3,139 educators in Year 2, 414 of 3,100 educators in Year 3, and 154 of 3,100 educators in Year 4.

Participating Teachers Reported Sharing ARI Experiences, But It Was Unclear Whether ARI Practices Were Spread

Chapter 3 detailed KVEC’s theory of communication and spread of the ARI across the region. It sought to build channels of communication across and within districts and schools to spread knowledge and implementation of new or different practices to those who did not directly participate in ARI activities. In interviews across the four years of the ARI and in the Year 4 teacher survey, the vast majority of ARI participants reported sharing their experiences with colleagues. The extent to which other teachers adopted the practices described by their colleagues was unclear. In interviews, very few with knowledge of another teacher’s experiences with the ARI reported “trying out” the practices shared by their colleagues. When asked whether they may be willing to try the practice later, responses were vague or noncommittal (e.g., “if I end a unit early,” “if every student had a device,” “if I can borrow everything [from the participant]”). Roughly 13 percent of interview participants described themselves as near the end of their teaching career and unlikely to change their practices, while approximately 10 percent were hesitant to try practices that used technology in their classroom. There was little evidence to suggest implementation of new and different practices adopted by ARI participants was spreading to nonparticipants by the spring of Year 4.

The Influence of Awareness and Communication on Participation

As noted in the introduction, our framework for examining conditions enabling and limiting participation is derived from research on factors necessary for innovations to lead to change, in particular: (1) channels of communication, (2) buy-in among stakeholders and alignment with school goals, and (3) district and school capacity. In Chapter 3, we discussed channels of

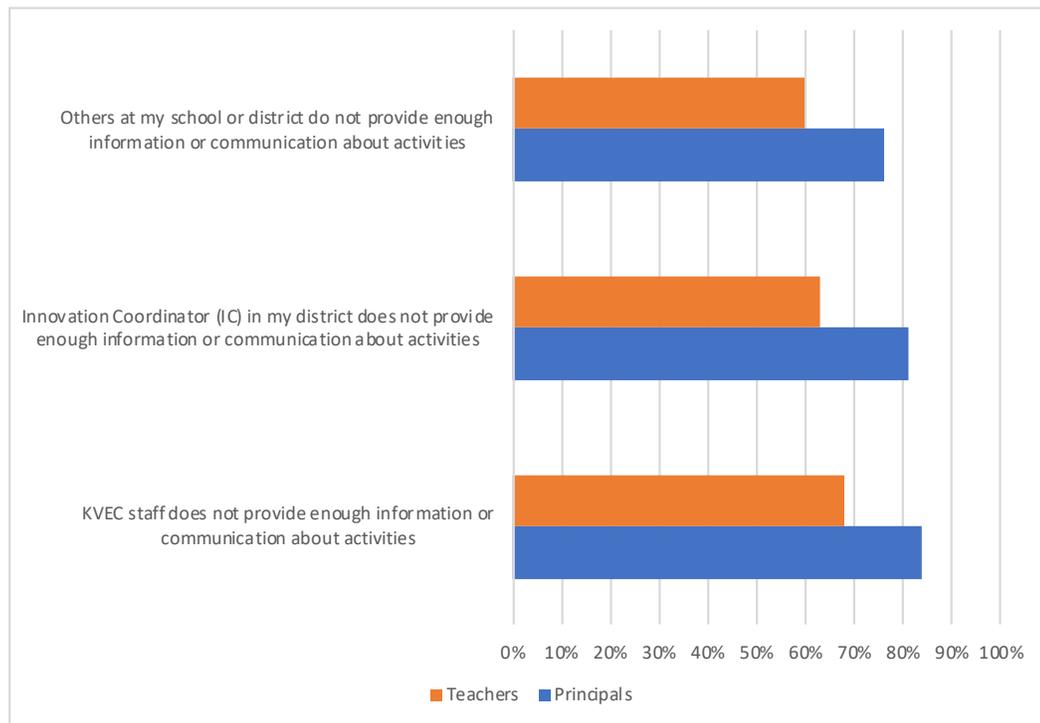
communication in some detail. In this section, we consider educator awareness of and communication about the ARI as a factor influencing participation. In subsequent sections, we explore buy-in and capacity as alternative explanations.

Roughly Half of the Principals and Teachers Who Heard About an Activity Opted to Participate in It

As noted in the previous chapter, roughly 60 percent of principals indicated hearing about any one ARI activity, on average across all activities, in the Year 4 survey. Of those who reported hearing about an activity that year, 31 percent reported participating in any one ARI activity they had heard of. Similarly, among the 34 percent of teachers who reported having heard of any one ARI activity, 14 percent reported they or their students participated in the fourth year. The difference in the awareness of and uptake in ARI activities was anticipated. ARI activities were designed to meet specific content needs, interests, and variations in the number of principals, teachers, and students who could participate. Yet, the differences between awareness and participation suggest that just hearing about an ARI activity was not necessarily a catalyst for participation.

In Year 4, principals and teachers were asked about aspects of communication that might have served as barriers to participation, including whether KVEC staff, their ICs, and others at their schools provided information needed to encourage participation. Principals' survey responses suggest communication about the initiative was not a barrier to participation in the ARI. When asked whether a lack of communication from their ICs, KVEC, or others was a barrier to their participation, more than three-quarters of principals and most teachers (64 percent, on average, across categories) indicated that it was not a barrier (see Figure 4.3). Most of the remaining principals and teachers indicated that lack of information was an issue but not a barrier to participation. Fewer than 10 percent of principals and teachers indicated that lack of information was a minor or major barrier to participation.

Figure 4.3. Percentages of Principals and Teachers Indicating That Each Condition Does Not Exist as a Barrier to Participation, Year 4



NOTE: Survey item: “Indicate whether the following condition exists at your school and the degree to which each is an obstacle to participation in ARI activities.” Possible responses: Doesn’t exist/Exists but is not an obstacle to participation in ARI/Exists and is a minor obstacle to participation in ARI/Exists and is a major obstacle to participation. Principal $n = 80$; teacher $n = 483$.

Stakeholder Buy-In as an Explanation for Participation

To examine buy-in, we explored principal and teacher perceptions of the alignment of ARI activities with school goals. We also asked principals and teachers who reported participation in activities whether their participation led to improvements in instruction, student achievement, and engagement for the majority of students.

Many ARI Activities Were Seen by Fewer Than Half of Principals and Teachers as Greatly Aligned with School Goals

In Year 4, principals and teachers were asked in the survey about the extent to which each activity was aligned with their schools’ main goals for improvement on a four-point scale from “a little” to “a great deal”; an “unsure” option was also available. Principals and teachers were asked about each activity, regardless of whether they heard of or participated in it. Between about one-third and one-half of principals and teachers reported that most activities were aligned a great deal with their main goals for school improvement (Figure 4.4). The majority of principals and teachers identified PGES, Next Generation Classrooms, and 1-to-1 Digital Learning as aligned a great deal with their main goals. Thirteen percent of principals and 21

percent of teachers, on average, were unsure about the extent to which activities aligned with their main school improvement goals.

Perceptions of alignment were more favorable in interviews, where about 90 percent of principals and teachers described the ARI overall as broadly aligned with school goals. In addition, all ICs reported that the ARI was aligned with their districts' goals. According to ICs we interviewed, principals and teachers were more likely to participate in activities they perceived as well aligned to their school improvement goals:

We've been working on a strategic plan the past year, and the ARI has had a huge impact on our priorities; our priorities have shifted. Our current superintendent has put an emphasis on personalized learning more, and he wants our teachers to attend and be part of trainings and groups and organizations and more outreach. . . . We're starting to see now we can reach students at a deeper level if we focus on individualized and personalized instruction. As far as when I see our [district] priorities, . . . they match more the priorities of ARI very nicely.

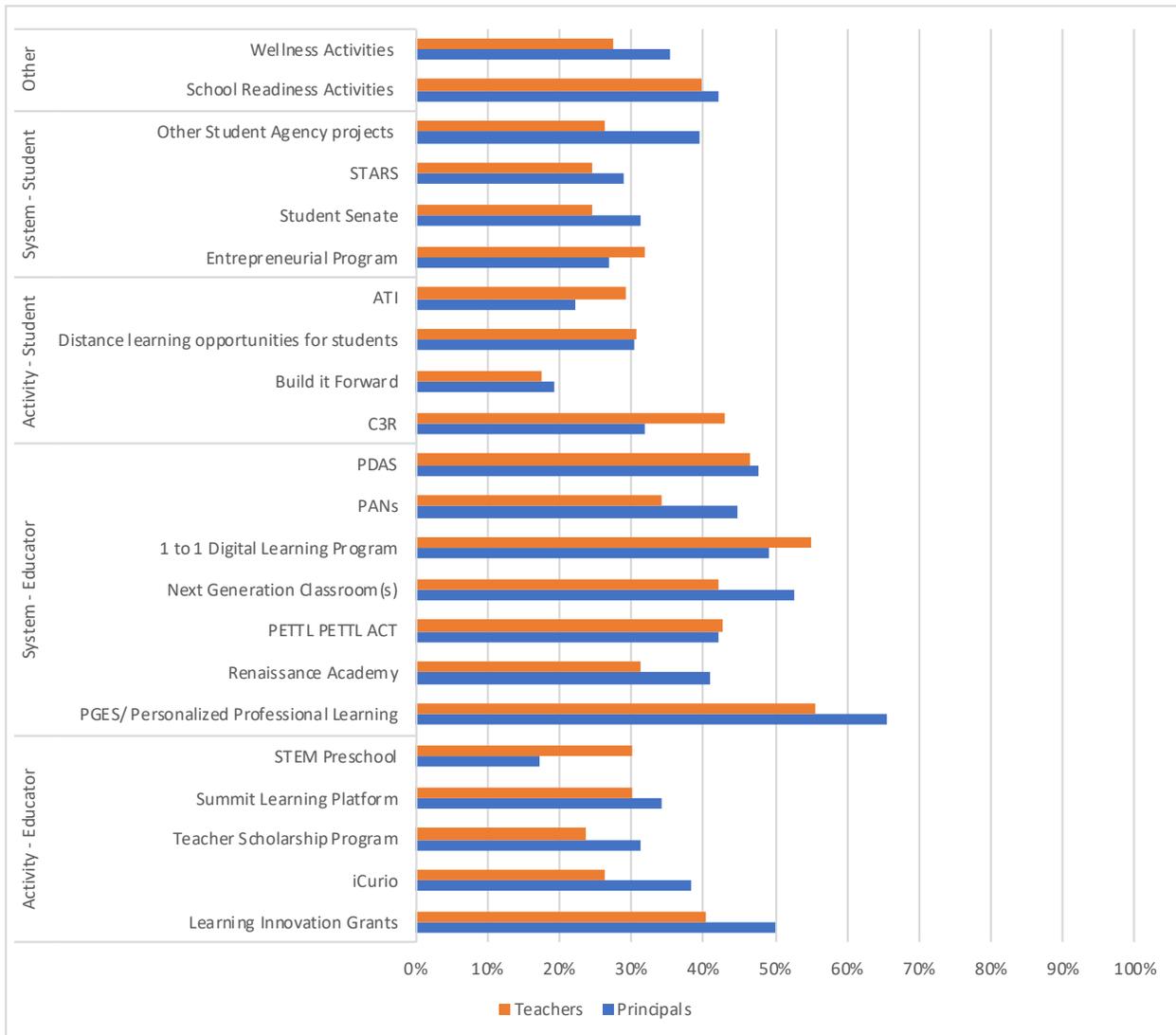
Interviewees noted that some activities were more aligned with school goals than others. Some interviewees particularly remarked that the ARI was well aligned with school goals of increasing access to or use of technology. Several principals indicated that they promoted staff attendance at activities related to personalized learning and use of technology because they wanted to facilitate personalized learning in their schools. And teachers and principals told us that they were more likely to participate in activities that received explicit support from leadership (district or school) than activities with little or no support.

Some ICs and principals reported that they did not promote activities that were not perfectly aligned with school goals, which may have resulted in less participation in some activities. For example, one IC said,

I usually try to take notes [during IC meetings] about the things that I feel like are important or useful or beneficial to our district. Some things I really don't see how it'd fit with our [School Improvement] plan, so we don't do everything. We do almost everything, but some things we don't do. (IC)

This also suggests that turnover in district leadership (superintendent) or school principals could also be a factor in participation. However, the extent to which this was a factor was not clear from interview data.

Figure 4.4. Average Percentage of Principals and Teachers Who Perceived a Given Activity Was Aligned “a Great Deal” with Their Main Goals for School Improvement



NOTE: Survey item: “In your opinion, to what extent is each ARI activity listed below aligned with your main goals for school improvement?” Possible responses: Little or not at all/Somewhat/A great deal/Unsure. Principal $n = 80$; teacher $n = 483$. The number of teacher and principal survey respondents was different for each activity, conditional on whether they indicated participating in that activity (as noted in Figure 4.1).

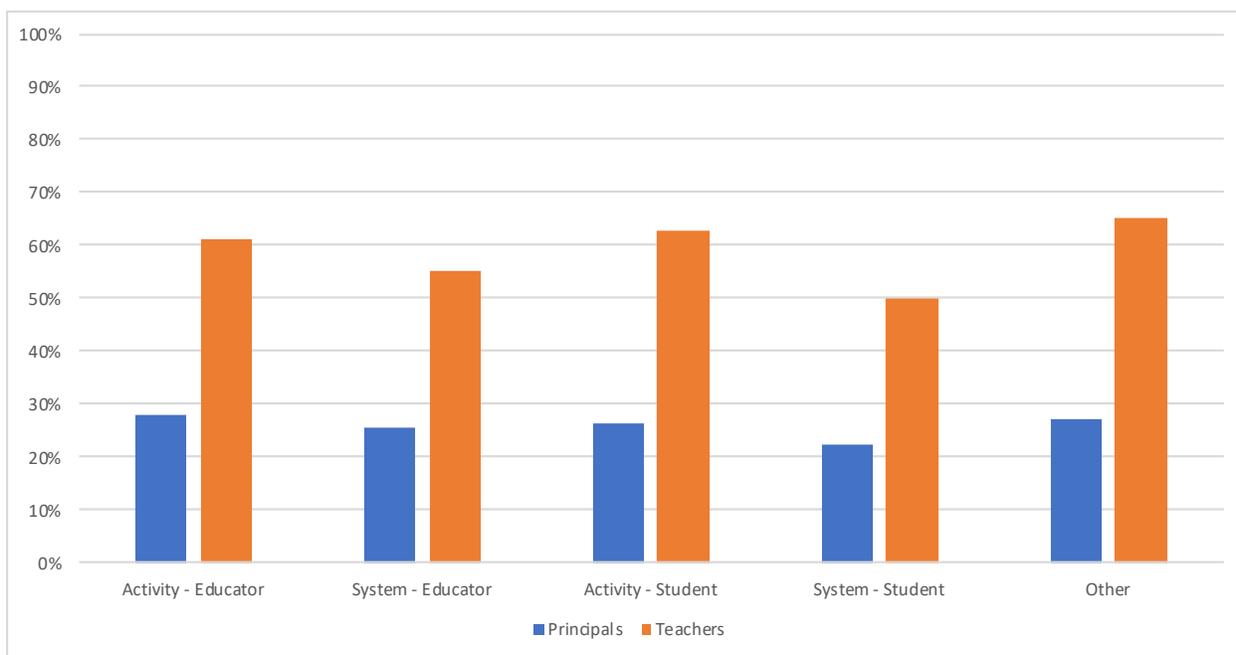
Teachers—More Than Principals—Felt Activities Helped Them Meet School Goals and Improve Instruction and Outcomes

We also surveyed principals and teachers about the extent to which each activity in which they participated was helping their schools address their main goals for school improvement (a little, somewhat, or a great deal). In addition, for each activity in which they noted they participated, we asked principals and teachers whether that activity led to improvements in (a)

instruction, (b) achievement, and (c) engagement for a few or no students, some but not the majority of students, a majority but not all students, or all or nearly all students.

There were more favorable perceptions among teachers than principals on the extent to which activities they participated in helped schools address their main goals for improvement (Figure 4.5). Roughly 25 percent of participating principals thought activities in each category addressed goals a great deal, whereas between about 50 and 65 percent of teachers said the same. Many teachers felt activities for educators (61 percent) and students (63 percent), as well as school readiness and wellness (65 percent), in particular, helped their schools address goals a great deal.

Figure 4.5. Average Percentage of Principals and Teachers Indicating That Activities in Each Category Helped Them a Great Deal in Addressing Their Schools’ Main Goals for Improvement



NOTE: Participants responded for only the activities in which they had participated (as noted in Figure 4.1). We collapsed activity responses by category and averaged the categories. Principal $n = 80$; teacher $n = 483$.

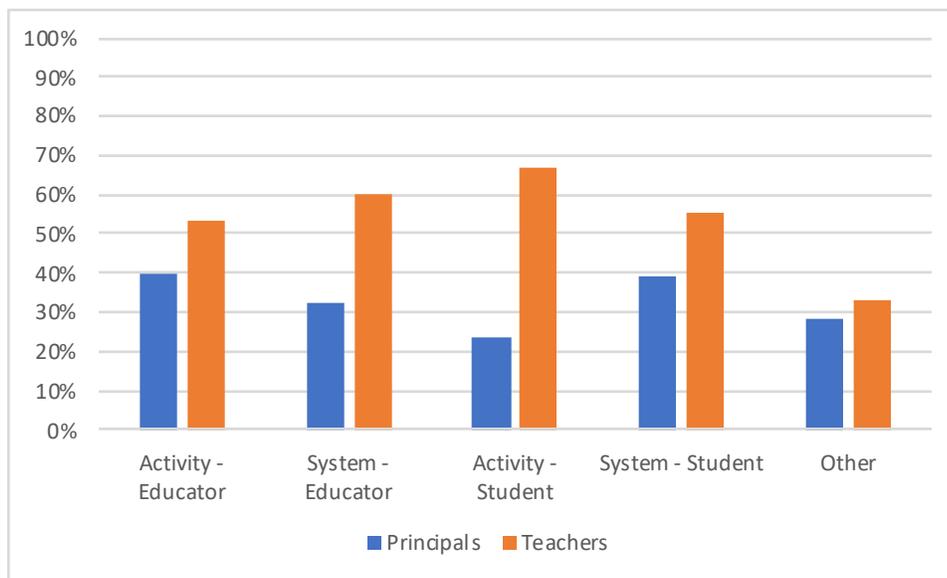
Overall, fewer than one-third of principals and a little more than half of teachers, on average, indicated that each activity they participated in was leading to improvements in instruction, student achievement, and student engagement. The figures that follow show average percentages of principals and teachers indicating that activities they participated in within each ARI category were improving instruction, achievement, and engagement for the majority or all of their students.

As noted in Figure 4.6, 40 percent of principals, on average, indicated that activities for educators in which they participated and systems their students participated in were improving instruction for the majority or all of the students in their schools. On the other hand, around 30

percent regarded ARI systems for educators as leading to improvements in instruction for the majority or all of the students. Half or more of teachers indicated that ARI activities for educators and students, as well as systems for educators and students, were leading to improvements in instruction for the majority or all of their students.

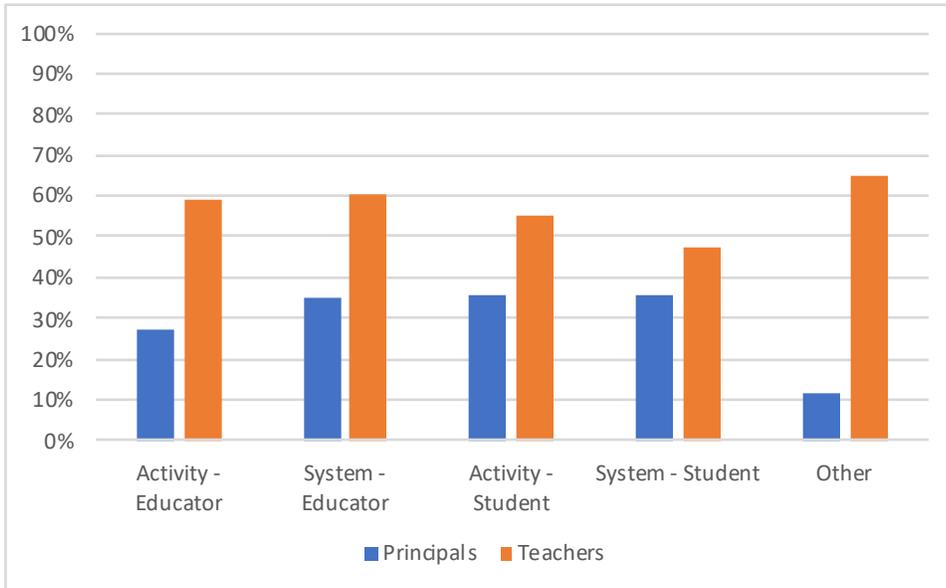
Relative to their thoughts on improving instruction, principals were more apt to indicate that activities and systems for students and systems for teachers were improving achievement and engagement for the majority of their students (see Figures 4.7 and 4.8). Compared with principals, teachers were far more favorable in their perceptions of the activities they participated in as leading to changes in achievement and engagement for the majority or all of their students. Roughly 50 to 60 percent of teachers reported the activity and systems elements designed for both educators and students were leading to improvements in achievement and engagement for the majority or all of their students (see Figures 4.7 and 4.8).

Figure 4.6. Average Percentage of Principals and Teachers Reporting That the ARI and Its Activities Were Leading to Substantive Improvements in Instruction for the Majority or All of Their Students, Year 4



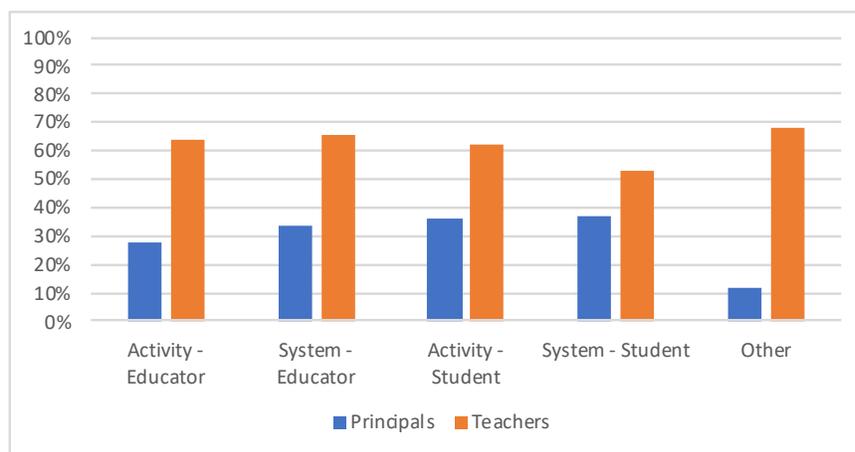
NOTE: Survey item: “For each activity you or others at your school are participating in, please estimate proportion of students for whom that activity **is** leading to substantive improvements to **instruction**.” Possible responses: Few or no students/Some but not majority of students/Majority but not all students/All or almost all students/Unsure. The number of teacher and principal survey respondents was different for each activity, conditional on whether they indicated participating in that activity (as noted in Figure 4.1). We collapsed activity responses by category and averaged the categories. Principal $n = 80$; teacher $n = 483$.

Figure 4.7. Average Percentage of Principals and Teachers Reporting That the ARI and Its Activities Were Leading to Substantive Improvements In Achievement for the Majority or All of Their Students, Year 4



NOTE: Survey item: “For each activity you or others at your school are participating in, please estimate proportion of students for whom that activity **is** leading to substantive improvements to **achievement**.” Possible responses: Few or no students/Some but not majority of students/Majority but not all students/All or almost all students/Unsure. The number of teacher and principal survey respondents was different for each activity, conditional on whether they indicated participating in that activity (as noted in Figure 4.1). We collapsed activity responses by category and averaged the categories. Principal $n = 80$; teacher $n = 483$.

Figure 4.8. Average Percentage of Principals and Teachers Reporting That the ARI and Its Activities Led to Substantive Improvements in Engagement for the Majority or All of Their Students, Year 4



NOTE: Survey item: “For each activity you or others at your school are participating in, please estimate proportion of students for whom that activity **is** leading to substantive improvements to **engagement**.” Possible responses: Few or no students/Some but not majority of students/Majority but not all students/All or almost all students/Unsure. The number of teacher and principal survey respondents was different for each activity, conditional on whether they indicated participating in that activity (as noted in Figure 4.1). We collapsed activity responses by category and averaged the categories. Principal $n = 80$; teacher $n = 483$.

Overall, principal responses were a bit more measured than those of teachers. Approximately 30 percent of principals identified the elements of the ARI in which they, their teachers, or students participated as improving instruction, achievement, or engagement for the majority or all of their students. By comparison, half to nearly 70 percent of teachers, on average, responded affirmatively on that question. Although participation in the ARI may not have led to changes for the majority of students, principals and teachers agreed that it was leading to changes in instruction, achievement, and engagement for at least some students (Table 4.4). In themselves, these data imply a varying degree of buy-in regarding activities of the ARI. Nonetheless, as we point out in the next chapter, principals and teachers recommended sustaining nearly all activities of the initiative, which suggests some perceived value, despite their perceived low impact on student outcomes for the majority or all of their students in the short term.

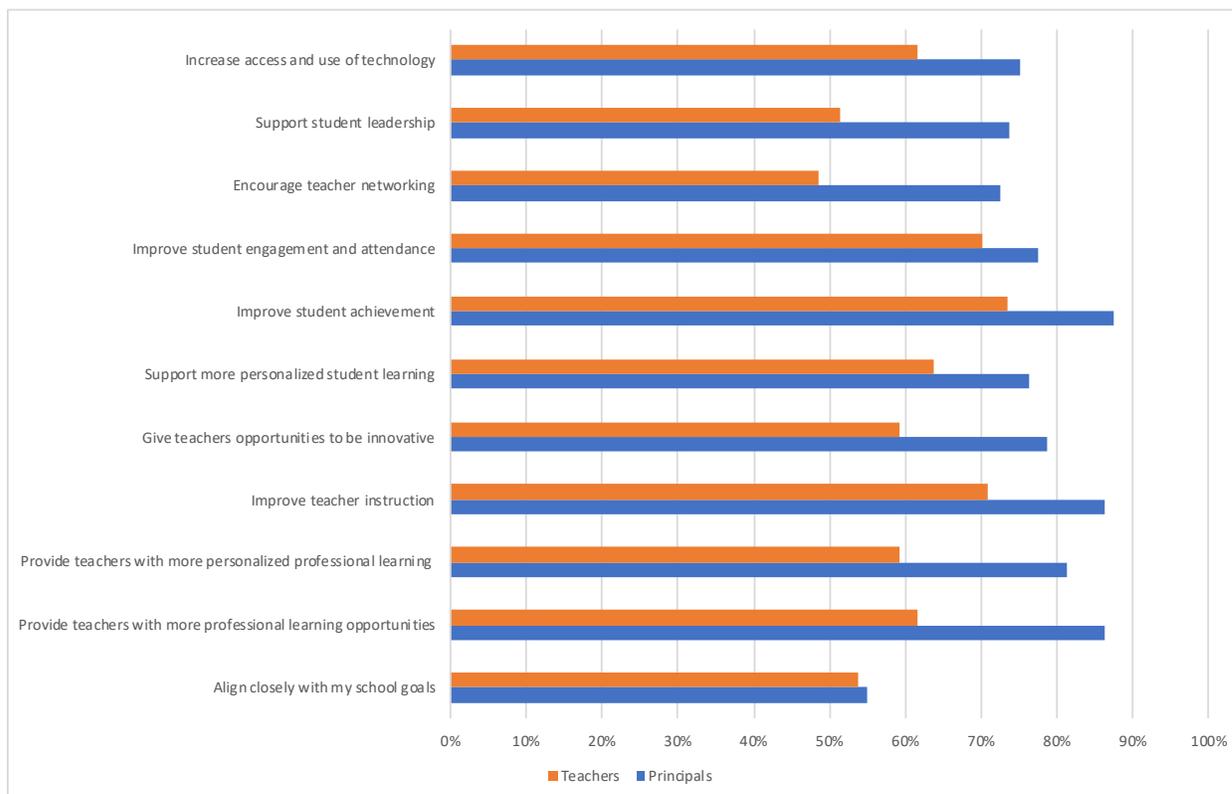
Table 4.4. Average Percentage of Principals and Teachers Reporting the ARI and Its Activities Were Leading to Substantive Improvements in Instruction, Achievement, and Engagement for Few or No Students, Year 4

	Instruction	Achievement	Engagement
Principals	18	20	17
Teachers	11	7	6

Alignment of the ARI with School Goals was Named Less Frequently As a Major Reason for Participation Than Improved Instruction and Student Achievement

In Year 4, teachers and principals were asked about a range of conditions that might have served as reasons for their participation in ARI activities. More than 70 percent of principals indicated that nearly every condition we asked about was a reason for their participation, from “increased access and use of technology” to “improved student achievement.” About half or more teachers also chose each as a reason for their participation. That said, relative to the other conditions presented, alignment with school improvement goals was selected less frequently by principals than the other reasons for participation. Slightly more than 50 percent of principals and teachers identified the ARI’s alignment with school improvement goals as a major reason for participating in the ARI and its activities. This is consistent with earlier findings that many ARI activities were regarded by fewer than half of principals and teachers as greatly aligned with their schools’ improvement goals. Principals more frequently cited reasons for participation, including that the ARI provided teachers with more professional learning, improved teacher instruction, or improved student achievement (Figure 4.9).

Figure 4.9. Percentage of Principals and Teachers Indicating a Given Item Was a Major Reason for Participation in ARI Activities, Year 4



NOTE: Survey item: “Please indicate the extent to which each of the following is a reason that your school participates in ARI activities.” Possible responses: Not a reason for participation in ARI activities/Minor reason for participation in ARI activities/Major reason for participation in ARI activities. The number of teacher and principal survey respondents was conditional on whether they participated in at least one activity (as noted in Figure 4.1). Principal $n = 80$; teacher $n = 483$.

District and School Capacity

District and school capacity are the last element we explored as a potential influence on participation. On one hand, capacity challenges within districts may have encouraged them to participate in the first place, given that the ARI provided free activities and resources (e.g., technology) that otherwise would not have been available. The ARI also reimbursed travel costs to trainings and meetings, covered costs of substitutes, and provided the systems for virtual collaboration and a variety of other resources to enable participation. Yet, participation also required some resources on the part of districts. Specifically, participation required ongoing commitment and time among district staff and, at the school level, principals and teachers.

Access to Resources Largely Motivated Educators to Participate in the ARI

In interviews, professional learning opportunities and technology were both commonly reported as reasons for participation. Nearly half of principals and teachers who participated in interviews (43 percent) identified access to free resources as the reason for their participation in

the ARI. Resources included professional development and learning sessions, technology (e.g., Chromebooks, 3-D printers), and classroom or curricular materials. ARI activities almost always provided educators with materials that schools could not afford. The Innovation Grants, in particular, were perceived by principals and teachers a way to obtain free resources. For example, one teacher noted,

Our school, we get by with very little funding. We had no extra anything. And with the new standards coming out in science, everything is so hands-on and engineering-based with STEM projects and . . . we just really did not have the resources that I needed to meet those standards. And so, I wrote a grant for \$1,000 and received it. And from that \$1,000, I was able to purchase all the materials I would need for that for last year for the school year.

Similarly, in talking about the Innovation Grants, another teacher said, “Well, it’s free stuff. It’s \$1,000 for something you’d like to have that you don’t really want to push your district for.” Some principals required all or nearly all teachers in their schools to submit Innovation Grants, as this activity provided funding for instructional resources and supplements the district could not afford to prioritize. A few teachers, ICs, and principals noted that a school principal would only allocate discretionary school funds if an Innovation Grant was submitted but not funded.

Many Principals and Teachers Participated Even Though the ARI Placed Considerable Demands on Their Time

Participation placed demands on time of principals and teachers. Despite the time demands of ARI activities, slightly more than half (53 percent) of teachers interviewed over the period of the ARI reported having enough time to participate, and only 21 percent said they did not participate because of the time required outside of class. That said, about one-third of teachers who participated in the ARI reported cutting back in subsequent years, either by not participating or participating in fewer activities, because more time was required than anticipated. According to one teacher,

I think that was the year before last; I was out of my classroom 17 days going to those various meetings and, like, it adds up. I mean, that’s classroom time, and that’s important. I have actually told [our IC] that I couldn’t do it [two activities] another year because it’s just too much, and so that’s why she had to get somebody else.

Over the four years, some teachers and principals suggested in interviews that more activities should occur outside of school time, so teachers would not feel torn between their interest in personal professional growth and their commitment to instructional time. Though teachers were interested in many activities, the time commitments required may have dissuaded them from higher levels of participation.

Time Out of the Classroom to Participate in the ARI Created Participation Challenges

Principals and teachers were both asked in the survey about the extent to which a series of conditions was an obstacle to their participation (Figures 4.10 and 4.11). The top three factors,

each noted by roughly half of principals as either a minor or major obstacle to participation, echoed a similar theme: a limited pool of substitute teachers in a district to cover classes for teachers participating in the ARI, especially at the frequency required for some ARI activities, and small school staff leading to capacity issues when participating teachers were absent. Similar proportions of teachers also identified problems acquiring substitutes as a barrier. One principal explained the challenge in an interview, “The school has only two substitute teachers. Even if we are given funds to pay for a substitute, it doesn’t matter. I can’t find enough substitutes.” KVEC provided funding for substitutes where activities required absences, but this did not alleviate the shortage of available substitute teachers for some schools or districts. A few principals noted in interviews that all schools share a pool of substitute teachers. If several teachers in each school needed substitutes the same day, demand far exceeded supply.

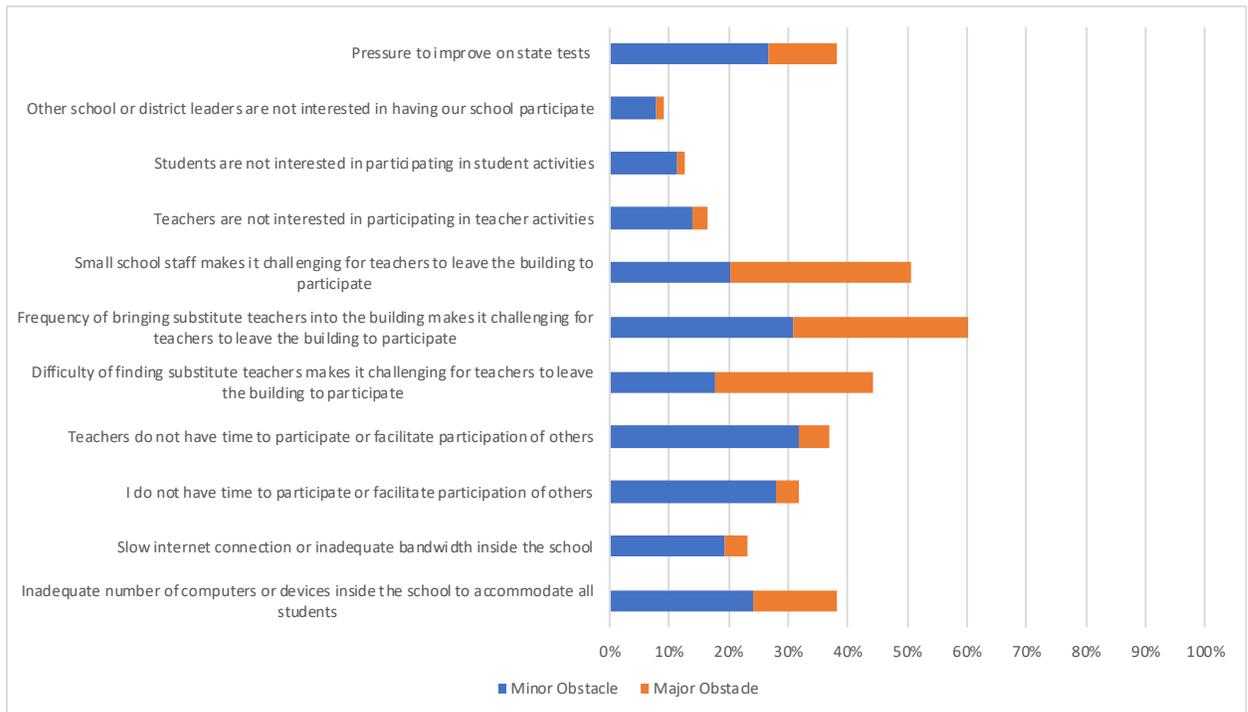
Small school staff exacerbated the difficulty of covering teachers. Roughly half of principals (42 percent) and teachers (52 percent) identified this as a barrier to participating. In interviews, respondents in small schools reported “feeling” the absence of their colleagues more. More demands were placed on those who remained at the school, such as losing a planning period to cover a class or teaching two classes in one room for the day. Teachers who participated in ARI activities “felt bad” for placing these additional burdens on their colleagues. As a result, teachers in these schools reported considering these burdens when deciding whether to participate. For activities like the summits, where all ARI participants were expected to be out of school, coordinating substitutes was a particular challenge for principals.

In addition, teachers who participated in many ARI activities missed many days of school. This prompted some principals and teachers to say that substitutes were at their school as often as some of the regular teaching staff. Interview participants, both principals and teachers, expressed some concern that this may affect student performance on state assessments. As one principal explained,

I can’t pull them [all of the teachers interested in the ARI] out of school. I have had to cut back on the number of days [teachers were released from school for activities]. Kids are not instructed when they [teachers] are taken out of the classroom. I would love to have more opportunities to encourage them [to participate in the ARI]. But I can’t take them out of the classroom. If a teacher misses six to eight days on their own and then 12 days on top of that for participation in various things, that is a lot of days. Then you have testing [and need for students to be ready for testing]. I won’t pull them out of the classroom that much.

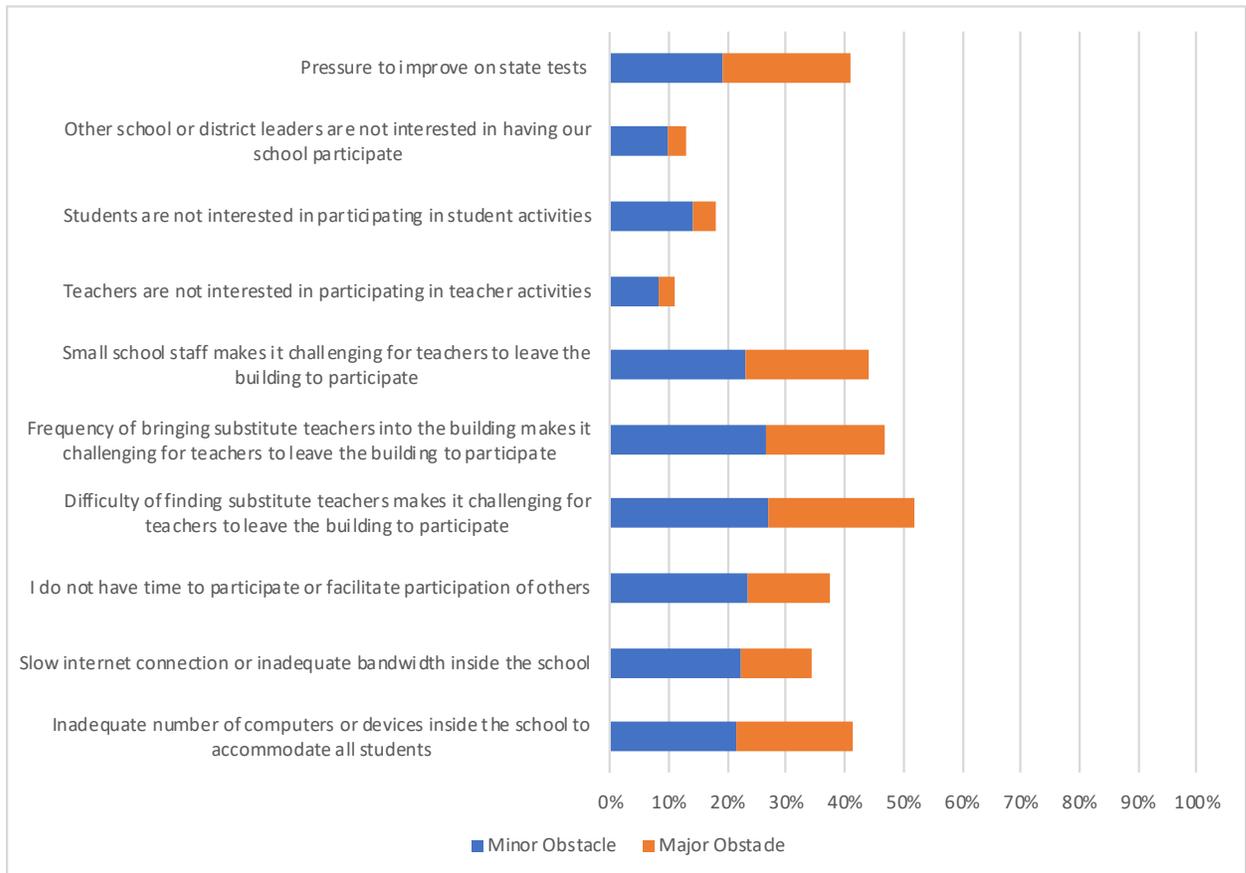
In interviews, principals and teachers described instruction from a substitute teacher as substantively different from instruction provided by a regular classroom teacher. From the perspective of principals and teachers with whom we spoke, teacher absence from the classroom harmed student learning. In addition, as noted in Figure 4.11, more than 20 percent of teachers regarded assessments as a major obstacle to their participation, which may suggest that teachers felt that the need to prepare students for state tests took up time that they could not then devote to ARI activities.

Figure 4.10. Obstacles to Principals' Participation in ARI Activities (by percentage)



NOTE: Survey item: "Please indicate whether the following condition exists at your school and the degree to which each is an obstacle to participation in ARI activities." Possible responses: Condition doesn't exist at my school/Condition exists in my school but is not an obstacle to participation in activities/Condition exists at my school and is a minor obstacle to participation in ARI activities/Condition exists in my school and is a major obstacle to participation in ARI activities. Principal $n = 80$.

Figure 4.11. Obstacles to Teachers’ Participation in ARI Activities (by percentage)



NOTE: Survey item: “Please indicate whether the following condition exists at your school and the degree to which each is an obstacle to participation in ARI activities.” Possible responses: Condition doesn’t exist at my school/Condition exists in my school but is not an obstacle to participation in activities/Condition exists at my school and is a minor obstacle to participation in ARI activities/Condition exists in my school and is a major obstacle to participation in ARI activities. Teacher *n* = 483.

Despite the ARI Emphasis on Getting Technology into Schools, Lack of Access to Technology May Have Kept Some Students from Participating

As part of the 1-to-1 activity, the ARI provided funds to districts each year to purchase technology required for personalized learning. The initiative also provided each school with a Next Generation Classroom. In interviews, principals and teachers agreed that the ARI provided the resources necessary to become a 1-to-1 school (i.e., provide each student with a device) over time. But, as reported in interviews, access to technology was still a challenge. Figures 4.10 and 4.11 supported interview findings that technology presented challenges in schools and, specifically, obstacles to participation in the ARI. On the Year 4 survey, roughly 40 percent of principals and teachers identified inadequate numbers of computers or devices as a barrier to participation for all students. Thus, although the 1-to-1 activity provided funding to increase

access to technology, funds did not support access to technology for every student at any time by the end of Year 4. Without individual student access to technology, widespread participation in activities of the ARI like C3R, WIN Mathematics, and iCurio would have been limited.

According to KVEC, its staff increasingly shifted the format of many trainings and professional learning communities to a virtual format or hybrid format (in-person and virtual), given concerns expressed to members in the early years of the ARI about the availability of substitutes and the amount of time that teachers spent away from the classroom. They also adjusted time to outside the school day for many virtual trainings to minimize time spent out of the classroom and traveling. In interviews, principals and teachers noted activities of the ARI “required them to miss less school” in the latter years. Yet, as noted by our Year 4 data, the need for substitutes and time for ARI participation remained a concern.

Summary

Participation goals set by KVEC in each year were generally met. Specifically, when KVEC set a target number of participants for a given activity, those targets were met. According to survey data, a little less than one-third of principals (31 percent) and 15 percent of teachers reported participation in any one ARI activity in Year 4. Among the principals and teachers who were aware of a given activity, about half reported that they participated in that activity. In addition, principals and teachers who participated in any ARI activity tended to participate in more than one activity. Data from our participation database, which collected documentation on educator participation through sign-in sheets and participant lists, suggested that 20 percent of educators participated in ARI activities in Years 1 and 2, although participation may have decreased somewhat in Years 3 and 4.

However, meeting participation targets did not lead to the expected spread to nonparticipants. As a result, the ARI did not appear to meet its goal to effect tangible change for all teachers and students in the participating districts.

Most principals and teachers did not regard lack of communication about the ARI as a barrier to participation. Buy-in may have been a bigger issue hampering participation: On average, between about one-third of principals and one-half of teachers considered the activities to be aligned “a great deal” with their school goals. In addition, among those who indicated that they participated in activities, only one-quarter of principals regarded the activities as helping them meet their school goals, and about one-third of principals, on average, felt that the activities in which they were participating were leading to improvements in instruction, student achievement or student engagement. Yet, in contrast, majorities of participating teachers felt that the activities in which they participated helped them meet their school goals, improved their instruction, and improved student engagement and achievement.

Access to resources was a major motivator for participation in the ARI, including the free technology. However, at least some principals and teachers indicated that lack of access to technology was one barrier to participation in the ARI. One additional district capacity issue that was a barrier to participation was time out of the classroom and the need for substitute teachers

to stand in for those teachers participating; small school size may have exacerbated that issue. While KVEC worked to address this challenge by providing virtual trainings and pulling teachers from their classrooms less often, this issue remained a concern, according to Year 4 survey results. In addition, pressure to prepare students for assessments was regarded as a major or minor reason impeding participation.

5. Effects of the ARI on Student Outcomes

In Chapters 3 and 4, we discussed the extensive activities offered through the ARI designed to support principals, teachers, and students, and we examined participation as well as explanations for participation. While KVEC did not envision that all educators and students would necessarily participate in the ARI, it did aim to broadly support and improve student outcomes, including achievement, graduation and dropout rates, and college readiness.

As discussed in Chapter 2, student outcomes data are available for the first three years of the ARI, and our analysis focuses on Year 3 (the 2016–2017 academic year) because that maximizes the opportunity for ARI implementation to have affected outcomes. Moreover, our analysis attempts to disentangle changes caused by the ARI from those that are part of statewide trends. So, for example, although graduation rates increased in the ARI schools during the project, they were also increasing statewide; our analysis estimates the amount of the increase that exceeds the statewide trend. We accomplish this by examining changes in outcomes in the ARI schools relative to changes in a comparable set of non-ARI schools throughout Kentucky. The analyses include measures of academic achievement, college and career readiness, and school completion. Appendix A presents details of our analytic methods and additional details related to the results summarized here.

Table 5.1 displays the results of this analysis. Except for the ACT test,⁴ results are presented on a scale of 1 to 100, representing the percentage change estimated to have been caused by the ARI, according to the statistical model described in the appendix. For example, the top-right cell of Table 5.1 indicates that ARI schools experienced a 0.68-percent increase in the third-grade mathematics proficiency rate relative to comparison schools. ACT results are reported on the scale of the test (1 to 36), with ARI schools estimated to experience an average score increase of 0.32 points relative to comparison schools. Among all of these results, dropout rates are unique in that a negative number is a favorable outcome (a 0.25-percent reduction in dropout rates relative to comparison schools). For all other outcomes, positive numbers are favorable.

Among the 21 achievement outcomes, two school completion outcomes, and one college and career readiness outcome, only one result is statistically significant: the effect on 4th-grade reading proficiency rates, where the ARI is estimated to have improved reading proficiency rates by more than 9 percentage points relative to comparison schools.

⁴ ACT used to stand for American College Testing and is not part of PETLL ACT.

Table 5.1. Estimated Effects of the ARI on Student Outcomes, 2016–2017 Academic Year

	Grade	Number of ARI Schools	Number of Comparison Schools	Estimated Effect of ARI
Academic achievement				
Mathematics proficiency rate				
	3	60	323	+0.68 %
	4	60	323	+5.86 %
	5	61	318	+4.73 %
	6	53	188	-0.25 %
	7	46	134	-0.21 %
	8	46	134	+9.30 %
Reading proficiency rate				
	3	60	323	+3.28 %
	4	60	323	+9.35 % *
	5	61	318	+4.03 %
	6	53	188	+0.25 %
	7	46	134	+0.74 %
	8	46	134	+1.12 %
Language mechanics proficiency rate				
	4	60	323	+4.47 %
	6	52	187	-2.14 %
Writing proficiency rate				
	5	61	318	-4.83 %
	8	46	134	-2.75 %
Social studies proficiency rate				
	5	61	318	+2.47 %
	8	46	134	+5.20 %
End-of-course English proficiency rate				
	HS	24	109	+4.21 %
End-of-course algebra proficiency rate				
	HS	24	109	+3.87 %
ACT mean score				
	HS	24	109	+0.32 points
College and career readiness rate				
	HS	24	109	-3.65 %
School completion				
Averaged freshman graduation rate				
	HS	24	109	+0.90 %
Dropout rate				
	HS	24	109	-0.25 %

NOTES: Except for the ACT, results are presented on a scale of 1 to 100, representing the percentage change estimated to have been caused by the ARI, according to the statistical model described in Appendix A. For example, the top-right cell indicates that ARI schools experienced a 0.68-percent increase in the third-grade mathematics proficiency rate relative to comparison schools. ACT results are reported on the scale of the test (1 to 36), with ARI schools estimated to experience an average score 0.32 points higher than that of the comparison schools. Among all of these results, dropout rates are unique in that a negative estimate is a favorable outcome (an 0.25-percent reduction in dropout rates). HS = high school.

* indicates statistical significance.

Looking more broadly, we find that many other 2016–2017 results are in the favorable direction. Although not statistically significant, several indicate improvements in proficiency rates of 4 or more percentage points, amounts that could be considered practically important. Our school-level analysis has limited statistical power. These findings must also be considered along

with the vulnerability of our research method to selection bias, which could make the reported results larger or smaller than the true effects of the ARI.

Our ultimate conclusion is that, although there are some signs that the ARI may have had a positive influence, there is not strong evidence of broad, measurable effects on student outcomes.

6. Sustainability

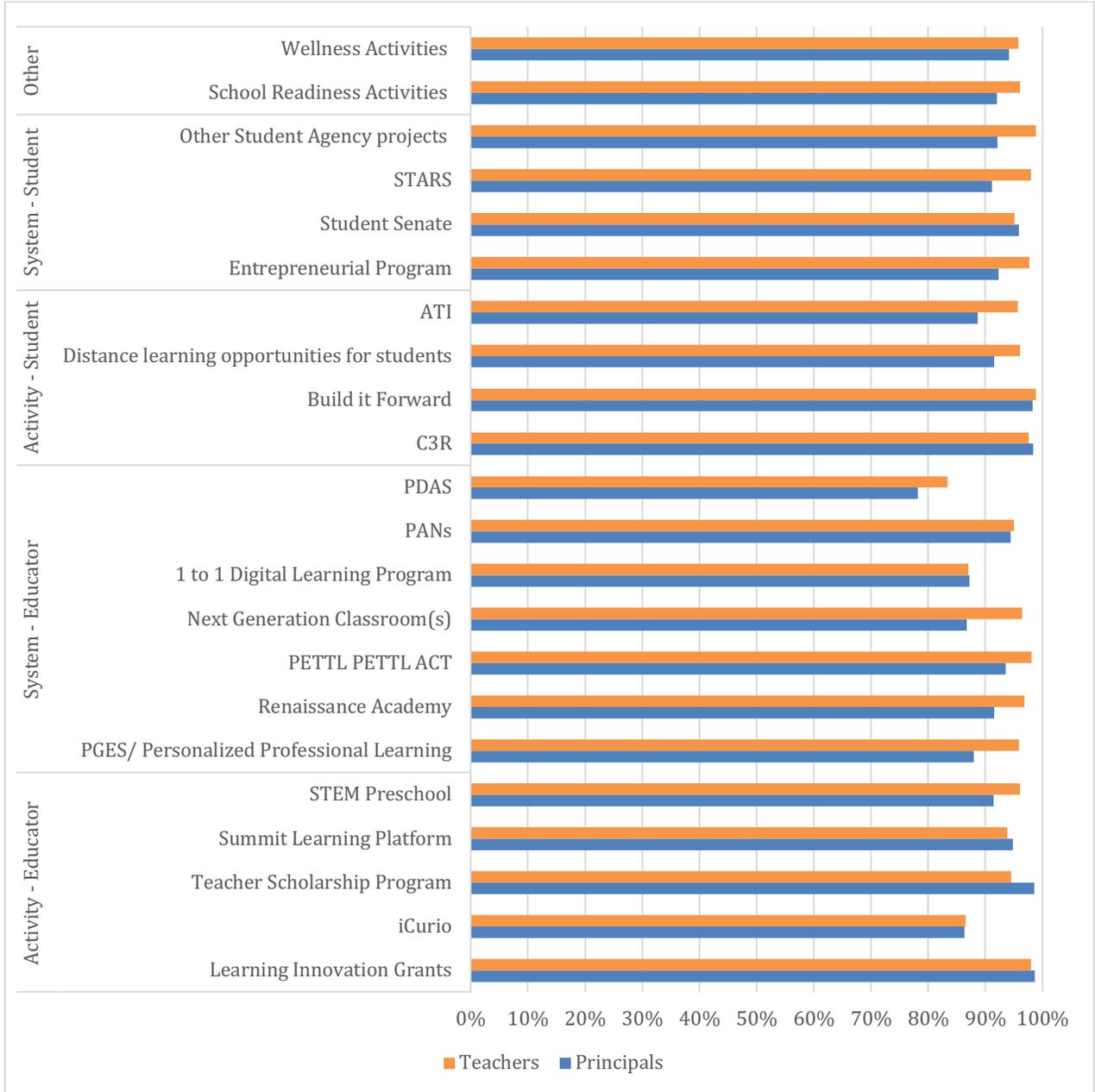
This chapter explores the extent to which stakeholders in the region recommended sustaining the ARI when funding from the RTT-D grant ended in December 2018. Surveys and interviews conducted in Year 4 focused on sustainability. Most ICs, principals, and teachers recommended sustaining the vast majority of the activities, systems, and structures of the ARI. In interviews, participants particularly identified the 1-to-1 Digital Learning, Innovation Grants, and Student Agency Activities as key activities and systems to sustain. Principals and teachers also recommended continuation of the ARI structures that created a collaborative network in the region. A subset of activities was identified as possible for districts and schools to sustain with their own funding or with limited investments from the community. Otherwise, KVEC was perceived as the best partner to secure the funding needed to sustain ARI activities.

From the outset of the ARI, KVEC prioritized sustainability. It implemented a train-the-trainer model for nearly all trainings in the PGES/Personalized Professional Learning activities; developed guides and toolkits for activities, such as the PDAS; and required that at least one teacher and leader from each school participate in the Next Generation Teacher and Leader Academy/Renaissance Academy. Further, KVEC relied on feedback from participants about the quality and fit of activities with school goals to refine those activities annually. Some activities existed for only one or two years (e.g., WIN Mathematics), while others, like PETLL/PETLL ACT, were offered every year. KVEC continually assessed activities to identify which were important to sustain. KVEC has already committed to sustaining some, including the Innovation Grants, the Holler, FIRESummits, PGES, and PETLL ACT.

Principals and Teachers Recommended Sustaining the Majority of ARI Activities

As shown in Figure 6.1, the majority of principals and educators who reported hearing of a given activity on the Year 4 survey recommended sustaining it, even though some of these same respondents did not always think the activities were closely aligned with school goals or leading to clear improvements in instruction, achievement, or engagement for the majority or all of their students. Ninety percent or more of principals recommended sustaining Innovation Grants, PDAS, Next Generation Classrooms, and the 1-to-1 Digital Learning activities. Interestingly, though higher percentages of teachers indicated that ARI activities led to improvements in instruction and student outcomes than principals, teachers were slightly less supportive of continuing ARI activities than principals; between 80 and 90 percent of teachers recommended continuing the bulk of the activities.

Figure 6.1. Average Percentage of Principals and Teachers Who Recommend Sustaining ARI Activities, Year 4



NOTE: Survey item: “For each of the following ARI activities, please provide your recommendations for whether they should be sustained after 2017–18 and—if so—who would be best to sustain (i.e., secure funding for and/or lead implementation of) the activities.” Possible responses: Do not recommend sustaining this activity after 2017–18/Recommend that KVEC sustains this activity/Recommend that my district sustains this activity/Recommend that my school sustains this activity/Recommend sustaining but unsure who could sustain it. The number of principal and teacher survey respondents was conditional on whether they indicated hearing about that activity (as noted in Figure 3.2). Principal $n = 80$; teacher $n = 483$.

In interviews, principals and teachers recommended sustaining all or as many activities of the ARI as possible because “if it helped one educator or student, it was worth it.” Interview participants perceived that the ARI was providing “opportunities that could make a difference in ways we may not know or see” and that “improving the life of just one person from a marginalized rural area mattered.” And, as noted in Chapter 4, the majority of principals and teachers reported on the Year 4 survey that the ARI was improving instruction, achievement, and engagement for more than a few students.

Activities Involving Technology and Innovation Were Identified as Particularly Important to Sustain

On the survey, both principals and teachers highly recommended sustaining the 1-to-1 Digital Learning activity (96 percent and 84 percent, respectively, Figure 6.1), which provided districts with a per-pupil allotment for technology each year. Nearly all interview participants—ICs, principals, and teachers—described the continuation as “critical” and a “need to have” for the future. As one principal said, “funding for technology is a nonnegotiable.” Interview participants associated technology with their schools’ overall ability to implement personalized learning, as well as to engage students, support academic achievement, and improve instruction. One teacher summarized changes in the classroom when using technology:

It’s made such a difference [in instruction] with the technology. It really engages students. I mean, that’s the number one thing, . . . students are engaged, and it makes them excited about learning. And it just makes it [instruction] fun for them, and so they’re learning. And not just the academic material, standards and all those things, but also technology.

Ninety-five percent of principals and 82 percent of teachers recommended extending Innovation Grants after the ARI ended. The majority of interview participants described the activity as critical. One principal described the significance of Innovation Grants by saying, “The Innovation Grants are a must have—without a doubt—because it has helped the school culture and environment.” School staff also described the Innovation Grants as the catalyst for innovation or changes in teacher practices. According to ICs, teachers saw their colleagues with Innovation Grants implement new or different innovative practices and experience success. One IC explained,

After a couple years and they were able to see how much it changed instruction—how the kids were more engaged—the teachers learned [about colleagues’ practices]. Those other teachers took a lot of guidance from younger teachers and how they’re changing stuff, and they see how their test scores were impacted.

Principals reported observing teachers who did not participate in the ARI implementing practices piloted by colleagues with an Innovation Grant. In interviews, a few teachers reported “trying out new and different approaches” other teachers piloted with an Innovation Grant in their classrooms. Innovation Grants thus appeared to support the spread of at least some innovation beyond the teachers who received those grants.

As seen in Figure 6.1, approximately 90 percent of principals and 97 percent of surveyed teachers recommended persisting with most activities and systems for students. In interviews, school staff focused on two specific student-focused activities to sustain: Student Senate and Build It Forward. Student Senate brought two students from each district together for meetings throughout the school year. Between meetings, the students worked to identify and solve local challenges. Interviewees reported that this activity provided students with a formal and informal leadership voice in the community (e.g., school, district, local, regional, state). One principal said that “even though few students participated, I have seen it help those students and our school.” Additionally, interview participants from schools participating in Build It Forward and ATI characterized these as critical in preparing students for the workforce. School staff considered these to be both academic and social-emotional learning activities because they provided students with opportunities to apply skills directly related to jobs. Principals and teacher interview participants perceived growth and development from these activities could not be measured through outcomes like the state college and career readiness system. The benefit would be seen when students “successfully transitioned to college then returned to the region to rebuild the economy.”

Principals and Teachers Identified KVEC as the Best Stakeholder to Sustain Most Activities

For each activity of the ARI, we asked principals and teachers to indicate not only whether they recommended sustaining it but who was the best positioned to sustain the activity. On average, across activities, slightly more than half of Year 4 principal survey participants identified KVEC as the stakeholder best suited to sustain the ARI activities (Table 6.1). Teachers also most frequently identified KVEC as best suited to lead sustainability efforts. Around 16 percent of principal and 27 percent of teacher survey respondents, on average, reported districts and schools could assume responsibility for sustaining a given activity.

Table 6.1. Average Percentage of Principals and Teachers Identifying a Given Entity as the Best Stakeholder to Sustain Activities, Year 4

Best to Sustain (i.e., secure funding for and/or lead implementation)	Principals	Teachers
KVEC	56	35
District	10	16
School	6	11
Unsure	15	18

NOTE: The number of principal and teacher survey respondents was conditional on whether they indicated hearing about that activity (as noted in Figure 3.2). We collapsed activity responses by stakeholder best suited to sustain and averaged the stakeholder categories.

Interviewees Had Ideas About Funding or Managing Costs for the ARI Activities They Championed

In interviews, educators largely considered funding when identifying the stakeholder that should assume responsibility for sustaining the “critical” activities and supports. For example, nearly all ICs and principals almost always identified KVEC as best suited to sustain the 1-to-1 Digital Learning activity, given its likely ability to obtain more funding for this purpose. From their perspective, KVEC had the capacity to apply for large grants like RTT-D. Districts and schools could submit applications and allocate funds in the district budget for technology, but the potential funding levels would likely not compare with those provided by the ARI. This perception was shaped by KVEC’s regular communication with district officials—including ICs—about grant applications they were submitting to government agencies and foundations to sustain aspects of the ARI.

As a secondary consideration for sustainability of the 1-to-1 Digital Learning activity, nearly all interviewed ICs and principals wanted KVEC to provide more training and support on how to integrate technology and use it more effectively during instruction. Without external funding, all interviewees recognized it would not be possible to maintain the same uptake of devices and shifts to digital learning.

As noted earlier, most principals and teachers indicated that Innovation Grants were important to sustain. KVEC shifted funding by means of a no-cost extension to its grant to sustain this activity through the 2018–2019 school year. There were varying perspectives on how to sustain Innovation Grants beyond that year. From the perspective of ICs and principal interview participants, districts were committed to sustaining the activity at some level locally or regionally and had ideas about how to do so. However, that said, if districts and schools self-funded Innovation Grants, the activity would likely look different from district to district throughout the region. Anticipated funding levels for Innovation Grants varied, as well as funding levels for individual grants. A few districts planned to solicit funds from alumni groups and other community organizations, while others expected to allocate general funds to Innovation Grants.

IC and principal interviewees perceived the financial burden to sustain many of these student activities and systems as low. As an example, the cost to send students to the Student Senate meetings and fund special projects was reportedly low. By and large, districts planned to maintain the Student Senate. The Build It Forward/Tiny House activity was designed with sustainability in mind. Districts that received funding to build a Tiny House received the initial investment of \$15,000, and the vast majority recovered more than \$15,000 when they sold the house. If a district sold the Tiny House in the 2017–2018 school year, it had funding necessary to build one the next year. Principals anticipated district funds would be required to sustain ATI if KVEC did not secure external funding. There were mixed thoughts from ICs and principals on the feasibility of sustaining that activity without external funding, as it required curriculum and teachers that could be cost prohibitive.

According to Interviewees, the ARI Systems That Built a Collaborative Network Were Important to Continue

Overall, interviewees identified networking opportunities for educators across the region as “critical” to sustaining a collaborative culture in the region. The vast majority of ICs and principals and many teachers reported that districts operated as silos prior to the ARI. There were very few opportunities for principals and teachers to meet. With the ARI in place, ICs described their monthly meetings as a mechanism for sharing successes and challenges, as well as other work in the district, and to disseminate information back to their districts. Principals appreciated the frequent opportunities to network and collaborate with other principals throughout the region. According to one principal, prior to the ARI there were no opportunities for cross-district meetings and “definitely not a variety of meetings that tailored and catered” to the needs of principals (e.g., PGES and Leader Academy). Another principal reported, “As a leader I have received ideas and support that I would not have received without the efforts of KVEC and ARI.” Although time out of the building for activities was a challenge for principals to manage, the activities were perceived as largely beneficial. FIRESummits, a communication mechanism created for the ARI, were also consistently identified by interview participants as an important networking opportunity to continue in the future. The culture of collaboration and shift towards personalized learning for principals, teachers, and students was described as the foundation of improvements in student achievement, though “it may take several more years to see the growth.” Overall, the existence of a collaborative network across the region was described as a “significant change and success” and, as explained by one principal, “a return on the [RTT-D] investment that we cannot predict or measure.”

There were perceptions that communication mechanisms initiated through the ARI could exist in future years. Ideally, from the perspective of interview participants, KVEC would secure external funding for the IC position, content-specific regional meetings, and summits. In the 2018–2019 school year, KVEC used no-cost extension funds to sustain these activities. When funds were exhausted, ICs and principals offered approaches to sustain these mechanisms at low or no cost. The majority of ICs suggested their position, for example, could be one of many positions assigned to a district-level staff member. Someone would serve in the role and execute the IC responsibilities while holding other positions. The cost for the IC to travel for monthly meetings was described as low and manageable. In addition, several interviewees noted that, as part of the professional development and trainings that KVEC is expected to provide into the future, it might be possible to add time for specialized content or principal meetings, though perhaps fewer than were being offered through the ARI.

FIRESummits presented greater funding challenges. ICs, principals, and teachers estimated the cost for these events to be very high and presented a variety of ideas on how to manage future costs. Rather than two summits, participants suggested hosting only one in the spring. Student performances presented at the summits over lunch were described as a highlight, but transportation and food costs could be reduced by limiting these. Similarly, interview participants who attended summits appreciated getting breakfast and lunch, but this was

described as a luxury. Educators suggested cutting these costs to sustain the event or to free up additional funding for the Innovation Grants.

Summary

Despite our findings in a previous section that ARI activities were not always perceived as closely aligned with school goals, the majority of survey and interview respondents—upward of 80 to 90 percent—felt that the majority of ARI activities should be sustained. Most survey respondents identified KVEC as best suited to lead the continuation of activities. In interviews, participants suggested KVEC was the right stakeholder to pursue funding for activities associated with the ARI because a grant application on behalf of all the member districts might be more easily funded than applications for individual districts. According to IC and principal interview participants, districts and schools were prepared to sustain the “nonnegotiable” and “critical” activities if KVEC did not secure external funding. However, self-funding would limit both the number of activities that could be sustained and the scale of implementation.

7. Conclusion

This report presented findings from RAND’s evaluation of the ARI in districts within the KVEC. KVEC received federal funding through the RTT-D grant program to provide participating districts with an array of opportunities and activities intended to support and improve teaching and learning. In response to RTT-D priorities, ARI activities focused on a range of areas, from personalized learning and next generation classrooms to college and career readiness and educator effectiveness. Districts and educators were able to choose the activities in which they participated; as a cooperative, KVEC could not and did not wish to mandate participation. For these reasons, the ARI could be regarded both as a “top-down” initiative—in that KVEC designed activities and then provided them to districts—and as a “bottom-up” initiative—in that districts and educators in schools could voluntarily engage in a given activity depending on whether it dovetailed with their own foci and goals, and activities were intended to involve teachers themselves in developing and testing their own innovative ideas in the classroom.

Our evaluation focused on the following four research questions:

1. What activities and opportunities constituted the ARI, and how were they communicated across districts?
2. To what extent did districts and schools actively participate in the ARI, and what were some explanations for variation in participation?
3. What changes in school and student outcomes can be associated with the ARI?
4. What elements of the ARI did stakeholders recommend sustaining?

The third question focused on findings from our quasi-experimental comparison of districts participating in the ARI and other districts in Kentucky. The other research questions reflect findings from our implementation study, which sought to track how the ARI was perceived, communicated, and acted upon within districts. For our implementation study, we focused both on describing the full range of activities that were part of the ARI and on three major areas that might explain ARI participation: how it was communicated within and across districts, buy-in and support among principals and educators within districts, and district capacity issues.

These implementation findings can both provide context for the findings from the quasi-experimental outcomes study and offer some information and lessons for others who might be engaged in similar types of reforms.

Key Findings

What activities and opportunities constituted the ARI, and how were they communicated across districts? The ARI comprised a large menu of personalized learning opportunities for principals, teachers, and students, as well as communities of practice for

educators and group activities for students. KVEC was successful in offering 26 activities altogether to educators and students over the course of the initiative, as well as numerous mechanisms for communicating about activities to district officials, principals, and teachers, including the KVEC leadership team; a full-time IC in each district; summits where educators could share what they had been learning through Innovation Grants; and technologies like MondoBoards, a social learning network called the Holler, and podcasts.

Overall, evidence suggests that the communication plan put in place by KVEC was effective in informing principals and teachers about the ARI. Nearly everyone with whom we spoke during our site visits and interviews knew about the ARI, although they had some varying thoughts about its purpose. That said, principal and teacher knowledge about specific ARI activities as reported on surveys ranged considerably from district to district by Year 4, suggesting that the extent of communication may have also varied across districts. On the whole, principals reported much greater knowledge about ARI activities than teachers. Teachers reported that their primary source for ARI communication was their principal or another administrator (e.g., their IC). Thus, if school administrators were not committed or had not bought into ARI activities, it is possible that teachers may not have been well informed about them. Teachers who participated in the ARI did report sharing their experiences with others, which was what KVEC intended. Yet, the sharing of experiences with colleagues did not appear to result in adoption of practices by nonparticipants. In the later years of the initiative, the ICs—one of the primary mechanisms for communication about the ARI—shifted to relying more on personal, targeted communication to encourage participation, which was regarded as more effective than mass communication. The Holler, which was an online social network intended to get out the word about the ARI, did not appear to be a major communication mechanism over and above ICs, district and school leaders, and teachers.

To what extent did districts and schools actively participate in the ARI, and what were some explanations for variation in participation? For the activities where KVEC set participation goals for educators and students, those participation goals were met. The ARI was not designed for all principals and teachers to participate in each activity in a given year. According to Year 4 survey data, about one-third of principals and 15 percent of teachers reported participation in any one ARI activity in Year 4.

While participation was generally what KVEC expected, we explored the factors that may have encouraged or limited participation and spread of the initiative among nonparticipants. Lack of communication about the ARI did not seem to be an obstacle, according to survey reports, although buy-in may have been a bigger issue hampering participation. Between one-half and one-third of principals and teachers reported that ARI activities were aligned “a great deal” with their school’s main goals for school improvement, regardless of whether they participated in those activities. Principals’ perceptions were even lower regarding the alignment of activities in which they participated. Only one-quarter of principals reported that each activity they, their teachers, or their students participated in addressed their goals for school improvement “a great deal.” Similarly, about one-third of principals and a little more than half of

teachers reported that a given ARI activity they participated in was leading to improvements in instruction, student achievement, and student engagement among all or the majority of their students. However, on average, the majority of principals and teachers reported on the Year 4 survey that the ARI was improving instruction, achievement, and engagement for more than a few students.

Free resources were one perceived key benefit of the ARI. Yet, both principals and teachers indicated that participation created staffing challenges, in that substitutes were necessary when teachers spent time away from the classroom participating in the ARI. In addition, if several teachers requested time out of the classroom simultaneously, the demand for substitutes could exceed supply. This issue was particularly salient in small schools with limited staff. While KVEC worked to address this challenge by providing virtual trainings and pulling teachers from their classrooms less often, this issue remained a concern, according to Year 4 survey results. Other factors that may have limited participation were lack of student access to the technology necessary to participate in the ARI (even despite the presence of Next Generation Classrooms in every school and per-pupil allocations for technology each year) and accountability pressures that may have diverted attention from participation in ARI activities.

What changes in school and student outcomes can be associated with the ARI? We focused on improvements that we could detect in student outcomes among ARI schools relative to a matched set of comparison schools in the 2016–2017 academic year (Year 3 of the ARI). We evaluated effects on school-level outcomes in three domains: academic achievement, college and career readiness, and school completion. We detected one significant difference for ARI schools relative to comparison schools in 2016–2017: a higher 4th-grade reading proficiency rate. Several other outcomes trended in positive directions but were not statistically significant.

We conclude that, although there are signs that the ARI may have had some small positive influence on student outcomes, our analysis does not provide conclusive evidence of broad, measurable schoolwide effects through the 2016–2017 academic year. This conclusion may be unsurprising, given the somewhat limited spread of the ARI across teachers and students in the participating schools.

What elements of the ARI did stakeholders recommend sustaining? Despite the relatively low percentages of principals and teachers who reported participation in the ARI, fairly high percentages of principals and teachers (70 to 100 percent, in most cases) recommended that each ARI activity be sustained (whether by KVEC, their districts, or their schools). Yet few principals and teachers recommended that their districts or schools be charged with sustaining a given activity—between 5 and 15 percent, respectively. These data suggest that principals and teachers had positive regard for most ARI activities—even for those in which they did not participate—but were uncertain who could sustain each activity beyond KVEC. Overall, principals and teachers recommended sustaining the ARI because it was leading to changes for more than just a few students, and it may not yet be possible to measure how the ARI would affect a student.

Implications

Taken together, these findings offer some potential lessons, both for school districts and for agencies like KVEC—and other regional and state entities—that are working to provide innovative opportunities for educators and students to improve teaching and learning. These findings may also provide funders of programs like RTT-D with guidance on how to invest their money. We offer a small set of recommendations that draw upon these findings:

1. **When leveraging the strengths of regional education agencies to implement large-scale initiatives, seek mechanisms to help ensure the intended changes will occur at the local level.** Although KVEC did not have the authority to require participation in the ARI, it successfully met targets for direct participation in activities in 17 districts across a geographic region larger than the state of Connecticut. KVEC designed and implemented structures to communicate about the ARI with principals and teachers. These structures reportedly broke down silos between districts and created a collaborative network. As such, the ARI fostered important changes in the KVEC region. However, to meet KVEC’s goal of reaching all teachers and students within the participating districts, the ARI initiatives needed to spread from the direct participants to the majority of others who did not directly participate. Here, the initiative was less successful, reaching only a fraction of the intended audience. There are a variety of explanations for limited spread; an important one is that regional support agencies like KVEC cannot compel change within their member districts. Although district collaboratives may be particularly important for including smaller and rural districts in programs intended to foster improvement, mechanisms to ensure strong engagement within the member districts seem essential for success.
2. **Consider communicating opportunities directly and personally to teachers when possible.** Our findings suggest that communication about the ARI varied considerably by district, and what teachers knew about the ARI depended somewhat on the information they got from their school principals and other district administrators, who could themselves have varied in their interest and support of the ARI. Part of a district’s and school administrator’s job is to “bridge and buffer” (Honig and Hatch, 2004)—or give information to staff that aligns closely with school goals while buffering them from information that does not align. Furthermore, principals sometimes thought teachers were getting more information than they were actually getting. Based on reporting from ICs and teachers, personal communication was the most effective approach for encouraging teachers to participate in ARI activities. We acknowledge that this might be a logistically challenging and expensive prospect. Districts sometimes have difficulty maintaining teacher rosters and contact information even in the best of circumstances. Yet, personal communication was reportedly the most effective approach in garnering participation.
3. **Consider intensive coaching or classroom support to improve educator effectiveness.** A growing body of research suggests that teacher coaching may be an effective approach

to support teacher learning and growth, likely because it focuses on teachers' individual needs and is typically more intensive than traditional professional development (e.g., Matsumura et al., 2010). The ARI provided training for principals and teachers over the course of the year and in a variety of topics. The initiative did not provide intensive and consistent coaching when principals and teachers returned to their schools. Coaching was the responsibility of district officials and principals. If the ARI had included an intensive focus on rigorous coaching and student engagement in a core subject area, we expect that educators would have perceived ARI activities as having more potential impact on their instruction, as well as achievement and possibly student engagement. This might require more of a focus on professional development for instructional coaches in each district, or more coaches to deliver intensive supports.

4. **Provide a set of activities with a focus on particular aspects of students' learning, possibly in specific subject areas, available to the majority of teachers.** Research on educator professional development has suggested that productive professional development that leads to growth in teacher effectiveness is intensive, subject-specific, and offered over an extended time (Garet et al., 2001; Correnti, 2007; Wei, Darling-Hammond, and Adamson, 2010; Desimone, 2009). This intensive, subject-specific focus would have been challenging to provide through the ARI, given that KVEC was charged with designing and implementing activities that satisfied the range of requirements of the RTT-D and the diverse school improvement goals and needs across the districts and schools being served. At the same time, principals and teachers did not perceive that most activities were well-aligned with their schools' improvement goals and were not supporting improvements in their instruction, or improvements in the majority of their students' achievement or engagement. If the ARI had included a widespread, intensive focus on professional development and student engagement in a core subject area, we expect that educators would have perceived it as having more potential impact on their instruction, as well as achievement and possibly student engagement. This might require more intensive goal-setting on participation with districts over time but could have greater payoffs for teachers and students.
5. **Consider how to align activities more closely with school goals and needs for all or the majority of students, to support buy-in.** KVEC sought input from participating districts, and they designed and refined ARI activities with this input in mind. However, our findings suggest that most activities did not align a great deal with schools' main improvement goals. Furthermore, principals and teachers indicated that activities were not improving instruction, achievement, or engagement for all or the majority of students. Designing and implementing activities that satisfied the range of requirements of the RTT-D and the diverse school improvement goals and needs across the districts and schools being served would be challenging. One possible reason for this gap between what was offered and what educators thought might address school goals and improvements for students could be that the ARI was focused heavily on providing

innovative and personalized activities. Recruitment focused on limited numbers of principals, teachers, and students, and, further, on participants who were interested in the activity. This approach may not be expected to meet goals for the majority of ARI schools that have traditional achievement concerns that require widescale changes in practices. That said, ARI activities could enable teachers and principals to experiment with ideas that could later lead to real improvements and change. We surmise there was somewhat of a disconnect between the participation approach supported by RTT-D and participation required for significant changes in student achievement.

- 6. Consider infrastructure and resource constraints other than funding that may hinder participation.** Activities that delivered training to principals and teachers occurred both during the school day and outside of school time. However, some activities always occurred during the school day and created resource challenges. Summits required nearly all ARI participants to attend a one-day conference in the fall and spring. KVEC provided funding for substitute teachers, eliminating a notable barrier to participation. Yet, the supply of substitute teachers was smaller than the demand in many districts. It also took time for principals to secure substitute teachers. Activities outside of school time may be poorly attended, but participation during school hours may have been limited by these factors. This is an important consideration for rural schools, where the pool of well-qualified substitute teachers may be particularly limited.

For participating districts and schools, the ARI offered an opportunity for teachers and students to engage in innovative work. We did not find evidence that the ARI affected student outcomes, and educators did not necessarily perceive the activities as leading to improvements for the majority of students. This report highlights some key findings and offers at least some lessons for implementation of similar programs.

Appendix: Technical Details

This appendix provides technical details of the methods used to evaluate the effects of the ARI on student outcomes.

Working with the set of all Kentucky schools, we first identified the KVEC schools participating in the ARI as members of the “treatment group.” Remaining schools in the state were candidates to be in the control group and ideally would represent “business as usual” in the state. To help ensure that the control group was not affected by the ARI or a similar initiative, we excluded schools in KVEC districts that opted not to participate in the ARI; by virtue of their membership in KVEC, they might have been affected by the initiative even though they were not formally participating. We also excluded schools participating in a co-occurring RTT-D project with overlapping goals known as kid-FRIENDLY. After these exclusions, remaining schools in the state were classified as part of the “comparison group.”

The next step in the process was to ensure, to the extent possible, that the treatment and comparison groups were similar at the beginning of the project. To accomplish this, we undertook a propensity weighting approach (McCaffrey, Ridgeway, and Morral, 2004) using a rich set of baseline variables, including school size, Title I eligibility and provision of Title 1 services, poverty as measured by the eligibility for free or reduced-price lunch, race/ethnicity, rurality, student-computer ratio, spending, average years of teaching experience of the staff, academic achievement scores, dropout and graduation rates, and college and career readiness indicators. For technical reasons related to large variation in school grade configurations, we prepared seven sets of weights: for high schools and for each grade level from 3 to 8. Later, when assessing outcomes for a particular grade level, we used the weighted comparison group for that same grade level.

In general, the weights improved balance on these variables considerably. However, although the balancing algorithm optimized balance across the entire set of variables, some variables remained imbalanced or even became slightly more imbalanced. Tables A.1 through A.7 summarize the balance between the treatment and comparison groups before and after applying weights.

To exert additional control over baseline differences that remained evident even after weighting, we included all of the same variables as covariates in outcomes models. This approach, often referred to as doubly robust, has been found to be useful as a supplement to weighting to further control for differences between two groups at baseline when estimating the effects of intervention programs (Guo and Fraser, 2009).

A separate outcomes model was run for each outcome of interest, for each outcome year under study. For example, 2016–2017 3rd-grade mathematics achievement was analyzed with all available 3rd-grade baseline variables as covariates, and with the 3rd-grade weights. The results

are reported in Chapter 5 and Table 5.1. A more detailed version of Table 5.1 appears as Table A.8.

Because the weights did not accomplish perfect balance, we also conducted a series of sensitivity tests to examine the performance of our methods. We did this by running all of the outcomes models again without any balancing weights. These sensitivity tests produced results that differed numerically from the weighted results reported in Chapter 5 but led to the same substantive interpretation. This gives us confidence that the imperfect balance after weighting is not biasing our findings about the effect of the ARI on student outcomes.

The R statistical software (R Core Team, 2018) was used for these analyses. The R package *twang* (Ridgeway et al., 2017) was used to develop the survey weights, and the package *survey* was used to apply the weights in outcomes models (Lumley, 2017).

We consider the 2016–2017 outcomes as the primary ones of interest because they capture the longest duration of exposure to the ARI program. That year, across all grades and subjects, there were 21 academic outcomes, one college and career readiness outcome, and two school completion outcomes (dropout/graduation rates). We treated the academic, school completion, and college and career readiness outcomes as separate domains and conducted adjustments for multiple hypothesis tests within each of those domains using the Benjamini-Hochberg method for controlling the false discovery rate (Benjamini and Hochberg, 1995).

Similar data were available for the 2014–2015 and 2015–2016 academic years, and we used the same methods to analyze those as intermediate outcomes. As was mentioned, in our a priori analysis plan we considered the outcomes from earlier project years (2014–2015 and 2015–2016) to be exploratory because they were intermediate results and we did not want to harm the statistical power of the main analysis by conducting additional confirmatory tests on intermediate outcomes. For completeness, we present those exploratory results in Tables A.9 and A.10. No results for 2014–2015 rise to the level of statistical significance. However, as seen in Table A.10, numerous estimates for 2015–2016 are significant. Significant favorable results are estimated for 4th- and 8th-grade mathematics proficiency rates, 3rd-, 4th-, 5th-, and 7th-grade reading proficiency rates, high school English proficiency rates, and graduation and dropout rates. Significant unfavorable results are estimated for 6th-grade writing proficiency rates. It is challenging to interpret the generally favorable 2014–2015 results. There is little about the design of the intervention or participation rates that can explain a strong effect in 2014–2015 that is not sustained the following year. On the other hand, the estimates in 2015–2016 remain generally favorable even if not statistically significant. This could suggest that the ARI was having a positive influence that was not durable over the longer term, and thus not strong enough to remain statistically significant in 2015–2016. Ultimately, we adhere to our original analysis plan and focus primarily on the 2016–2017 results with only one significant effect in 4th-grade reading.

Table A.1. Assessment of Treatment-Comparison Group Balance Before and After Weighting, Grade 3

	Unweighted Balance						Weighted Balance			
	Treatment Mean	Treatment SD	Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student membership	376.44	174.14	412.56	153.25	-0.21	0.10	376.58	165.72	0.00	0.94
Title I: not eligible	0.02	0.12	0.04	0.20	-0.21	0.56	0.02	0.14	-0.02	0.82
Title I: eligible and provides services	0.98	0.12	0.96	0.21	0.23	0.56	0.98	0.14	0.03	0.82
Title I: eligible but does not provide services	0.00	0.00	0.00	0.05		0.56	0.00	0.02		0.82
Percentage female	0.48	0.04	0.48	0.03	-0.02	0.73	0.48	0.03	0.13	0.56
Percentage free or reduced-price lunch	0.77	0.10	0.66	0.14	1.12	0.00	0.76	0.12	0.17	0.84
Percentage white	0.97	0.03	0.88	0.13	2.92	0.00	0.96	0.09	0.62	0.84
Urban Centric Local: Town: Distant	0.03	0.17	0.17	0.37	-0.78	0.00	0.04	0.21	-0.07	0.91
Urban Centric Local: Town Remote	0.17	0.38	0.14	0.34	0.10	0.00	0.19	0.39	-0.04	0.91
Urban Centric Local: Town: Fringe	0.17	0.38	0.25	0.43	-0.20	0.00	0.14	0.35	0.08	0.91
Urban Centric Local: Distant	0.31	0.46	0.36	0.48	-0.10	0.00	0.36	0.48	-0.11	0.91

	Unweighted Balance						Weighted Balance			
	Treatment Mean	Treatment SD	Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Urban Centric Local: Remote	0.31	0.46	0.09	0.29	0.47	0.00	0.27	0.44	0.10	0.91
Student-computer ratio	2.53	1.12	2.81	1.47	-0.25	0.06	2.46	0.93	0.06	0.94
Per-student spending	9,152.53	3,016.69	8,536.46	2,388.96	0.20	0.19	8,763.14	2,360.00	0.13	0.94
Average years of teaching experience	13.45	2.33	12.19	2.21	0.54	0.00	13.50	2.21	-0.02	0.70
Percentage proficient or distinguished mathematics	40.80	17.60	45.40	14.88	-0.26	0.01	37.81	14.80	0.17	0.56
Percentage proficient or distinguished reading	55.03	15.58	54.55	12.43	0.03	0.58	50.95	13.38	0.26	0.56

NOTE: SD = standard deviation.

Table A.2. Assessment of Treatment-Comparison Group Balance Before and After Weighting, Grade 4

	Treatment Mean	Treatment SD	Unweighted Balance				Weighted Balance			
			Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student membership	376.44	174.14	409.73	150.32	-0.19	0.11	371.69	163.04	0.03	1.00
Title I: not eligible	0.02	0.12	0.04	0.21	-0.23	0.51	0.02	0.14	-0.05	0.75
Title I: eligible and provides services	0.98	0.12	0.95	0.21	0.25	0.51	0.98	0.15	0.05	0.75
Title I: eligible but does not provide services	0.00	0.00	0.00	0.05		0.51	0.00	0.01		0.75
Percentage female	0.48	0.04	0.48	0.03	-0.02	0.71	0.48	0.03	0.09	0.80
Percentage free or reduced-price lunch	0.77	0.10	0.66	0.14	1.12	0.00	0.76	0.13	0.19	0.78
Percentage white	0.97	0.03	0.89	0.13	2.90	0.00	0.96	0.09	0.59	0.93
Urban Centric Local: Town: Distant	0.03	0.17	0.17	0.37	-0.77	0.00	0.04	0.20	-0.05	0.98
Urban Centric Local: Town Remote	0.17	0.38	0.13	0.34	0.11	0.00	0.19	0.39	-0.04	0.98
Urban Centric Local: Town: Fringe	0.17	0.38	0.25	0.43	-0.21	0.00	0.15	0.35	0.07	0.98
Urban Centric Local: Distant	0.31	0.46	0.36	0.48	-0.09	0.00	0.33	0.47	-0.04	0.98
Urban Centric Local: Remote	0.31	0.46	0.10	0.30	0.47	0.00	0.30	0.46	0.04	0.98

	Treatment Mean	Treatment SD	Unweighted Balance				Weighted Balance			
			Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student-computer ratio	2.53	1.12	2.81	1.46	-0.25	0.05	2.42	0.90	0.10	0.99
Per-student spending	9,152.53	3,016.69	8,524.52	2,398.86	0.21	0.17	8,679.70	2,557.97	0.16	0.99
Average years of teaching experience	13.45	2.33	12.14	2.22	0.56	0.00	13.43	2.18	0.01	0.73
Percentage proficient or distinguished mathematics	44.87	17.09	48.40	14.53	-0.21	0.04	43.57	16.91	0.08	0.91
Percentage proficient or distinguished reading	54.89	14.62	53.99	12.91	0.06	0.57	52.57	13.16	0.16	0.61
Percentage proficient or distinguished language mechanics	52.40	16.18	52.03	12.64	0.02	0.48	50.30	14.23	0.13	0.75

Table A.3. Assessment of Treatment-Comparison Group Balance Before and After Weighting, Grade 5

	Treatment Mean	Treatment SD	Unweighted Balance				Weighted Balance			
			Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student membership	374.53	174.25	408.95	149.04	-0.20	0.08	374.18	165.40	0.00	0.96
Title I: not eligible	0.02	0.12	0.05	0.21	-0.24	0.41	0.03	0.16	-0.10	0.49
Title I: eligible and provides services	0.98	0.12	0.95	0.23	0.31	0.41	0.97	0.17	0.12	0.49
Title I: eligible but does not provide services	0.00	0.00	0.01	0.09		0.41	0.00	0.06		0.49
Percentage female	0.48	0.04	0.48	0.03	-0.03	0.69	0.48	0.03	0.16	0.61
Percentage free or reduced-price lunch	0.77	0.10	0.66	0.14	1.09	0.00	0.75	0.13	0.18	0.64
Percentage white	0.98	0.03	0.88	0.13	3.25	0.00	0.95	0.10	0.82	0.73
Urban Centric Local: Town: Distant	0.03	0.17	0.17	0.37	-0.78	0.00	0.04	0.20	-0.07	0.93
Urban Centric Local: Town Remote	0.17	0.38	0.13	0.34	0.10	0.00	0.18	0.39	-0.03	0.93
Urban Centric Local: Town: Fringe	0.17	0.38	0.25	0.43	-0.20	0.00	0.16	0.37	0.02	0.93
Urban Centric Local: Distant	0.31	0.46	0.36	0.48	-0.09	0.00	0.36	0.48	-0.09	0.93
Urban Centric Local: Remote	0.31	0.46	0.10	0.29	0.47	0.00	0.25	0.44	0.13	0.93

	Treatment Mean	Treatment SD	Unweighted Balance				Weighted Balance			
			Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student-computer ratio	2.51	1.11	2.81	1.47	-0.28	0.03	2.45	0.91	0.05	0.98
Per-student spending	9,137.12	3,030.61	8,509.38	2,410.91	0.21	0.14	8,665.56	2,565.09	0.16	0.99
Average years of teaching experience	13.49	2.33	12.12	2.22	0.59	0.00	13.45	2.19	0.02	0.72
Percentage proficient or distinguished mathematics	45.23	17.81	52.11	15.25	-0.39	0.01	47.25	17.73	-0.11	0.76
Percentage proficient or distinguished reading	56.84	13.64	55.88	11.82	0.07	0.68	53.57	13.36	0.24	0.44
Percentage proficient or distinguished social studies	59.17	17.10	59.31	14.66	-0.01	0.48	57.74	16.00	0.08	0.67
Percentage proficient or distinguished writing	38.02	19.10	37.87	15.90	0.01	0.50	36.19	16.91	0.10	0.72

Table A.4. Assessment of Treatment-Comparison Group Balance Before and After Weighting, Grade 6

	Treatment Mean	Treatment SD	Unweighted Balance				Weighted Balance			
			Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student membership	370.76	177.02	448.79	203.28	-0.44	0.04	389.06	180.55	-0.10	0.68
Title I: not eligible	0.00	0.00	0.02	0.14		0.01	0.00	0.06		0.17
Title I: eligible and provides services	0.98	0.13	0.84	0.37	1.15	0.01	0.94	0.24	0.35	0.17
Title I: eligible but does not provide services	0.02	0.13	0.15	0.35	-0.99	0.01	0.06	0.24	-0.33	0.17
Percentage female	0.48	0.04	0.49	0.03	-0.10	0.18	0.48	0.03	0.05	0.86
Percentage free or reduced-price lunch	0.77	0.10	0.66	0.14	1.06	0.00	0.75	0.13	0.12	0.62
Percentage white	0.98	0.03	0.90	0.12	2.86	0.00	0.96	0.07	0.51	0.96
Urban Centric Local: Town: Distant	0.03	0.18	0.17	0.37	-0.72	0.00	0.05	0.22	-0.10	0.84
Urban Centric Local: Town Remote	0.20	0.40	0.19	0.39	0.05	0.00	0.23	0.42	-0.06	0.84
Urban Centric Local: Town: Fringe	0.17	0.38	0.19	0.39	-0.06	0.00	0.11	0.32	0.15	0.84
Urban Centric Local: Distant	0.27	0.45	0.34	0.47	-0.14	0.00	0.32	0.47	-0.11	0.84
Urban Centric Local: Remote	0.32	0.47	0.13	0.33	0.42	0.00	0.29	0.45	0.07	0.84

	Treatment Mean	Treatment SD	Unweighted Balance				Weighted Balance			
			Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student-computer ratio	2.38	0.85	2.77	1.25	-0.45	0.03	2.40	0.85	-0.02	0.96
Per-student spending	8,971.71	3,375.53	7,926.22	1,907.91	0.31	0.01	8,175.26	2,458.10	0.24	0.58
Average years of teaching experience	13.28	2.34	11.98	2.40	0.56	0.00	13.29	2.42	0.00	0.50
Percentage proficient or distinguished mathematics	44.72	15.14	48.48	14.84	-0.25	0.24	44.13	14.66	0.04	0.88
Percentage proficient or distinguished reading	54.91	12.34	53.46	11.19	0.12	0.37	53.90	12.61	0.08	0.88
Percentage proficient or distinguished language mechanics	40.69	12.48	42.11	11.13	-0.11	0.29	39.57	10.82	0.09	0.57
Percentage proficient or distinguished writing	54.27	16.83	54.25	16.36	0.00	0.57	53.31	16.94	0.06	0.93

Table A.5. Assessment of Treatment-Comparison Group Balance Before and After Weighting, Grade 7

	Treatment Mean	Treatment SD	Unweighted Balance				Weighted Balance			
			Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student membership	383.85	182.82	507.39	202.02	-0.68	0.00	455.02	180.71	-0.39	0.03
Title I: not eligible	0.02	0.14	0.03	0.18	-0.09	0.02	0.02	0.13	0.03	0.48
Title I: eligible and provides services	0.92	0.28	0.72	0.45	0.71	0.02	0.86	0.35	0.19	0.48
Title I: eligible but does not provide services	0.06	0.24	0.25	0.43	-0.76	0.02	0.12	0.33	-0.23	0.48
Percentage female	0.49	0.04	0.49	0.03	0.05	0.30	0.48	0.03	0.23	0.26
Percentage free or reduced-price lunch	0.75	0.12	0.63	0.13	1.06	0.00	0.70	0.14	0.41	0.25
Percentage white	0.98	0.03	0.88	0.13	3.09	0.00	0.94	0.10	1.03	0.20
Urban Centric Local: Town: Distant	0.04	0.20	0.21	0.41	-0.85	0.00	0.08	0.28	-0.21	0.59
Urban Centric Local: Town Remote	0.28	0.45	0.21	0.41	0.16	0.00	0.22	0.42	0.12	0.59
Urban Centric Local: Town: Fringe	0.11	0.31	0.23	0.42	-0.39	0.00	0.19	0.39	-0.26	0.59
Urban Centric Local: Distant	0.28	0.45	0.23	0.42	0.11	0.00	0.30	0.46	-0.06	0.59
Urban Centric Local: Remote	0.30	0.46	0.12	0.33	0.38	0.00	0.20	0.40	0.21	0.59

	Treatment Mean	Treatment SD	Unweighted Balance				Weighted Balance			
			Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student-computer ratio	2.43	0.94	2.70	1.22	-0.29	0.61	2.55	1.05	-0.13	0.97
Per-student spending	8,446.06	2,769.98	7,485.58	1,846.20	0.35	0.00	7,689.97	1,938.40	0.27	0.25
Average years of teaching experience	13.43	2.44	11.65	2.27	0.73	0.00	12.87	2.24	0.23	0.52
Percentage proficient or distinguished mathematics	39.82	14.75	39.64	12.83	0.01	0.44	36.25	15.01	0.24	0.12
Percentage proficient or distinguished reading	55.72	9.21	53.84	11.04	0.20	0.60	54.32	12.20	0.15	0.29

Table A.6. Assessment of Treatment-Comparison Group Balance Before and After Weighting, Grade 8

	Treatment Mean	Treatment SD	Unweighted Balance				Weighted Balance			
			Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student membership	383.85	182.82	507.39	202.02	-0.68	0.00	460.07	193.57	-0.42	0.05
Title I: not eligible	0.02	0.14	0.03	0.18	-0.09	0.02	0.01	0.10	0.08	0.26
Title I: eligible and provides services	0.92	0.28	0.72	0.45	0.71	0.02	0.85	0.36	0.22	0.26
Title I: eligible but does not provide services	0.06	0.24	0.25	0.43	-0.76	0.02	0.14	0.34	-0.30	0.26
Percentage female	0.49	0.04	0.49	0.03	0.05	0.30	0.48	0.03	0.22	0.34
Percentage free or reduced-price lunch	0.75	0.12	0.63	0.13	1.06	0.00	0.70	0.14	0.47	0.11
Percentage white	0.98	0.03	0.88	0.13	3.09	0.00	0.94	0.11	1.20	0.13
Urban Centric Local: Town: Distant	0.04	0.20	0.21	0.41	-0.85	0.00	0.08	0.26	-0.16	0.41
Urban Centric Local: Town Remote	0.28	0.45	0.21	0.41	0.16	0.00	0.25	0.43	0.06	0.41
Urban Centric Local: Town: Fringe	0.11	0.31	0.23	0.42	-0.39	0.00	0.23	0.42	-0.39	0.41
Urban Centric Local: Distant	0.28	0.45	0.23	0.42	0.11	0.00	0.26	0.44	0.05	0.41
Urban Centric Local: Remote	0.30	0.46	0.12	0.33	0.38	0.00	0.19	0.39	0.24	0.41

	Treatment Mean	Treatment SD	Unweighted Balance				Weighted Balance			
			Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student-computer ratio	2.43	0.94	2.70	1.22	-0.29	0.61	2.47	1.04	-0.05	0.99
Per-student spending	8,446.06	2,769.98	7,485.58	1,846.20	0.35	0.00	7,768.11	2,098.63	0.25	0.50
Average years of teaching experience	13.43	2.44	11.65	2.27	0.73	0.00	12.73	2.23	0.29	0.36
Percentage proficient or distinguished mathematics	43.00	16.68	43.53	13.08	-0.03	0.93	40.71	13.60	0.14	0.76
Percentage proficient or distinguished reading	54.76	12.09	51.97	9.51	0.23	0.18	52.70	12.00	0.17	0.57
Percentage proficient or distinguished social studies	60.97	14.92	60.44	12.56	0.04	0.91	58.97	14.55	0.13	0.71
Percentage proficient or distinguished writing	33.47	15.84	35.12	14.00	-0.10	0.15	35.06	14.85	-0.10	0.45

Table A.7. Assessment of Treatment-Comparison Group Balance Before and After Weighting, High School

	Unweighted Balance						Weighted Balance			
	Treatment Mean	Treatment SD	Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student membership	525.52	217.12	737.52	349.05	-0.98	0.00	637.14	248.69	-0.51	0.10
Title I: not eligible	0.08	0.27	0.14	0.34	-0.20	0.15	0.12	0.32	-0.14	0.64
Title I: eligible and provides services	0.52	0.50	0.32	0.47	0.41	0.15	0.40	0.49	0.25	0.64
Title I: eligible but does not provide services	0.40	0.49	0.55	0.50	-0.31	0.15	0.49	0.50	-0.18	0.64
Percentage female	0.48	0.04	0.49	0.02	-0.15	0.87	0.49	0.02	-0.15	0.96
Percentage free or reduced-price lunch	0.70	0.13	0.57	0.12	0.96	0.00	0.64	0.13	0.46	0.02
Percentage white	0.97	0.03	0.90	0.11	2.38	0.00	0.93	0.12	1.39	0.55
Urban Centric Local: Town: Distant	0.00	0.00	0.24	0.43		0.01	0.08	0.27		0.26
Urban Centric Local: Town Remote	0.32	0.47	0.18	0.38	0.30	0.01	0.26	0.44	0.14	0.26
Urban Centric Local: Town Fringe	0.16	0.37	0.23	0.42	-0.18	0.01	0.17	0.38	-0.04	0.26
Urban Centric Local: Distant	0.20	0.40	0.22	0.41	-0.04	0.01	0.21	0.41	-0.03	0.26
Urban Centric Local: Remote	0.32	0.47	0.14	0.34	0.40	0.01	0.28	0.45	0.09	0.26

	Unweighted Balance						Weighted Balance			
	Treatment Mean	Treatment SD	Control Mean	Control SD	Standardized Effect Size	p Value	Control Mean	Control SD	Standardized Effect Size	p Value
Student-computer ratio	2.46	1.16	2.63	2.35	-0.15	1.00	2.93	2.51	-0.40	0.99
Per-student spending	9,098.85	2,964.77	7,873.91	1,749.01	0.41	0.05	7,912.62	1,592.76	0.40	0.43
Average years of teaching experience	13.43	2.22	11.80	1.88	0.74	0.00	12.88	2.02	0.25	0.27
Graduation rate	92.28	5.12	92.30	4.53	0.00	0.99	92.29	5.22	0.00	0.92
Percentage college- or career-ready	77.68	16.24	74.54	14.57	0.19	0.12	74.27	15.32	0.21	0.32
Percentage proficient or distinguished English	53.42	11.35	55.01	9.18	-0.14	0.21	53.02	10.34	0.04	1.00
Percentage proficient or distinguished algebra	33.06	19.82	34.89	16.78	-0.09	0.25	32.25	16.57	0.04	0.52
Mean score ACT	18.57	1.43	19.10	1.04	-0.37	0.02	18.83	1.09	-0.18	0.69
Mean score PLAN	16.65	0.82	17.14	0.80	-0.60	0.00	16.86	0.93	-0.26	0.40
Dropout rate	0.01	0.01	0.01	0.01	0.18	0.82	0.01	0.01	-0.03	0.87

NOTE: The PLAN test is a preliminary ACT generally administered in the sophomore year.

Table A.8. ARI Effects of Student Outcomes, Primary Analysis, 2016–2017 Academic Year

Domain	Grade	N_t	N_c	Estimate	Std. Error	p
Academic achievement						
Mathematics proficiency rate						
	3	60	323	0.68	2.78	0.93
	4	60	323	5.86	2.66	0.12
	5	61	318	4.73	2.88	0.21
	6	53	188	-0.25	2.63	0.93
	7	46	134	-0.21	2.26	0.93
	8	46	134	9.30	3.44	0.08
Reading proficiency rate						
	3	60	323	3.28	2.31	0.30
	4	60	323	9.35	2.12	0.00*
	5	61	318	4.03	2.45	0.21
	6	53	188	0.25	2.12	0.93
	7	46	134	0.74	2.36	0.93
	8	46	134	1.12	2.18	0.80
Language mechanics proficiency rate						
	4	60	323	4.47	2.46	0.21
	6	52	187	-2.14	2.13	0.48
Writing proficiency rate						
	5	61	318	-4.83	2.90	0.21
	8	46	134	-2.75	3.06	0.52
Social studies proficiency rate						
	5	61	318	2.47	2.04	0.37
	8	46	134	5.20	3.00	0.21
End-of-course English proficiency rate						
	HS	24	109	4.21	1.78	0.10
End-of-course algebra proficiency rate						
	HS	24	109	3.87	3.08	0.37
ACT mean score						
	HS	24	109	0.32	0.14	0.10
College and career readiness rate						
	HS	24	109	-3.65	3.47	0.30
School completion						
Averaged freshman graduation rate						
	HS	24	109	0.90	0.66	0.17
Dropout Rate						
	HS	24	109	-0.25	0.13	0.11

NOTES: Each row represents results from a separate statistical model. N_t is the number of treatment group schools in the analysis; N_c is the number of comparison group schools. Outcomes expressed as rates are on a scale of 1 to 100, representing the percentages of students in the school meeting the criterion. An estimate of 0.68 for 3rd-grade math proficiency, for example, can be interpreted as ARI schools experiencing a 0.68-percent increase in the proficiency rate. ACT scores are reported on the scale of the test (1 to 36), with ARI schools estimated to experience an average score 0.32 points higher than that of the comparison group. Among all of these tests, dropout rates are unique in that a negative estimate is a favorable outcome (a reduction in dropout rates). P values are adjusted for multiple hypothesis tests within domain; * indicates statistical significance after this adjustment.

Table A.9. ARI Effects of Student Outcomes, Exploratory Analysis, 2014–2015 Academic Year

Domain	Grade	N_t	N_c	Estimate	Std. Error	p
Academic achievement						
Mathematics proficiency rate						
	3	63	328	4.18	2.50	0.31
	4	63	328	0.02	2.48	0.99
	5	63	322	-0.23	1.99	0.95
	6	58	195	5.89	2.47	0.14
	7	46	137	2.89	1.88	0.37
	8	47	137	7.19	2.97	0.14
Reading proficiency rate						
	3	63	328	4.96	2.02	0.14
	4	63	328	4.25	2.08	0.19
	5	63	322	0.94	1.98	0.86
	6	58	195	2.65	1.91	0.43
	7	46	137	2.13	1.93	0.57
	8	47	137	3.75	1.98	0.23
Language mechanics proficiency rate						
	4	63	328	0.81	2.18	0.86
	6	58	195	0.70	1.86	0.86
Writing proficiency rate						
	5	63	322	-4.03	1.96	0.19
	6	58	195	1.92	2.27	0.71
	8	47	137	-1.66	2.08	0.71
Social studies proficiency rate						
	5	63	322	-0.48	2.15	0.90
	8	47	137	1.00	2.68	0.86
End-of-course English proficiency rate						
	HS	25	109	0.56	1.82	0.87
End-of-course algebra proficiency rate						
	HS	25	109	-1.95	2.47	0.71
ACT mean score						
	HS	25	109	-0.09	0.13	0.75
PLAN mean score						
	HS	25	109	0.20	0.16	0.50
College and career readiness rate						
	HS	25	109	0.11	2.12	0.96
School completion						
Averaged freshman graduation rate						
	HS	25	109	1.80	0.82	0.06
Dropout rate						
	HS	25	109	0.09	0.15	0.58

NOTES: Each row represents results from a separate statistical model. N_t is the number of treatment group schools in the analysis; N_c is the number of comparison group schools. Outcomes expressed as rates are on a scale of 1 to 100, representing the percentages of students in the school meeting the criterion. ACT and PLAN scores are reported on the scales of the test (1 to 36 for ACT and 1 to 32 for PLAN). Among all of these tests, dropout rates are unique in that a negative estimate is a favorable outcome (a reduction in dropout rates). P values are adjusted for multiple hypothesis tests within domain. No tests in this table are significant after this adjustment.

Table A.10. ARI Effects Of Student Outcomes, Exploratory Analysis, 2015–2016 Academic Year

Domain	Grade	N_t	N_c	Estimate	Std. Error	p
Academic achievement						
Mathematics proficiency rate						
	3	62	324	1.25	2.38	0.70
	4	62	323	5.83	2.13	0.04*
	5	62	318	2.50	2.33	0.45
	6	58	191	3.96	2.47	0.23
	7	47	136	4.54	2.86	0.23
	8	47	136	8.17	2.90	0.04*
Reading proficiency rate						
	3	62	324	5.61	2.19	0.04*
	4	62	323	7.78	1.82	0.00*
	5	62	318	6.02	1.95	0.02*
	6	58	191	1.36	2.16	0.69
	7	47	136	5.37	2.11	0.04*
	8	47	136	2.07	1.86	0.45
Language mechanics proficiency rate						
	4	62	323	1.58	2.33	0.68
	6	58	191	-4.20	2.52	0.23
Writing proficiency rate						
	5	62	318	-3.24	2.21	0.26
	6	58	191	-8.10	3.17	0.04*
	8	47	136	-1.98	2.81	0.68
Social studies proficiency rate						
	5	62	318	-0.31	2.32	0.89
	8	47	136	0.71	2.60	0.82
End-of-course English proficiency rate						
	HS	25	109	2.71	1.12	0.05*
End-of-course algebra proficiency rate						
	HS	24	109	-1.33	3.36	0.76
ACT mean score						
	HS	25	109	0.09	0.18	0.70
College and career readiness rate						
	HS	25	109	-1.79	3.60	0.62
School completion						
Averaged freshman graduation rate						
	HS	25	109	2.34	0.99	0.03*
Dropout rate						
	HS	25	109	-0.34	0.16	0.03*

NOTES: Each row represents results from a separate statistical model. N_t is the number of treatment group schools in the analysis; N_c is the number of comparison group schools. Outcomes expressed as rates are on a scale of 1 to 100, representing the percentages of students in the school meeting the criterion. ACT scores are reported on the scale of the test (1 to 36). Among all of these tests, dropout rates are unique in that a negative estimate is a favorable outcome (a reduction in dropout rates). P values are adjusted for multiple hypothesis tests within domain; * indicates statistical significance after this adjustment.

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