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Kentucky Targeted Intervention Program Cost Study

MARCH 2020

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1. Introduction

This study provides a detailed cost analysis of an education reform implemented throughout the state of Kentucky called the Targeted Interventions (TI) program. The following chapter includes an introduction of the policy context and state requirements for the program implemented in Kentucky. In addition, it outlines the goals of the study, corresponding research questions, and analyses conducted to address these questions.

1.1 Context and Description of the Targeted Interventions Program

In 2009, the Kentucky legislature signed Senate Bill 1 (2009 RS SB 1) into law, which called for a complete overhaul of Kentucky's assessment and accountability system for PreK–12 education. Since then, the Commonwealth has adopted a comprehensive system of education reform—known as *Unbridled Learning*—to monitor, document, and support progress toward the goals of college and career readiness for all students. Kentucky's Next Generation Learners program is one of the strategic priorities established by the Kentucky Board of Education in response to Senate Bill 1. In support of this strategic priority, the Kentucky Department of Education (KDE) designed and implemented the Targeted Interventions (TI) program.

The TI program is integrated into the Kentucky Systems of Interventions framework, with the goal of intervening early in a student's educational career to ensure students leave high school ready to pursue opportunities in higher education and the workforce. This program, in effect since the 2010–11 school year, is designed to monitor student progress on college- and career-readiness proficiency standards, screen students who need support, and provide interventions that will address those needs. Specifically, KDE defines *targeted interventions* as "planned, carefully considered interventions that occur when students do not meet the grade level expectations (i.e., benchmarks) that are necessary for academic progress" (KDE, 2018). The TI program targets Grades 8, 10, and 11. Each intervention cycle typically consists of a diagnostic pretest, the development of instructional targets and associated formative assessments, direct delivery of instruction, and a post-test or other measurement to demonstrate the expected milestone had been achieved. Supports for students who do not meet statewide benchmarks are required by law to be offered in order to enable students to enter college without the need for developmental or remedial coursework (KDE, 2019a). These supports are sometimes referred to as *transitional interventions*. Every district has the autonomy to determine how best to implement the intervention process to meet the needs of their students. Interventions are delivered in a variety of fashions, including as full courses (e.g., within a school's regular schedule as existing courses or stand-alone courses) and/or outside of the regular school day (e.g., offered as before-/after-school activities).

While on-the-ground implementation details are determined by districts, the *Unified Strategic Plan* defines a uniform process for identifying students in need of intervention services (KDE, 2019b). All Kentucky students in Grades 8, 10, and 11 were supposed to take grade level-appropriate tests within

the ACT® suite of assessments,[1] and those who did not meet statewide benchmarks[2] were supposed to receive a referral to the TI program. As mentioned above, all intervention programs are intended to focus on preparing students to demonstrate college and career readiness by the end of high school (KRS 158.6453, 2017; KRS 158.6459, 2017; 704 KAR3:305, 2018).

1.2 Study Purpose and Overview

The American Institutes for Research (AIR) conducted two separate but related studies to understand the implementation of the TI program. The first study analyzed the effects of the program on various college outcomes such as remedial course taking in college, enrollment and pass rates of introductory college-level courses, student persistence, and credit accumulation (Xu, Backes, Oliveira, & Goldhaber, 2020). This study gives policymakers important information about how a statewide high school remediation initiative aimed at college and career readiness affects student achievement. As a companion analysis, the current work focuses on identifying the costs associated with the implementation of the TI program during the 2014–15 and 2015–16 school years.[3] The cost information reported here is intended to inform practitioners throughout Kentucky who are implementing interventions to promote college and career readiness. However, with high school remediation programs similar to Kentucky's TI program becoming increasingly popular,[4] stakeholders in other states considering similar education policies may also find this information helpful as they navigate implementation of similar interventions. In sum, the intention of this research is to provide information vital to understanding the costs of the Kentucky TI program and to add to the greater body of literature on the costs associated with interventions intended to promote college and career readiness.

To provide stakeholders and policymakers with high-quality cost information about this statewide policy, this study answers the following research questions:

1. What is the overall cost per student of providing services under the TI program?
2. What are the costs per student of the TI program associated with different types of personnel and non-personnel resources?
3. What are the costs per student associated with the common implementation activities performed under the TI program?

This work uses the ingredients approach to cost analysis (Levin et al., 2018) and a resource cost model (RCM) to organize data on the quantities and prices of resources used to deliver program services. Together, the research approach and data organization were used to produce several important,

[1] For more information about the ACT® suite of assessments, visit https://www.act.org/content/act/en/k12-educators-and-administrators.html.

[2] The *Unified Plan* defines benchmark scores for 11th-grade students as "ACT scores of 18 for English, a score of 20 for Reading, and a Mathematics score of 19 for some introductory courses in Mathematics (often statistics or an applied Mathematics course), a 22 for college algebra, and a 27 for calculus … SAT equivalent scores may also be used" (p. 7).

[3] Note that the current study is limited to interventions received by targeted 11th-grade students in the 2014–15 and 2015–16 school years. This is because individual student-level intervention data collection started in 2014–15, and reporting was mandatory for 11th-grade students only.

[4] The number of statewide high school remediation programs doubled between 2013 and 2017. Currently, there are 17 statewide high school remediation programs, and 22 states offer local high school remediation programs (Barnett, Chavarín, & Griffin, 2018).

contextualized cost estimates for the TI program. A diverse sample of schools was selected to investigate the resources involved in the implementation of the TI program across the state. Data collection focused on identifying all resources used to implement the TI program at each site. The data collected included information about the design of the program and how services were provided to students. Qualitative data from across the study sites were also captured to provide a comprehensive narrative describing implementation and the associated cost estimates.

The study results provide the overall per-student cost for the entirety of the TI program for each study site along with the average across the sites. The per-student costs are further broken out by the types of resources used to implement the program (i.e., personnel, materials/equipment, facilities, and training). We then provide a breakdown of the per-student costs across a set of activity types (administration, instruction, monitoring progress, professional development, and student referrals). Finally, we attempt to make the results more practical by considering the costs of the TI program in the context of overall, current per-student spending at the study sites reported by KDE. For each cost analysis provided in this study, costs are presented in a per-student fashion for each site and as an average cost across all study sites.

The remainder of the study is organized as follows: Section 2 provides an overview of the methods and data used. Section 3 includes the main cost results. Section 4 presents a discussion on ways in which the findings might be used to inform policy and future research activities.

2. Methods and Data

A rigorous approach to cost analysis requires that the data collected provide a comprehensive account of all personnel and non-personnel resources used and their corresponding costs. The following chapter describes the methods used to determine the quantities and types of resources utilized to implement the TI program, their prices, and subsequent costs. The data collection process and study sample are also explained in detail. This includes information about how data were organized and analyzed to determine the per-student costs of the TI program across categories of resource and activity, and for the entire program.

2.1 Methodology

2.1.1 The Ingredients Approach

Analysis of the costs associated with complex, multifaceted programs requires a specialized method that accounts for all resources involved in the implementation of the program. Basing cost analysis on expenditure and budget documents most often fails to convey the true costs associated with a program (Levin & Belfield, 2015). Therefore, the cost analysis for this study employs the ingredients method (Levin et al., 2018) to identify all resources and portions of resources used in the TI program. The ingredients approach is a rigorous cost analysis method that enables researchers to isolate the costs associated with individual programs by identifying and assigning prices to all personnel and non-personnel resources (ingredients) involved in the program, regardless of their source (e.g., existing resources that have been redirected for use by the program, volunteered effort, etc.). In this way, the ingredients approach finds its roots in calculating the economic opportunity cost associated with all resources used to deliver an intervention. The study team took three general steps to apply the approach: identify ingredients, assign prices, and calculate costs.

Identifying ingredients involved in the program required in-depth investigation that involved reviews of documentation and extant data, as well as primary data collection through interviews and surveys. By identifying the ingredients used in a program, we achieved a detailed understanding of the program's components and their respective specifications. The TI program provides flexibility in how schools implement the program and deliver services, which made it particularly important to understand implementation details at the school level. Information collected at the school level provided fine-grained detail about how resources were leveraged to implement the program. In addition, tracking implementation at the school level gives the state a better understanding of how the program flexibility offered was leveraged by sites to meet students' needs.

Key to this approach is the specification of each resource used to deliver program services. It was essential that during data collection (described in detail below) the types and quantities of each resource were meticulously recorded. The resource specifications for this study included information about facilities, personnel, materials, equipment, and software that were essential to the implementation of the program.

The next step in the ingredients approach is to assign prices to the resources. The ingredients approach focuses on identifying the monetary value of all resources used for the program of interest. This is done by applying corresponding prices to each of the resources identified and using resource quantities to

calculate costs. Simply put, calculating costs involves multiplying the quantity of each resource by its corresponding unit price. Importantly, by assigning dollar values to every resource input, the ingredients method captures the opportunity cost involved in implementing the program (i.e., the dollar value of those resources dedicated to the program instead of some other purpose), regardless of the source from which the resources were provided.

Producing accurate cost estimates requires the use of a highly structured system of organizing the cost data described above. Our cost estimate calculations relied heavily on the development of an RCM both to facilitate the collection of resource specifications (i.e., quantities, prices, etc.) and to calculate prices. The following subsection describes the RCM and how it was tailored for use in this cost analysis.

2.1.2 The RCM

An RCM is a structured system used to support data collection and analyze cost analysis results. The RCM shares its origin with the ingredients approach to cost analysis. This system enables researchers to accurately calculate the cost of programs using specific implementation information and to compile pricing data. For the current study, site-specific RCMs were used to organize and analyze resource specification information within and across all sites. The RCM supported the overall cost calculations and was critical in the calculation of more fine-grained cost information.

In an RCM, every program resource is assigned to a specific resource type category. The resource types used for this study are listed in Exhibit 1. Researchers can use the resource categories as a guide to ensure that all resources are being considered, not just those that are described in a budget, policy, or program manual. Furthermore, the separation of resources into categories helps avoid double counting of similar resources. Finally, cost estimates of categorized resources provide important information to potential adopters of the policy in terms of laying out the resource requirements for implementing the program.

Exhibit 1. Intervention Program Resources Types Captured Across Study Sites

Resource Type	Definition
Personnel	Includes the time school- and district-level staff dedicate to the program (for example, time spent in meetings regarding the intervention, referring students to interventions, delivering instruction, monitoring student progress, grading student work, etc.).
Materials and Equipment	Includes materials and equipment used in the operation and implementation of the program, such as textbooks, software, computers, interactive boards, and other required supplies.[5]
Facilities	Includes all costs associated with using physical facilities to implement the program, primarily capturing the spaces that were used for direct delivery of intervention services (classrooms) and meetings (office space).
Tuition	Includes the time and cost of attending conferences and professional development sessions related to the TI program.

In the process of collecting data, it became clear that there were similar program activities that occurred repeatedly across the study sites. For example, every site had administrative duties associated with the

[5] Note that the cost of the ACT suite of assessments is not included in this work, as the assessment is used for purposes other than solely to identify students in need of TI program services.

implementation of the TI program that included facilitating meetings, developing interventions, and managing logistics within schools. Another example is the body of activities associated with the TI program referral process, such as reviewing student ACT scores and assigning them to appropriate interventions. The cost study team synthesized information on the various tasks involved in program implementation to develop the activities types listed in Exhibit 2. These common activities were included in the RCM and analyzed further to understand their associated costs. Reporting costs by activity type may help future adopters understand how this policy fits into existing activity and procedural structures.

Exhibit 2. Intervention Program Activities Captured Across Study Sites

Activity Type	Definition
Administrative	Administrative tasks and duties related to the TI program, including designing and modifying how the program is implemented at schools
Instruction	Delivery of TI program instruction to students including direct instruction, grading, preparing lessons, software, and materials
Monitoring	Activities related to supporting and monitoring TI program implementation
Professional Development	Organizing and participating in professional development opportunities related to the TI program, including training on software used to deliver interventions
Referral	Assessing, referring, and enrolling students into the TI program, as well as tracking their attendance and completion

Resource specification information collected at each site was entered into site-specific RCMs along with relevant pricing information. This information was used to calculate the per-student cost of the TI program overall, as well as by resource type and program activity for each of the study schools.

2.2 Data Collection

The AIR cost study team began the data collection by reviewing documents to better understand the TI program and its requirements. The study team also had multiple informal conversations with practitioners and experts at KDE and individual schools in the state. During these conversations, it became clear that schools implemented unique interventions under the TI program. Therefore, the data collection had to be designed to capture data from a variety of implementation structures. The study team took a multipronged approach to gathering data. Surveys were sent to certificated staff members involved in the TI program, and interviews were conducted with both school- and district-level staff with exceptional knowledge of the program's implementation.

2.2.1 Documentation Review and Framework Development

Extant materials from KDE regarding the TI program were used to understand the structure of the program and the requirements of schools and districts. Where details were unclear during this initial phase, the study team conducted telephone discussions with selected state, district, and school staff knowledgeable about the program to fill these gaps. Using this information, the study team began developing survey and interview protocols that would capture all the essential information about resources used in the implementation of the TI program across the study sites. This information also helped frame the development of the RCM template used to organize the data collected from the study sites.

2.2.2 Instrument Development and Deployment

It is important to recognize that the data collection for this study was retrospective in nature. The TI program analyzed in the current study was implemented in the 2014–15 and 2015–16 school years, yet data were collected in 2019. Given the 4-year gap between implementation and data collection, it was determined that collecting multiple types of data and looking for overlapping information across the reported data sources would lead to more accurate results. A combination of staff surveys and interviews served as the primary data sources for this work. This combination contributed to a detailed and contextualized account of the resources that were used to implement the TI program at the various study schools. The use of surveys not only enabled participants to take their time answering detailed questions about time previously spent on TI program activities but also enabled the study team to collect data from a larger number of staff members than could be done solely with interviews. Interviews at the school and district levels gave more specific and contextual information about the implementation of the TI program.

Surveys were delivered online and designed in a way that respondents would be routed to the appropriate set of questions based on their answers to preliminary screening questions (i.e., skip logic). The survey asked about the individual's involvement in the delivery of intervention services, time spent preparing for those services, and any related professional development.[6] Survey data on resource quantities were then compiled and added to the site-specific RCMs.

District- and school-level interview protocols were developed, which included topics that were not as easily captured in the online survey. For example, the interview protocols included questions about the intervention referral process, the plan used to communicate the TI program to staff, design of the interventions offered, and administrative components of the program. The semistructured interview protocol gave researchers the flexibility to order questions in a way that accommodated the natural progression of the individual conversations.[7] The interview audio was recorded with permission from the subject for reference purposes. Once the interviews were completed, two researchers from the study team independently coded the information, reconciled their work for accuracy, and entered the relevant resource information into the RCM. Additional information included in the interview responses that added to the context of the program was noted for later discussion.

2.2.3 Study Sample

To represent the diversity of contexts in which the TI program was implemented, a stratified sample was drawn from all traditional public high schools in the state. Mainstream education finance literature has long recognized that both the degree of urbanicity and student family income are key drivers of the cost of providing educational services (Duncombe, Hoang, & Yinger, 2015). In addition, research on educational achievement shows that family income is a major predictor of significant variation in student test scores (Reardon, 2011). Therefore, the sample of school sites in this work was drawn from strata based on urbanicity and the percentage of 11th-grade students who qualified for free or reduced-price lunch (FRPL) in the second study year (i.e., the 2015–16 school year).[8] Specifically, the population

[6] See Appendix A for a copy of the staff survey.
[7] See Appendix B for a copy of the protocol used for the district and school staff interviews.
[8] In addition to the dimensions recommended by the education finance literature, we could have also stratified the sample of schools by intervention type. Unfortunately, there were no prescribed intervention models that schools and districts could choose from *a priori* that we could draw upon for sampling purposes.

of high schools in the state was categorized by district locale (urban, suburban, small town, rural remote) and by low, medium, and high FRPL according to tercile in the statewide distribution.[9] Prior to sample selection, schools and districts that demonstrated low TI implementation compliance were removed from the pool.[10]

Exhibit 3 displays the number of schools statewide within each stratum in school year 2015–16. The study team randomly selected two schools from each stratum without replacement. Specifically, we performed an initial first pick where one school was sampled from each stratum and then a second-pick sample without replacing those that were sampled as first picks. The first-pick set of schools constituted the primary sample, and the second-pick schools served as the backup sample if participation was not secured from schools in the primary sample.[11]

Exhibit 3. Numbers of Kentucky Public High Schools by Locale and Free/Reduced Price Lunch Tercile in 2015–16

District Locale	Schools in 1st FRPL Tercile	Schools in 2nd FRPL Tercile	Schools in 3rd FRPL Tercile	Total
City	6	3	1	**10**
Suburb	30	9	18	**57**
Town	25	29	11	**65**
Rural	17	36	47	**100**
Total	**78**	**77**	**77**	**232**

After the sample was drawn, the districts in which each selected school resided were sent an overview of the study and contacted to discuss what participation in the study would entail.[12] With the district's permission, individual schools were then sent the study overview and a formal request to participate. In cases in which both the school and district agreed, the study team attempted to conduct two interviews—one at the district level and one at the school level—and administer an online survey to all certificated staff at the school. If a district or school did not consent to participation, they were dropped from the sample, and the corresponding backup school and respective district were contacted.

Not all contacted districts and schools agreed to participate in the study. Additionally, some schools and districts that initially agreed to participate did not submit any completed surveys or submit to interviews. Data were successfully gathered from a total of eight schools within seven districts. This included six district-level interviews, seven school-level interviews, and survey responses from staff at

[9] Urbanicity was measured using the district locale code contained in the National Center for Education Statistics Common Core of Data (available at https://nces.ed.gov/ccd/ccddata.asp), and school-level incidence of students from low-income families (i.e., those eligible for the National School Lunch Program) was derived from the same data source. The cut-points used to define the statewide terciles of school-level FRPL percentage were 51.6% and 63.5%.

[10] To determine compliance rates, the AIR impact study team checked the discontinuity of the TI program participation rate around the benchmark threshold scores. When there was no discontinuity around the cutoff, the district was deemed noncompliant. For more details see Xu, Backes, Oliveira, & Goldhaber, 2020.

[11] The reader will note that one stratum included only one school (schools located in City districts belonging to the 3rd tercile of poverty). In this case, the one school was selected as a first pick, while the second-pick backup was selected from the stratum defined by schools located in Urban districts belonging to the 2nd FRPL tercile. This was done to preserve representation of Urban locales in the sample. It was the case that the first pick was not able to participate, which required us to draw upon the second pick from neighboring Urban/2nd FRPL tercile strata.

[12] See Appendix C for the study overview provided to districts and schools.

five schools. After data collection was completed, two schools were removed from the analysis due to insufficient data, leaving data from six schools upon which the analysis results are based. Exhibit 4 shows the distribution of sample schools from which information was gathered and the types of data the schools provided.

Exhibit 4. Cost Study Participant Sample of Kentucky Public High Schools Used for Analysis, by Locale and Free/Reduced Price Lunch Tercile in 2015–16

District Locale	Schools in 1st Tercile FRPL	Schools in 2nd Tercile FRPL	Schools in 3rd Tercile FRPL	Total
City		1_{SI}		**1**
Suburb			$1_{DI, SI, SS}$	**1**
Town		$1_{DI, SI, SS}$		**1**
Rural	1_{SI}	$1_{DI, SI, SS}$	$1_{DI, SI, SS}$	**3**
Total	**1**	**2**	**3**	**6**

Notes. Schools and districts had varying levels of participation in the three types of data collection. Subscripts indicate the type(s) of data collection to which schools submitted: DI = district interviews, SI = School Interviews, and SS = School Staff Surveys. Shaded cells indicated either nonparticipation or insufficient data.

2.2.4 Assigning Prices

The surveys and interviews were designed to capture the types and quantities of the resources used in the TI program. Once the resources were quantified, prices were assigned for each using a variety of sources based on the specific resource type and its characteristics. All prices were also adjusted (as appropriate) to represent their value in 2015 dollars. Below are details about how prices were derived for each ingredient type.

The production of accurate cost estimates requires a comprehensive understanding of how each personnel position was compensated in its respective district; this includes both wages and benefits. The cost analysis team worked with KDE staff to create a database with district-specific, average full-time annual salaries and hourly wages for each certificated and classified position type identified during data collection, respectively. This information was entered into the RCM for each position type.

In addition to an annual salary, all personnel are provided with benefits as a part of their employment compensation package. These benefits need to be included to represent the full dollar value of personnel time. To calculate benefits, the study team made use of the U.S. Census Annual Survey of Public School Finances (also known as the F-33 Form), which collects information regarding expenditures for each public school district in the country.[13] The F-33 includes data on the total employee benefits and salary expenditures for every school district in the country by various position types (e.g. teachers, school administrators, instructional support staff, etc.). The study team calculated benefit ratios for each study district and school year based on job type by dividing total employee benefit expenditures by total expenditures on salaries. These ratios were multiplied by the district average salaries for each position to calculate the cost of benefits. The cost of benefits was then added to salaries to produce total compensation rates. County-level inflation rates were then used to inflate 2014–15 prices for personnel to

[13] For access to the F-33 data and corresponding documentation, visit https://nces.ed.gov/ccd/f33agency.asp.

2015 dollars.[14] Lastly, because all data were district specific, the final compensation rates had to be regionally adjusted to account for the fact that the cost of hiring and retaining staff varies across geographic labor markets. The study team used the Comparable Wage Index (CWI) developed by Dr. Lori Taylor of Texas A&M University to standardize these regional compensation rates to the state average.[15]

While average annual compensation rates for certificated job types were calculated for each study district, the reported staff time devoted to the different program activities was captured in hours. To this end, hourly compensation rates for certificated staff were needed to calculate the dollar value of time spent on the program. In turn, it was assumed that full-time administrators worked year round for a standard 40-hour work week, totaling 2,080 annual hours. Collective bargaining agreements and employee handbooks from the study districts were used to determine the number of hours worked by full-time teachers. Depending on the district, the annual hours worked that constituted a full-time teaching position ranged from 1,250 to 1,309 across the study sites. These figures were used to determine teachers' hourly compensation rates at each site.

This method of calculating compensation rates was applied to every staff position involved in the TI program, from superintendents to classified instructors. To better understand the calculations performed, consider a hypothetical district that paid teachers an average salary of $50,000 in 2014–15. If the benefit ratio for that position and district in this year was 40%, then the total compensation rate for the teacher would be $70,000. The prices from the 2014–15 school year were then multiplied by the local inflation rate to be reported in 2015 dollars. For example, if the inflation rate for this district was 1.03, it would bring the compensation rate for teachers in the 2014–15 school year to $72,100 in 2015 dollars. To adjust for regional personnel price differences, the compensation rate was then divided by the CWI. For example, if the CWI for the hypothetical district were 1.1 (i.e., it was 10% more costly on average to hire and retain staff), then the regionally *and* inflation-adjusted 2014–15 compensation rate for teachers in the district would be $65,545 a year in 2015–16 dollars (equal to $72,100 divided by 1.1). The overall salary was then divided by the number of hours a teacher works in the year (e.g., 1,250) to produce an hourly wage of $52.44 in regionally adjusted 2015 dollars.

Prices for materials and equipment were collected in two ways. In some cases, staff shared exact prices in their survey and interview responses. For example, prices for professional development (e.g., "tuition") and specific software subscriptions were explicitly reported by some study participants. In contrast, prices for materials and equipment were collected from national online retailers. Using the specifications described during data collection (e.g., functionality of the equipment, description of materials), the closest item match possible was found, and its respective unit price was entered into the RCM as part of the data collection process. Prices for materials and equipment were obtained in 2019 for non-personnel items that were used in the 2014–15 and 2015–16 school years. This is important to

[14] The inflation factors used to convert staffing costs into 2015 dollars come from the U.S. Bureau of Labor Statistics Occupational Employment Statistics (OES) Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates for Education, Training and Library Occupations (Standard Occupation Code: 25000) for the specific regional areas of work in Kentucky in which our study sites were located (see https://www.bls.gov/oes/).

[15] For access to the CWI data and corresponding documentation, visit https://bush.tamu.edu/research/faculty/Taylor_CWI/.

consider when assigning accurate prices to resources used in a program. Inflation rates were used to adjust the prices found in 2019 to 2015 dollars before including the costs in the main analysis.[16]

The prices of facilities used by the programs came from the *CostOut Toolkit* database developed by the Center for Benefit-Cost Studies in Education at Teachers College, Columbia University. The toolkit compiles national construction and maintenance information to provide a comprehensive database of facility prices. This source was used to identify the prices of classrooms and computer labs, the two types of facilities reported in our data collection. Price calculations used an average classroom size (750 square feet, according to KDE) and a fully equipped computer lab design (as described in the Data Collection section) to assign prices for facilities. Like all other resources, facility prices were adjusted for inflation to reflect 2015 dollars.

2.3 Calculating Costs

Resource specifications were collected separately for the English language arts (ELA) and mathematics intervention services provided at each site. In addition, the RCM separated the specification and pricing information across resource and activity types. The costs of personnel time were calculated by multiplying the amount of time devoted to the various program activities and the hourly compensation rate for each respective position type.

The costs of materials, equipment, and facilities required specialized calculations to ensure the appropriate value for each resource was achieved. The current cost analysis captures the annual value of several types of resources that are used over multiple years. Because these resources are not fully consumed in the year they are procured, it would be inappropriate to incur their full cost in the initial year in which they are acquired. Instead, the costs associated with materials and equipment were amortized across the respective product life spans to provide an annual cost for each year they are expected to be used.[17] For example, the analysis assumed the useful life of a computer was 5 years, over which period its cost was amortized. Similarly, facility costs were amortized across a 50-year life span.

The final step in the cost calculations was to put the total TI program costs of ELA and mathematics intervention services at each school site into per-student terms. This was done by dividing the total intervention costs for ELA and mathematics, respectively, by the number of students who were enrolled in these types of interventions at each site.[18] The calculated intervention costs are reported in the next section as a total cost per student of the TI program, by resource type, and by activity type. In addition, costs are reported in the context of average per-student spending in the focus districts.

[16] Adjustments of the current (2019) prices for non-personnel resources to the 2 study years (2014–15 and 2015–16) were performed using the U.S. Bureau of Labor Statistics Consumer Price Index for Urban Consumers (series ID: CUUR0000SA0), available for download from https://data.bls.gov/PDQWeb/cu.
[17] The costs of all non-personnel resources were calculated using a 3.5% discount rate to account for depreciation of each asset over time. For more detail on calculating annualized costs of non-personnel resources see pages 89-90 from (Levin et al, 2018).
[18] The numbers of students taking ELA and mathematics interventions were measured using the counts who failed to meet the state benchmark thresholds on the ACT English/reading and mathematics assessments, respectively.

2.4 Study Limitations

The methods, data, and subsequent study findings provide prospective policy adopters and education practitioners with practical information about how the Kentucky TI program was implemented and the associated costs. However, to help put the findings in context, readers should be aware of some limitations of the study. The following section lays out these limitations and provides a lens through which future planned cost analysis of similar interventions can be viewed.

The study team employed rigorous methods in an effort to ensure that results accurately represent intervention implementation and associated costs of the TI program in the sample of participating districts/schools that varied with respect to incidence of FRPL and locale. However, the limited size of the sample, as well as the number of districts that participated and provided the required information for our analysis, greatly restricted our ability to generalize the findings across the state. Specifically, our analysis sample did not include schools from 6 of the 12 targeted locale/FRPL tercile stratum and therefore lacks representation.[19] Districts and schools outside our analysis sample may have used a different mixture of intervention types than were captured in this study. In turn, the costs associated with those models are therefore also absent in the study results. An understanding of a wider variety of intervention models would allow for cost estimates that are more representative of what was implemented across the state. The small sample size also restricts our ability to make definitive claims regarding the relationship between implementation decisions driving costs (e.g., interventions delivered in a traditional classroom setting, computer-based learning, or a blended approach) and district characteristics (e.g., district wealth, historic student achievement, district size).

Determining the *incremental* cost of implementing the TI program (i.e., the cost above and beyond what would have been spent in lieu of the program) also proved to be difficult. The TI program was a statewide policy implemented in every school district in Kentucky with no districts, other than those in which all students met the ACT benchmark scores, continuing with their "business as usual" programming. Without comparison districts in the state, it is difficult to understand how TI program intervention services affected existing programming in the schools. For example, on the one hand, intervention services may have crowded out other educational programming that students otherwise would have taken. On the other, TI program services may have been introduced as an additional component to students' existing educational programming. The presence of non-TI program comparison districts and schools would have allowed for a better understanding of how the treatment and control groups differed. However, this particular policy which prescribed implementation in all districts/schools statewide made it impossible to observe business-as-usual schools alongside treatment schools during the same time frame.

Future related research in other states would benefit from strategically phased implementation that allows for accurate district comparisons between schools receiving the treatment and comparison schools continuing with business-as-usual programming. Another potential solution for a lack of comparison districts would be to conduct a thorough cost analysis of the academic programming for students *not* receiving TI program services and compare this to spending on TI program services. Unfortunately, extending this analysis to investigate the costs of non-TI program services was outside the scope of this study. However, the calculated TI-program costs presented in the next chapter still

[19] The representativeness of the sample was particularly lacking with respect to schools located in districts with relatively low incidences of FRPL (see Exhibit 4).

provide useful information. Specifically, they represent an upper bound of the program costs under the assumption that TI services were provided on top of the existing educational programming. This would be the case if implementing the TI program did not displace existing programming for any students (students who were referred to an intervention and those who met the ACT benchmark scores).

3. Results

The results presented in this chapter include findings from both qualitative and quantitative analyses. The qualitative results describe how implementation of the TI program varied across the study sites, which were given significant flexibility with respect to program design and delivery of intervention services. The quantitative findings illustrate the subsequent costs associated with the implementation decisions of each district. In turn, the qualitative results provide important context with which to interpret the quantitative findings.

3.1 Qualitative Descriptions of TI Program

Implementation information was used to identify resources and calculate costs in a quantitative fashion. However, in-depth qualitative information collected as part of the interviews is used in this section to describe what occurred at the school level. The following provides an overview of the TI program as it was implemented in the study sites, based on information gathered from the interviews with school and district staff. It first describes common, general programmatic features of the TI program (i.e., initial planning meetings, referrals, monitoring, and professional development). This is followed by specific descriptions of the TI program intervention models implemented across the sites. This includes how the intervention services were delivered (i.e., traditional classroom setting, computer-based learning, or a blended approach) and during what times services were provided (i.e., during the regular school day versus after school). The narrative highlights the programmatic variation across sites and builds context for the presentation of the quantitative cost results that follow.

3.1.1 General Programmatic Features

Implementation of the TI program at each site began with initial planning leading up to the start of the school year. Districts also created referral procedures for students in need of intervention services along with protocols for monitoring student progress. In addition, various types of professional development to support implementation were used across the study sites. The following section provides descriptions of these general programmatic features.

Initial Planning

As is the case with any intervention, initial planning was necessary to design and implement the TI program. Schools and districts had varying approaches for the planning process, though there were several commonalities across sites. Teachers and administrators met as part of their professional learning communities (PLCs) to design the intervention at most study sites. The PLC structure was used for planning regardless of the mode of eventual intervention service delivery (i.e., off-the-shelf-curriculum, software package, teacher-designed curriculum, or a combination of modes). Guidance counselors and assistant principals were often involved in the initial planning process, while principal involvement was more supervisory in nature.

Most school districts reported that they were available to support schools in the TI program design process. However, the level of support provided by districts and desired by schools varied. Half of the participating districts described themselves as having an active role in the planning process, while the other half explained that most planning decisions were left to school discretion.

During the initial planning stages, most sites offered teachers professional development opportunities in preparation for implementation. For one site, this included attending a conference to learn about how to design and implement the TI program. For other sites, professional development focused on building the capacity of teachers and staff to effectively use newly purchased software packages intended to be a component of the TI program. Two schools reported securing a contract with a software company to facilitate face-to-face training sessions about specific software programs.

Referring Students

Each district had to define a referral process to identify and place students in the appropriate intervention(s). Most sites followed the recommended TI program regulations by using the state-sanctioned assessment (i.e., the ACT suite of assessments) as the sole indicator to refer students to the intervention program. However, one school in this sample leveraged its local autonomy to use end-of-course assessments as the TI program indicator instead of the ACT. Regardless of the mechanism for triggering a referral, schools held the primary responsibility of referring students who required additional supports and met the eligibility requirements set forth by the district.

All schools in the sample followed district-specific guidelines for referring students to the TI program. However, there was variation across districts in how this process was implemented. The majority of districts reported working closely with school-level personnel to gather student data. This collaboration included content-area teachers, special educators, and guidance counselors. Data included ACT scores and subject specific performance data that guided the referral and intervention planning processes. District involvement also included discussions with school administrators about specific students using existing data and teacher familiarity with students to inform the referral process. In one site, school administrators created a team dedicated to processing the referrals for the entire senior class. This team was tasked with identifying eligible students and discussing relevant data on ELA and mathematics achievement to inform the subsequent intervention programmatic decisions for each student.

Monitoring Student Progress

Monitoring procedures often took the form of scheduled meetings among staff members, including teachers, administrators, and district-level personnel. Most districts left tracking and monitoring responsibilities to the school. However, in one school, the district staff met weekly with the school principal to discuss the intervention process and how students were progressing within the TI program. School-based monitoring meetings varied in length and frequency. One high school reported that a 3-hour team meeting was held each month to discuss student progress, while another met for 1 hour each week. Regularly scheduled teacher PLC meetings were also a vehicle for monitoring student progress and determining necessary program revisions to better support students. One site used summer working days and held daylong meetings among administrators to discuss student progress and make plans for the following year.

School-based monitoring required a variety of resources, including teacher time and software programs. Although one school used Google Docs to track individual student programs and progress, the majority of sites relied on other software solutions. For example, schools that used software packages to deliver the bulk of the intervention services relied on those programs to track student progress. These software programs automatically collected performance data and, in many cases, provided a report of student progress. Infinite Campus, a product used to collect and organize student data and selected in 2006 by

KDE as the statewide student information system, was also widely used to document student progress and intervention service attendance.

Professional Development

The majority of sample sites reported school and/or district requirements to participate in professional development opportunities as a precursor to implementing the TI program. These opportunities varied from longer, formal sessions to shorter and more informal trainings. For example, one site held formal professional development sessions during the summer prior to implementing the TI program. During these sessions, the superintendent met with principals and other administrators at the school to discuss how students would be identified, referred, and monitored throughout the TI program process. In another school, TI program implementation included in-house informal training sessions for all teachers about how implementation would occur. In all sites, both formal and informal training opportunities were part of the planning process for the TI program.

Professional development opportunities also gave teachers the information and support they needed to provide effective intervention services using the school-determined mode. As will be described later, some schools decided that additional software programs were the best way to meet students' needs. In those instances, teachers required training on how to use and maximize the functionality of recently purchased software programs. This involved mandatory professional development events that focused on familiarizing teachers with the software functionality and the associated data analysis available to support student progress. Across the study schools, these types of training sessions were reported to take anywhere from a total of 1 to 18 hours.

3.1.2 Descriptions of Interventions

Information gathered through staff interviews and surveys shows that the types of intervention services varied across study sites, ranging from more traditional, teacher-led classroom instruction to computer-based activities to tutoring support. The day-to-day implementation of the TI program also took on varying forms across the sites. While some schools provided intervention services within existing required courses, others used an altered class schedule or after-school opportunities to serve students. In addition, the interviews and surveys captured information on various challenges faced implementing the TI program. The following section describes variation in implementation across the sites and associated challenges that were reported.

Intervention Types

Schools chose the types of interventions they felt best fit the needs of their students. These choices were also shaped by district and school capacity along with other logistical considerations (e.g., scheduling, resources). Some schools opted to embed the intervention programs into existing ELA or mathematics classes. This meant that students received intervention services within their required coursework and potentially alongside students who were not enrolled in the TI program. Other schools designed stand-alone TI classes that focused on serving only students in need of intervention services, as identified through the referral process. In both the embedded and stand-alone course models, students were considered to have demonstrated mastery and fulfilled the requirement of the TI program once they completed the assigned course. Many schools with the stand-alone courses also gave students the option of exiting the TI course before its conclusion by "testing out." Most often, this meant that a student had to score above a certain benchmark on an assessment taken through the Kentucky Online

Testing (KYOTE) service. Another option was for a student to pass an assessment that was included in the school's purchased software package used to deliver the intervention services.

Computer-based software programs were used as a mode of service delivery for the TI program implemented in five of the study schools. The rationale provided by schools for using these programs was that they allowed for individualized tailoring of instructional support. These programs were used for both classroom activities and homework. The software programs were also used to track progress, analyze performance data, and administer assessments to check for content mastery and inform instructional decisions. Most schools used educational software for at least a portion of their TI program offerings, and some schools used software packages as the main component of their intervention programs. In these cases, the intervention required students to work on individual computers. Site staff explained that students often worked through the software program material in a school computer lab with the guidance and support of a staff member. The aim of the software programs was to provide each student with individualized educational experiences. In addition, software programs were reported to be adaptive in nature and responded to student performance with appropriately challenging material. Participants explained that the functionality of these types of programs enabled teachers to meet the needs of students with differing abilities while also preparing students for standardized test-taking platforms. Software packages were used for both ELA and mathematics interventions and included Reading Plus, DreamBox, IXL, Study Island, Plato, Edgenuity, and ALEKS.

Implementation of TI Services

The type of staff allocated to deliver intervention services was determined by the programmatic structure in each school. This often included a full time-equivalent, certified teacher for each core subject content area (e.g., English and mathematics). These teachers focused on providing intervention services for students enrolled in the TI program, but may have performed other non-program duties as well. Depending on the service delivery structure in each school, these dedicated teachers either were the primary instructor for content-specific courses or oversaw and supported the use of computer software programs. Teachers also spent time in PLCs or other collaborative environments to develop the curriculum and make necessary programmatic and instructional changes to meet students' evolving needs.

Although the allocation of full-time, certified teachers was the most common service delivery structure across all sampled sites, one school stood out in its instructional staffing choices for the TI program. This school relied predominately on classified (hourly) staff to provide instruction for students in the TI program. Classified staff are generally less expensive to employ based on the terms of employment and required qualifications. The primary mode of intervention service delivery for this particular school consisted of an off-the-shelf software solution and curriculum programs, with a classified staff member facilitating sessions. In addition, this school provided all the intervention services within the confines of the school computer lab. Aside from this single outlier, all schools utilized full-time, certified instructors to deliver instructional services in a variety of modes.

Logistical management of program implementation varied across schools as a function of school structure, staff capacity, and student needs. One site reported that a majority of the senior class fell short of the required benchmarks in a single year. As a result, nearly every student in that senior class qualified for some type of TI-related intervention delivered either during the regular school day or as after-school programming. This school created a unique service delivery model to meet the needs of the

struggling seniors, as well as a majority of the overall school population. Each month, teachers identified struggling students and grouped them based on skill strengths and deficits. Students were then excused from their typical classes for most of a single day, enabling them to attend approximately 5 hours of TI intervention-focused instruction and coursework. This deviation from the typical school day occurred several times during the year for all students who required intervention services.

An additional component of this school's TI program structure was an after-school tutoring program open to all students. Although the tutoring program was not required, students who were eligible for the TI program were strongly encouraged to attend. Each week of the school year, teachers offered specialized classes designed for small-group instruction. The after-school sessions focused on building specific skills that teachers felt students needed. In this unique school setting, all interventions—both those offered during regular school hours and those offered during after-school programs—were designed by certified teachers. Software packages were only occasionally used to enhance teaching, based on students' needs and teacher instructional style.

Challenges

At the start of implementation, many sites faced difficulties integrating the TI program into the pre-existing school culture. In some cases, interviewees described difficulty generating buy-in from teachers and other staff members, as well as from students and families. These sites had trouble making teachers feel they had an adequate voice in the curriculum design process and other decisions. There were also occasional concerns about interventions relying too heavily on software programs for instruction. However, these challenges were not insurmountable. Two schools reported that they persuaded initially reluctant teachers, parents, and students by engaging stakeholders in revising the intervention process. Over the course of the first year, this type of collaboration built acceptance and support for the program. Staff at one school explained that after the conclusion of the TI program mandate, they revisited their model and made important adjustments. While the school kept its current software, they decided to de-emphasize the software's prominence in the TI program and instead enable teachers to integrate it into their own intervention curricula as they saw fit. Through that process, the school was able to re-engage teachers delivering intervention services.

With newly required educational programs, there are often concerns about adequate resources to meet requirements while continuing with existing initiatives. In our study sample, staff at two sites voiced concerns related specifically to the TI program and their available budget. Participants at these sites explained that they did not feel their budgets were sufficient to purchase adequate materials and allocate personnel to the TI program. They felt these costs could not be absorbed into their existing budget structure. As a result, some of these schools decided to embed the TI program services into existing courses. Other schools experiencing similar concerns felt forced to cut some existing classes to free up resources for stand-alone TI program courses. Aside from budgetary constraints, schools reported concerns about the logistical burden of the program. Specifically, some schools found it challenging to fit the TI program into the existing high school student schedules. At times, there were competing priorities for students to fit coursework and intervention programming into the school day.

Implementation information is important to understand for educational policies, especially those that allow for local decision making. like the TI program. The information provided in this section gives policymakers an understanding of how the study sites implemented the TI program along with

challenges they faced. While there likely was more implementation variation across the state, this sample illustrates how some districts and schools actualized the TI program policy required by the state. This information also provides context for the variation in the quantitative results described in the next section, in which the calculated costs of TI program intervention services are reported. These calculated intervention costs are described in a variety of ways. First, we provide the overall costs per student of ELA and mathematics interventions for each school in the cost study sample and as an average across all the sites. Next, we present the average intervention costs per student across the school sites by resource type (i.e., personnel, materials/equipment, facilities, tuition). Finally, we report average intervention costs per student by activity category (administration, instruction, monitoring, professional development, and referrals). Lastly, we present the calculated intervention costs for each site in the context of overall spending.

3.2 Costs of the TI Program

This section describes the results from the quantitative cost analysis. First, the overall per-student costs of the ELA and mathematics interventions offered under the TI program are provided for each study school and as averages across the study sample. Next, these costs are broken out by resource type (i.e., facilities, materials/equipment, personnel, and tuition) and activity (i.e., administration, instruction, monitoring, professional development, and referral), respectively. Finally, the costs of the TI program are put into the context of the overall spending across the study sites.

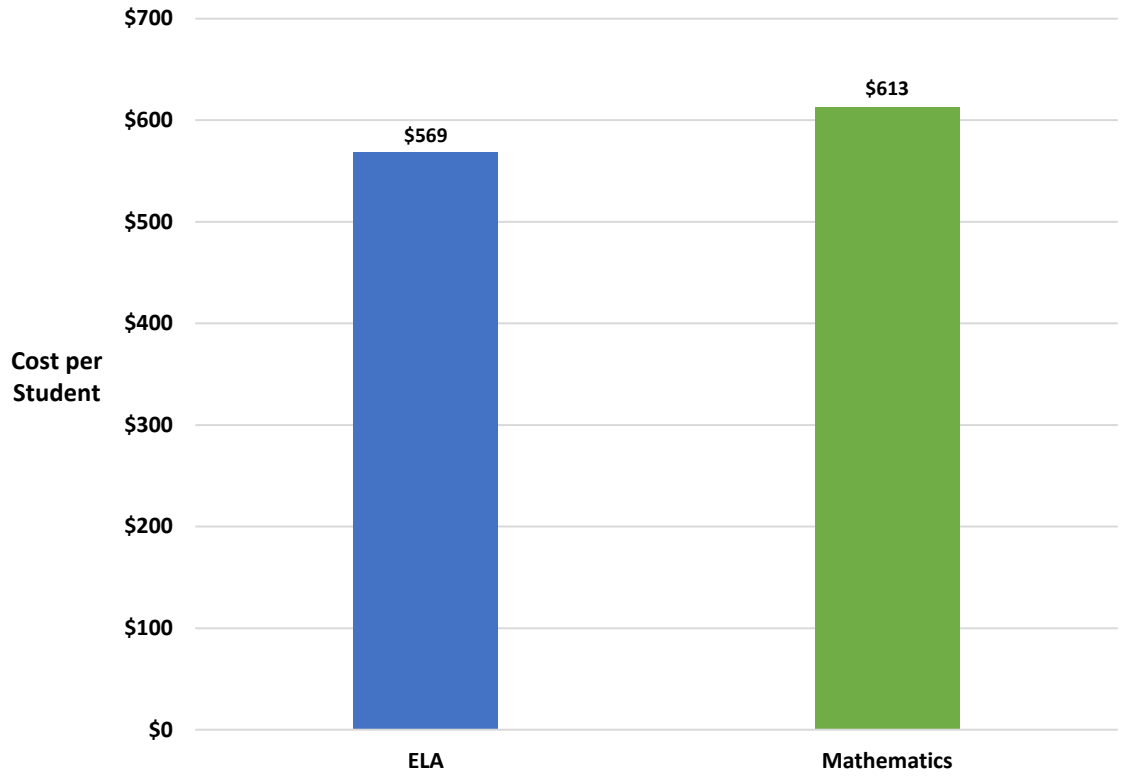
3.2.1 Overall Costs

Our analysis draws upon the data on costs derived from the quantities and prices captured through data collection and organized in the RCM. In our analysis, we calculated costs for each individual resource reported by respondents as being used in the implementation of their respective ELA and mathematics interventions in the 2014–15 and 2015–16 school years. Information was then aggregated within the sites to arrive at the overall school-specific costs of the TI program for each of the 2 study years. Next, the costs for the first study year (2014–15) were adjusted for inflation to represent 2015 dollars. All costs were then regionally adjusted to account for differences in the cost of hiring and retaining staff across the different regional labor markets in the state in which sample sites are located. Finally, the overall costs of the ELA and mathematics interventions for each school and study year were put into per-student terms by dividing by the total number of students who did not make the benchmark cutoff scores on the relevant ACT assessment (and therefore would have been referred to a *targeted intervention*).

Exhibit 5 presents the average per-student costs of the ELA and mathematics interventions that were implemented across the six study schools over the 2-year study period.[20] The average per-student cost of the ELA interventions implemented across the school sample over the 2-year study period was $569, while the corresponding cost of the mathematics interventions was $613.

[20] Specifically, the figures represent the pupil-weighted average costs per student of the ELA and mathematics interventions across the study schools.

Exhibit 5. Average per-Student Costs of ELA and Mathematics Interventions Implemented Under the Kentucky TI Program Across Study Schools Over the Study Period (in 2015 Dollars)



The findings show a broad range of costs associated with interventions across the sample sites. Exhibits 6 and 7 provide an overview of how the average per-student costs of ELA and mathematics interventions delivered under the TI program over the study period varied across the study schools. As the exhibits illustrate, the average cost per student participating in an ELA intervention ranged from $123 to $1,228, while for mathematics the range was $110 to $1,076. The yellow columns represent the per-student average costs across the study schools previously presented in Exhibit 5.

As described in the preceding section, the types of interventions and the manner in which they were implemented varied across sites. This variation may account for the wide range of calculated costs across schools. However, other factors also may have driven the cost differences, such as the numbers of students who received TI program services (listed under the site labels in the exhibits that follow), which ranged on average across the school sites over the 2-year study period from 85 to 274 for ELA and from 95 to 277 for mathematics. This diseconomies-of-scale explanation (i.e., the fact that districts/schools operating at a smaller scale tend to have higher per-student costs due to a smaller number of students over which costs associated with fixed inputs can be spread) may help explain the high costs per student calculated for Site A, which served the smallest number of students of all the study schools. However, we would expect to also see upward pressure on the per-student costs for Site E, which served the second smallest number of students. Instead, Site E shows the lowest per-student costs. This latter result can be explained by the staffing decisions made in Site E, whereby far less expensive, classified (hourly) staff were used exclusively to deliver instruction.

Exhibit 6. Average per-Student Costs of ELA Interventions Implemented Under the Kentucky TI Program Across Study Schools Over the Study Years (in 2015 Dollars)

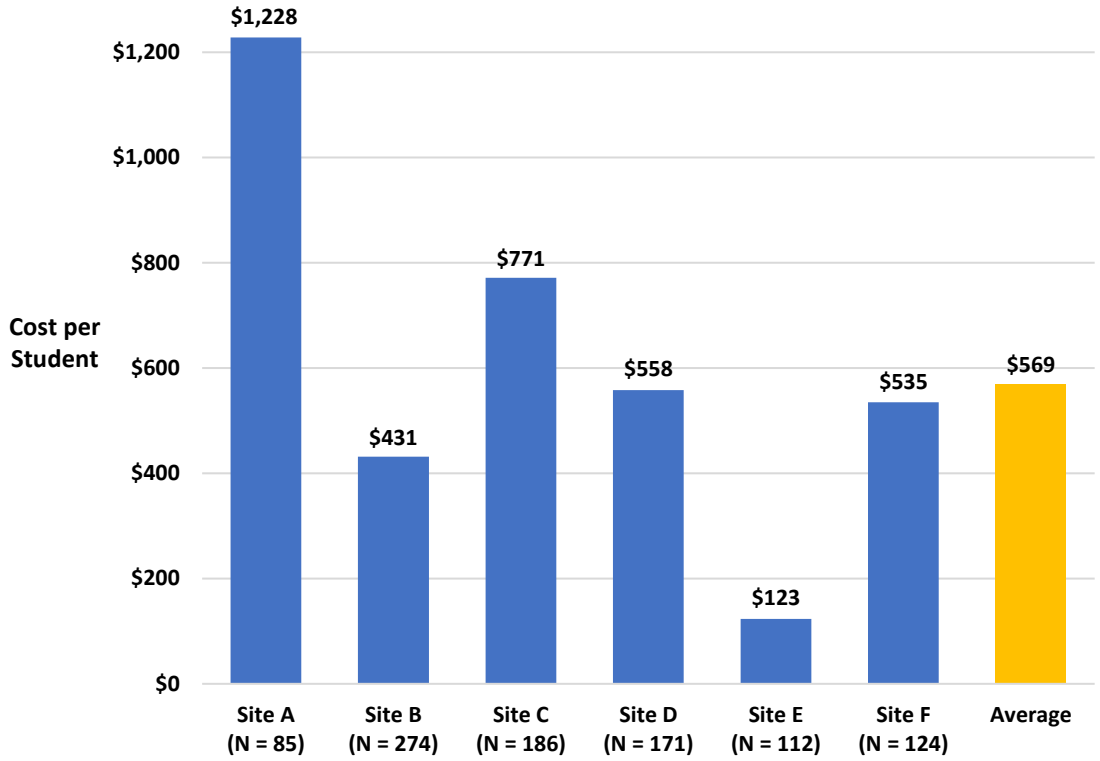
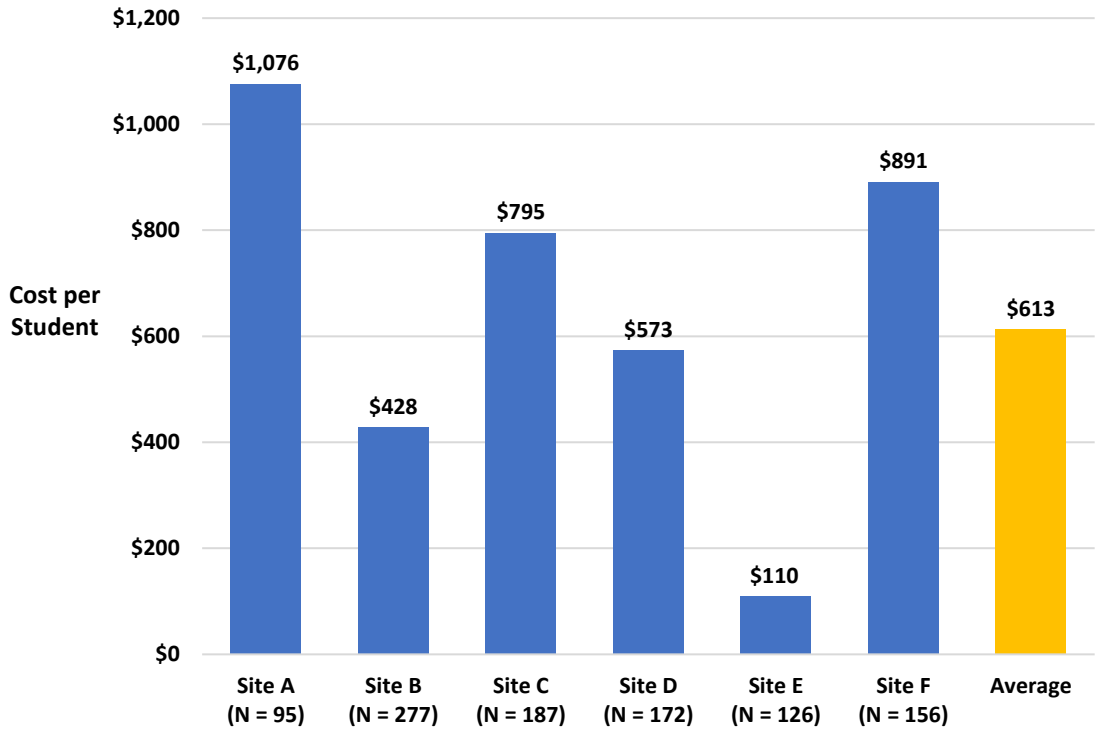


Exhibit 7. Average per-Student Costs of Mathematics Interventions Implemented Under the Kentucky TI Program Across Study Schools Over the Study Years (in 2015 Dollars)



In order to provide additional context to the average per-student costs presented above the study team developed indicators denoting when the intervention took place (*timing*) and how it was delivered (*structure*) using the reported descriptions of the interventions offered at each sample site. Specifically, *timing* indicates whether the intervention took place within versus outside the regular school day, while structure is categorized as computer-based, teacher-led or blended (a combination of computer-based and teacher-led). Exhibit 8 provides the structure and timing of the ELA and mathematics interventions implemented at each study school.

Virtually all of the schools delivered interventions in both subject areas in class periods within the regular school day. However, school C also reported delivering ELA and mathematics intervention services after school. Because there were no sites that delivered interventions solely outside of the regular school day it is impossible to draw associations between costs and implementation timing. There was more variation with respect to intervention structure. Specifically, four schools implemented computer-based interventions for ELA (schools A, B, D and E) and mathematics (schools A, B, E and F). Two schools implemented teacher-led interventions for ELA (schools C and F), with one of these also using a teacher-led intervention for math (school C). Finally, one school chose a blended approach for their mathematics intervention (school D).

Exhibit 8. Structure and Timing of ELA and Mathematics Interventions Implemented at Study Schools

Intervention Structure	Intervention Timing			
	ELA		Math	
	Within Regular School Day	Outside Regular School Day	Within Regular School Day	Outside Regular School Day
Computer-Based	A, B, D, E		A, B, E, F	
Teacher-Led	C, F	C	C	C
Blended			D	

Exhibits 9 and 10 present the average per-student costs of the ELA and mathematics interventions implemented across the sample schools by intervention structure. As might be expected, across the sample schools the average cost per student of delivering both computer-based interventions for ELA and mathematics was less than for those that were teacher led by $160 and $224, respectively. In addition, the average per-student cost of delivering computer-based mathematics interventions was also less than for blended learning. However, we note that these results should be interpreted with caution due to the small numbers of schools upon which they are based and the fact that there are a variety of factors including implementation decisions and school characteristics potentially driving the costs that may not be associated with intervention structure.

Exhibit 9. Average per-Student Costs of ELA Interventions Implemented Under the Kentucky TI Program Over the Study Years by Intervention Structure (in 2015 Dollars)

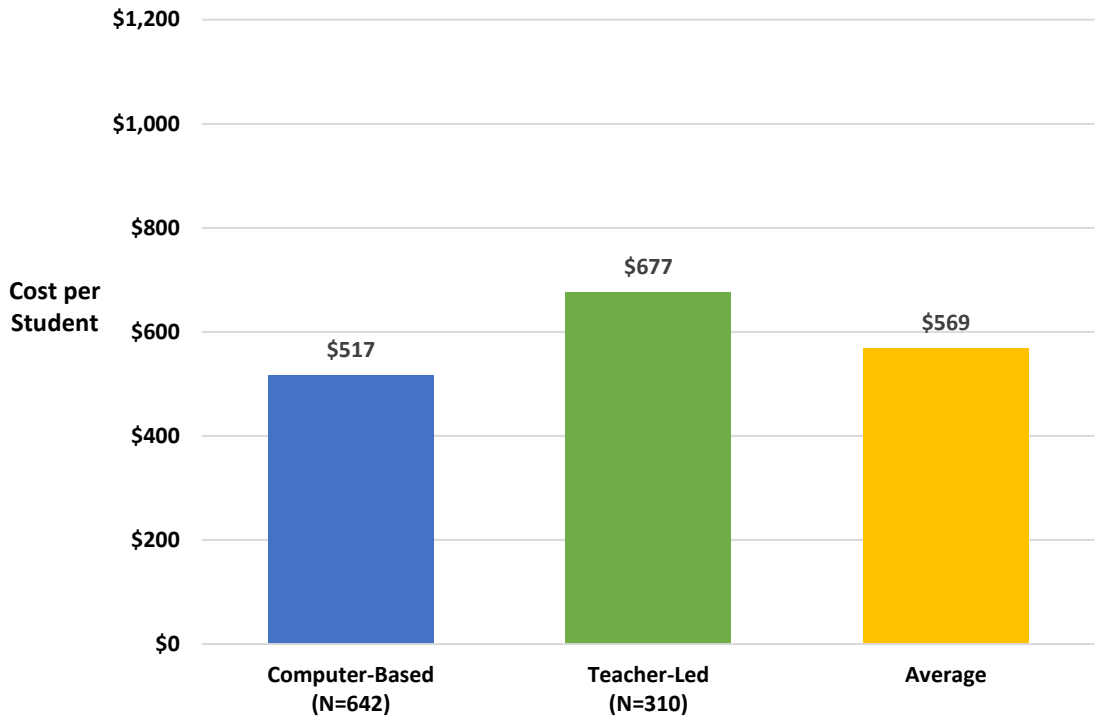
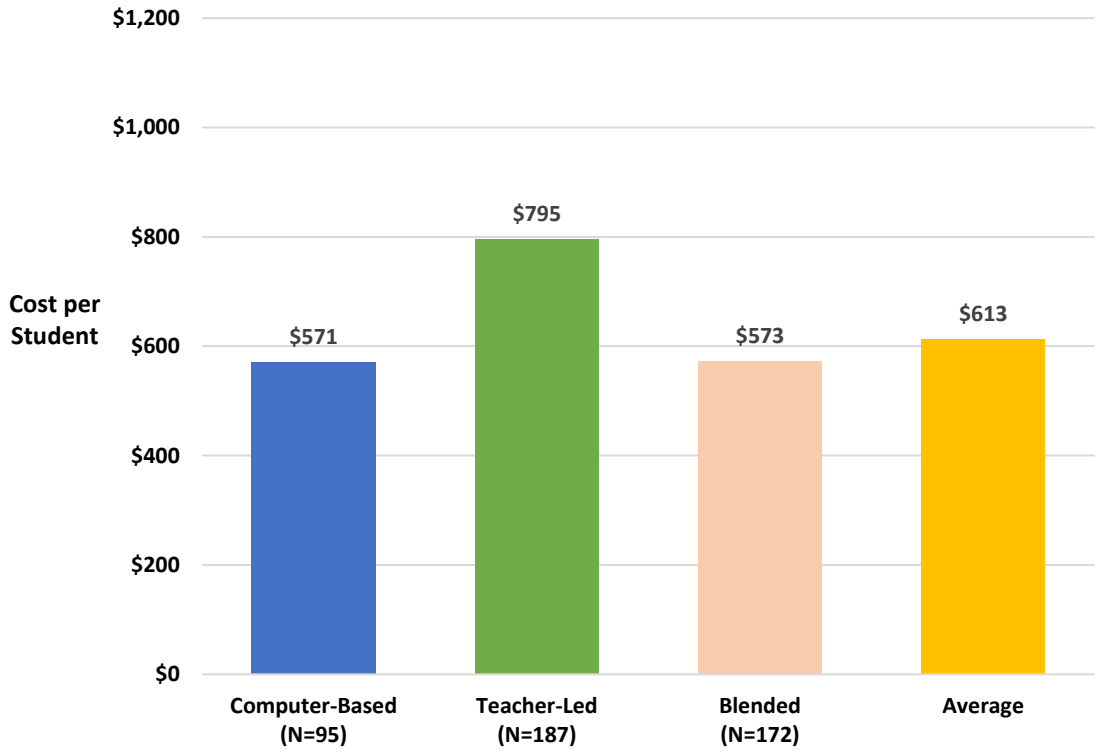


Exhibit 10. Average per-Student Costs of Mathematics Interventions Implemented Under the Kentucky TI Program Over the Study Years by Intervention Structure (in 2015 Dollars)



3.2.2 Costs by Resource Type

The data on resource costs were also organized by type across common categories of resources (personnel, materials/equipment, facilities, and tuition). Personnel resources were clearly a key driver of the overall costs of providing intervention services. Exhibit 11 shows the average breakdown of per-student cost for ELA TI program interventions by resource type across the school sites over the study period. On average, $532 per student, or 93% of the overall ELA intervention cost, went to personnel. The remaining $37 per student, on average, was spent on materials/equipment ($29), facilities ($5), and tuition ($3). Exhibit 12 shows the corresponding figures for mathematics interventions, which follow a similar pattern: $576 (94%) of the average per-student costs were devoted to personnel, while $38 per student was spent on the other resource types, with materials and equipment accounting for most ($31 or 5%) of this remaining cost. These findings align well with the intention of the program. Specifically, TI that meets the needs of individual students requires significant personnel effort for their development and implementation, which includes targeted student referrals, direct instruction, and subsequent monitoring of results.

Exhibit 11. Average per-Student Costs of ELA Interventions Implemented Under the Kentucky TI Program Across Study Schools Over the Study Period, by Resource Type (in 2015 Dollars)

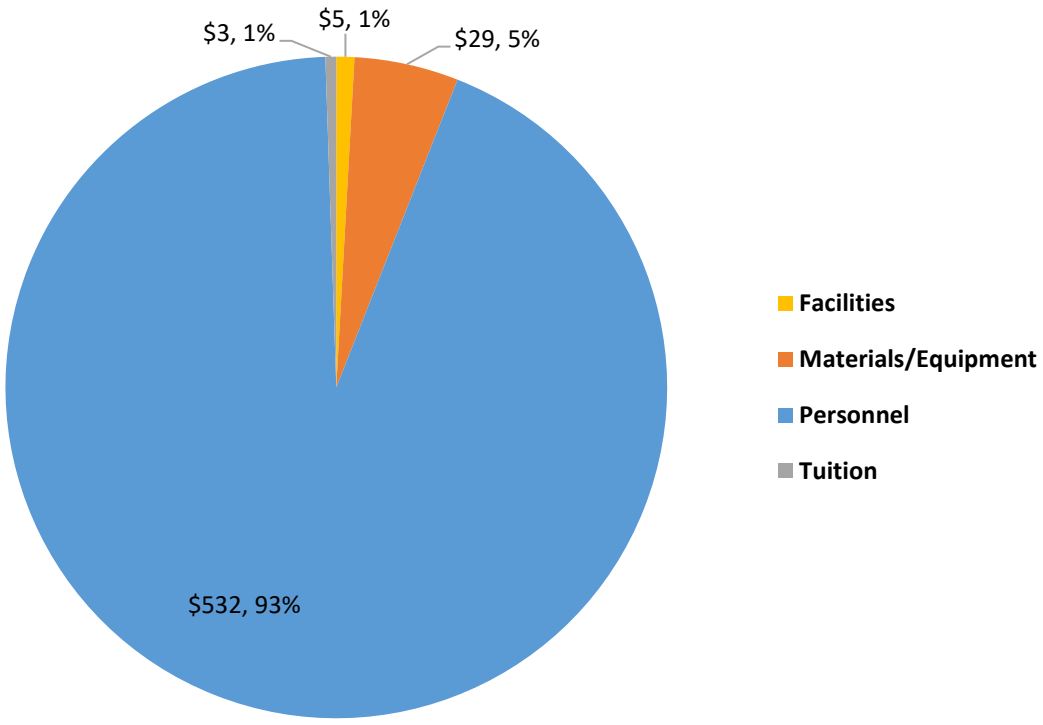
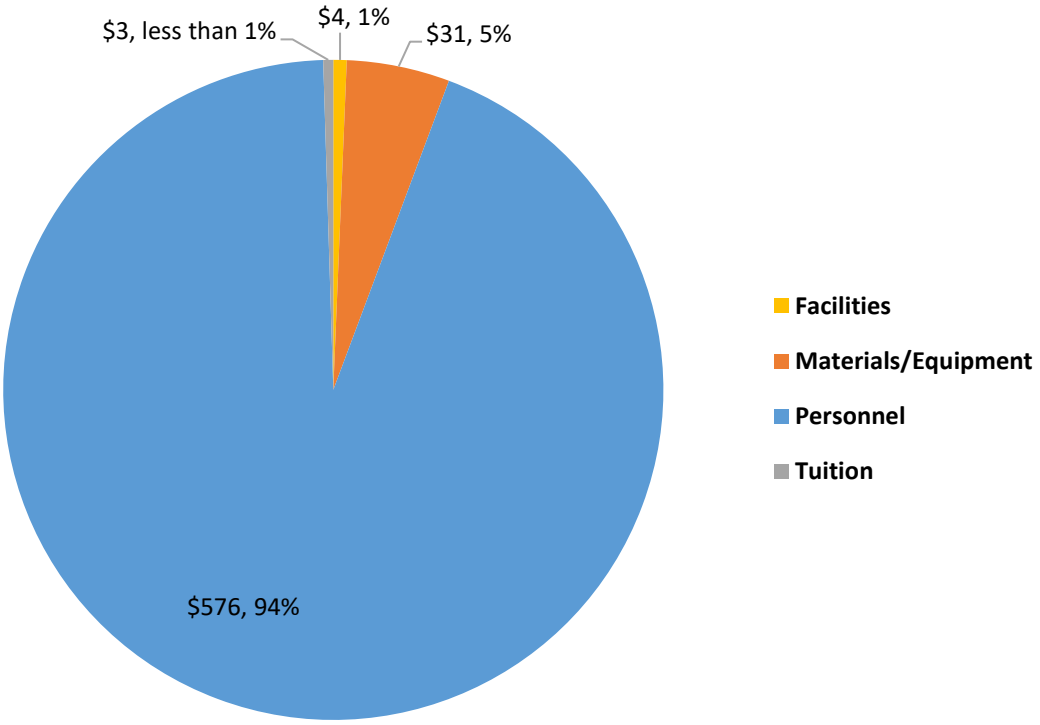
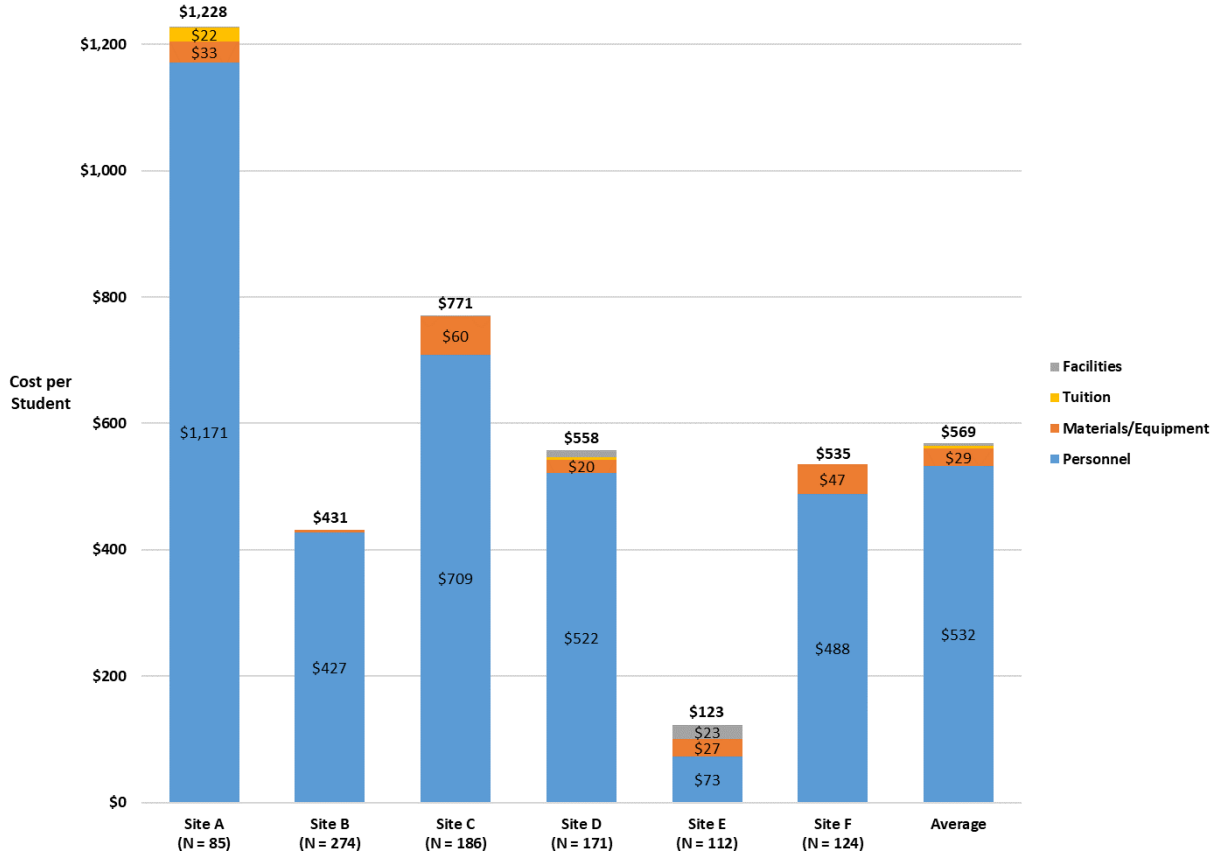


Exhibit 12. Average per-Student Costs of Mathematics Interventions Implemented Under the Kentucky TI Program Across Study Schools Over the Study Period, by Resource Type (in 2015 Dollars)



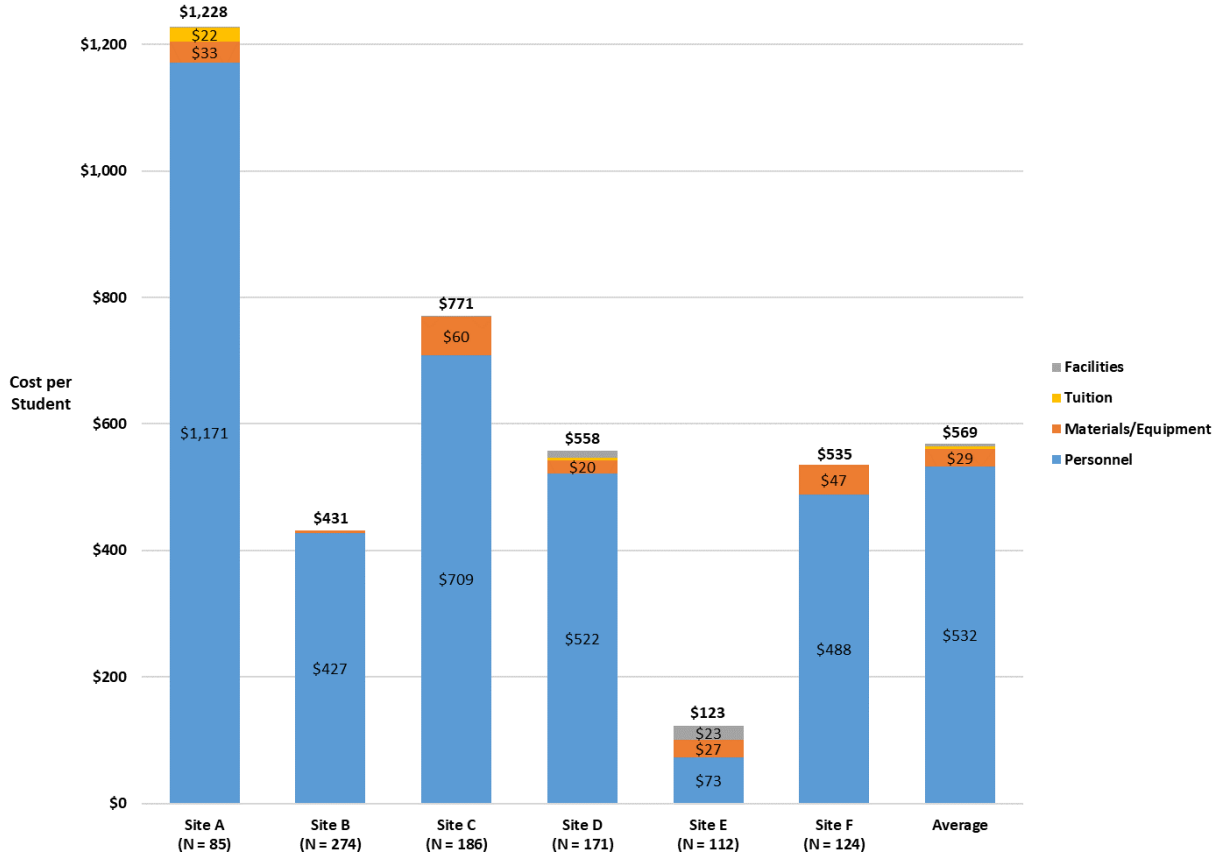
Exhibits 13 and 14 provide average cost breakouts by resource type of the ELA and mathematics interventions, respectively, over the study period on a school-by-school basis. As shown in the average cost figures presented above, a majority of the overall intervention costs were attributed to personnel. In five of the six study schools, personnel accounted for at least 91% of the cost of both the ELA and mathematics interventions, while personnel for the remaining school (Site E) accounted for 59% of these intervention costs.

Exhibit 13. Per-Student Costs of ELA Interventions Implemented Under the Kentucky TI Program Across Study Schools Over the Study Years, by Resource Type (in 2015 Dollars)



Note. The overall ELA intervention cost per student is shown in boldface. Labels for dollar values less than $20 are not shown.

Exhibit 14. Per-Student Costs of Mathematics Interventions Implemented Under the Kentucky TI Program Across Study Schools Over the Study Years, by Resource Type (in 2015 Dollars)



Note. The overall mathematics intervention cost per student is shown in boldface. Labels for dollar values less than $20 are not shown.

While we have seen that non-personnel costs made up a relatively small portion of the overall cost across all schools, it is important to note that they represent critical resource requirements for implementing the various interventions. The most universally used non-personnel resource was materials/equipment (e.g., textbooks, software licenses, etc.), which was reported by all study schools. Usage of facilities outside of the regular classroom (e.g., computer labs) and tuition for professional development were reported by two school sites (Sites D and E for facilities and Sites A and D for tuition). However, these two resource types often represented much smaller shares of intervention costs. In sum, for both ELA and mathematics interventions, the corresponding costs were predominantly attributable to personnel, although some non-personnel resources were reported, mostly in the form of materials/supplies.

3.2.3 Costs by Activity

The policy behind the TI program preserved local control by giving districts and schools the autonomy to select their intervention models and implement them with maximum latitude. While this flexibility enabled sites to tailor interventions to best meet the unique needs of their students, it posed a challenge to the systematic collection of resource data organized according to the ways in which resources are used. However, as data were collected and analyzed, several activity patterns began to

appear. The study team used these patterns to develop a common set of activities observed across all school sites. Specific tasks were then categorized into activity types to offer a more detailed account of resource usage and the associated costs. The activity categories discovered during data collection, as described in Exhibit 2, were implementation activities related to administration, instruction, monitoring, professional development, and referral. Thus, our analysis offers an additional lens through which to view costs that may be of interest to policymakers and practitioners. Gaining a better understanding of costs by activity category can inform future policy decisions that aim to provide an optimal balance of resource autonomy and accountability.

Exhibit 15 shows how ELA implementation costs were distributed, on average, across the five activity categories. As expected, the majority of costs associated with ELA interventions are attributable to instruction, which accounted for $466, or 82% of the overall per-student cost. This was followed by $42 per student, or 7% of the overall cost devoted to identifying and referring students to interventions, and $40, or 7% on monitoring student progress. The remainder of the costs were split between professional development activities ($15, 3%) and administration ($7, 1%). Exhibit 16 depicts the distribution of average mathematics intervention costs across the five activity categories. While we observed across activities a pattern of average resource allocation similar to that which emerged for ELA interventions, the cost share is slightly more heavily weighted toward instruction, which is offset by slightly smaller shares of cost devoted to monitoring, professional development, and referrals.

Exhibit 15. Average per-Student Costs of ELA Interventions Implemented Under the Kentucky TI Program Across Study Schools Over the Study Period, by Activity (in 2015 Dollars)

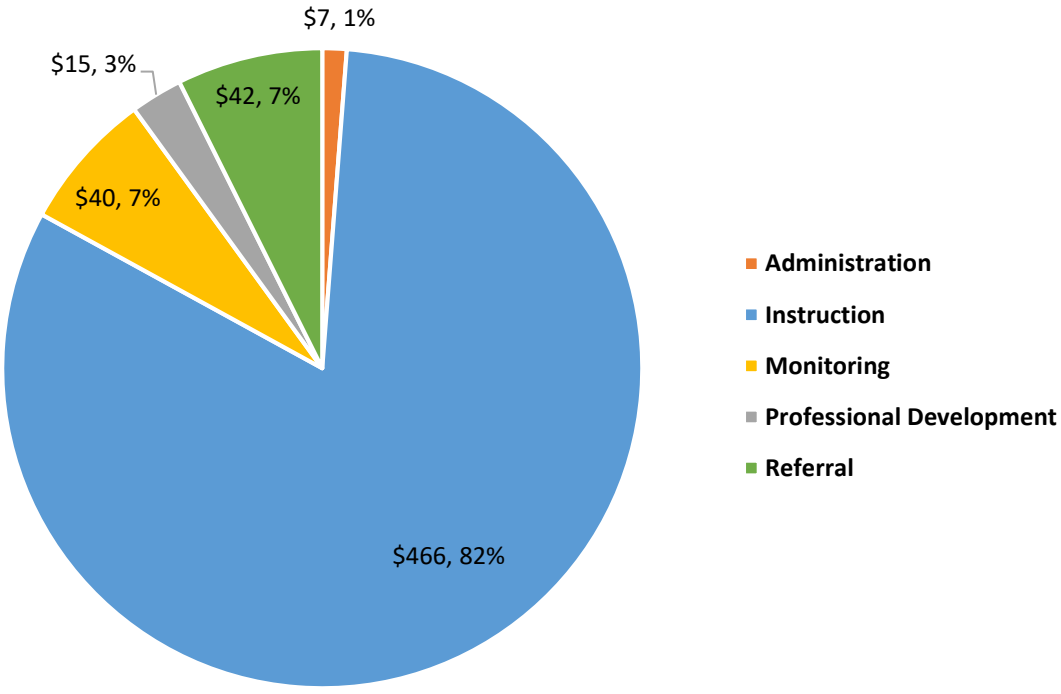
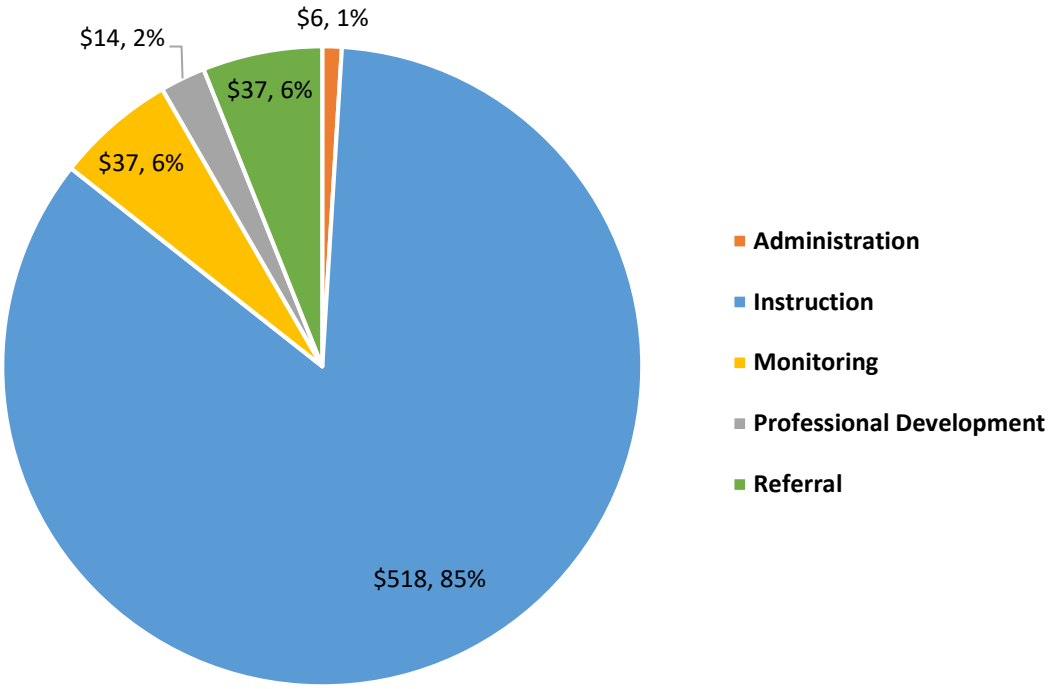


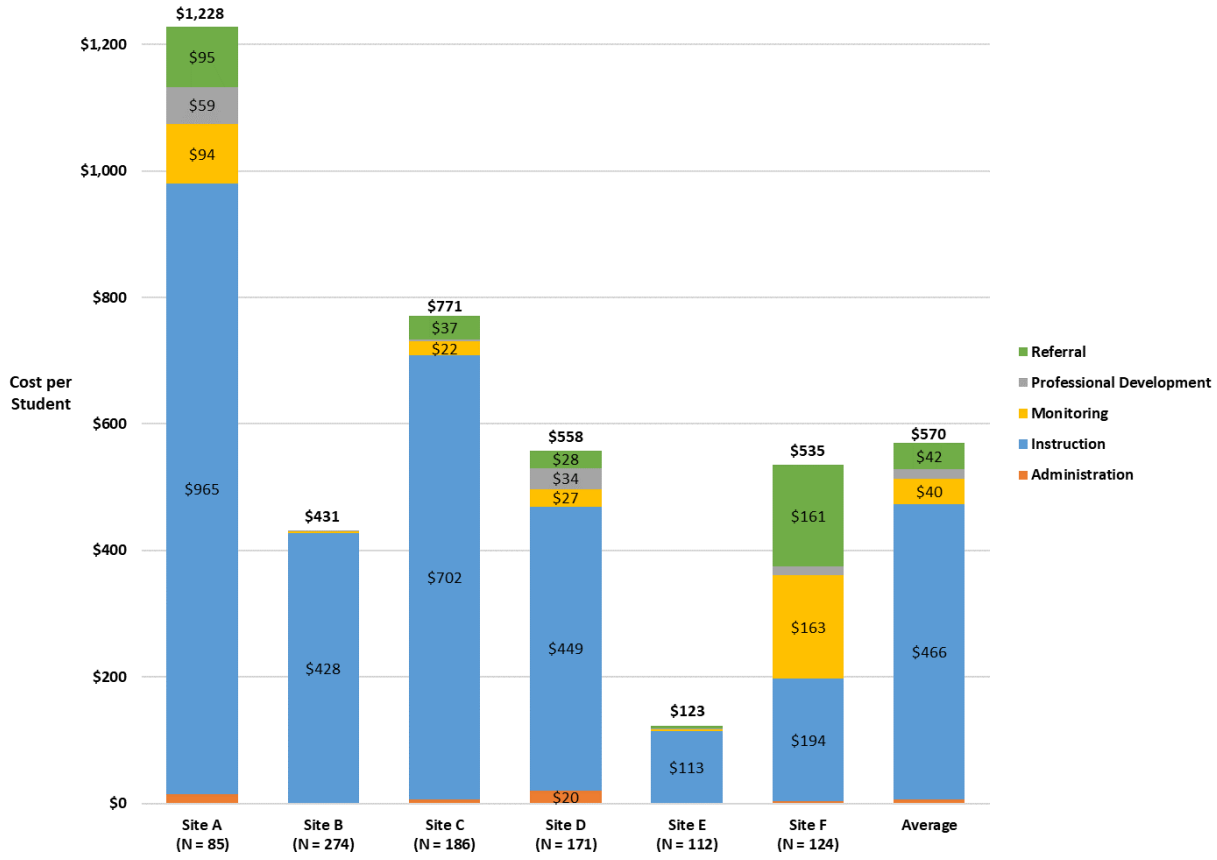
Exhibit 16. Average per-Student Costs of Mathematics Interventions Implemented Under the Kentucky TI Program Across Study Schools Over the Study Period, by Activity (in 2015 Dollars)



Exhibits 17 and 18 report the site-specific breakouts of ELA and mathematics intervention costs by activity, respectively. The variation in the patterns of cost by activity across the study schools is notable. For ELA, a majority of the cost for all but one site was attributable to instruction (Exhibit 15). Site F differed from other schools in this respect for two reasons. First, this site reported a significant amount of involvement on the part of school- and district-level staff both in referring students to interventions and in monitoring their progress. Second, Site F implemented its ELA intervention differently than other sites. Rather than offering a stand-alone class section or after-school session (strategies used by other sites), the site devoted about 20% of a regular English class period to ELA intervention instruction, which resulted a relatively small share of the intervention cost being attributable to instruction.

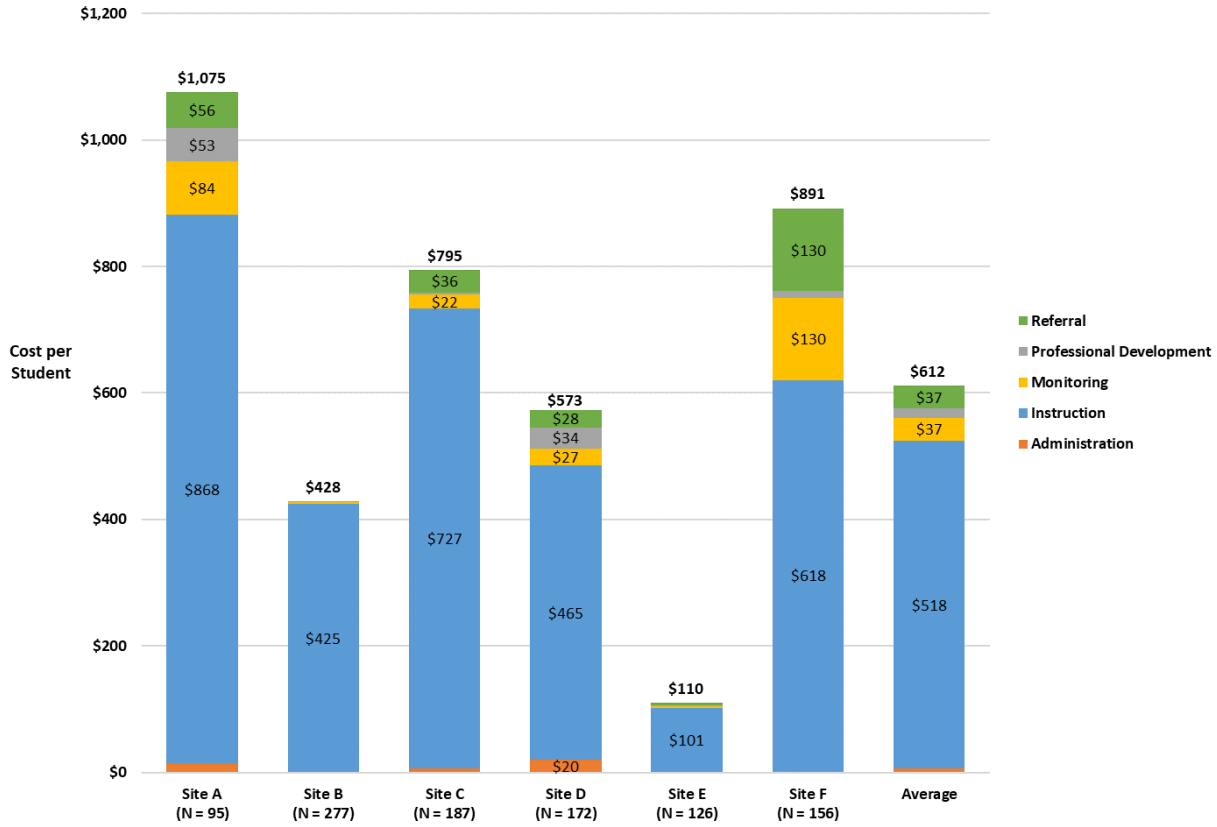
Three of the other sites (Sites A, C, and D) had more moderate costs for monitoring and referral, while very little of the intervention cost at two sites (Sites B and E) was attributable to these noninstructional activities. Fairly similar patterns of cost by activity category emerged for the mathematics interventions (Exhibit 16). Because Site F treated its mathematics intervention as a stand-alone course, the school spent significantly more on instruction for the mathematics intervention than on instruction for its ELA intervention.

Exhibit 17. Per-Student Costs of ELA Interventions Implemented Under the Kentucky TI Program Across Study Schools Over the Study Years, by Resource Activity (in 2015 Dollars)



Note. Overall ELA intervention cost per student is shown in boldface. Labels for dollar values less than $20 are not shown.

Exhibit 18. Per-Student Costs of Mathematics Interventions Implemented Under the Kentucky TI Program Across Study Schools Over the Study Years, by Resource Activity (in 2015 Dollars)



Note. Overall mathematics intervention cost per student is shown in boldface. Labels for dollar values less than $20 are not shown.

3.2.4 TI Costs in the Context of Overall Spending

It is helpful to view the calculated costs of the TI program interventions in the context of overall current expenditures. Average current per-student spending expressed in 2015 dollars for all students (both those receiving and not receiving TI program services) over the 2-year study period (2014–15 and 2015–16) ranged from $6,845 to $11,063 across the study schools, with $9,291 spent on the average student in the study school sample.[21]

The study team calculated the average spending per intervention student and non-intervention student by subtracting the calculated ELA and mathematics intervention costs from the current spending figures for each of the study schools to show how much, on average, was spent on (a) students who were not participating in an intervention and (b) students who did participate in an ELA and/or a mathematics

[21] Data on current spending per pupil were taken from the publicly available data posted on the KDE website. Specifically, we used the Learning Environment datasets called "Students/Teachers" for the 2014–15 and 2015–16 school years located here: https://applications.education.ky.gov/SRC/DataSets.aspx. The definition of current spending can be found in the KDE data glossary here: https://applications.education.ky.gov/SRC/Glossary.aspx. The 2014–15 per-pupil spending figures were transformed into 2015 dollars using rates based on the OES wage data (see footnote 10, above) and then averaged with the 2015–16 figures for each site.

intervention. The latter TI program spending was broken out by that devoted to instruction versus noninstructional activities.

Exhibit 19 shows the resulting average spending across the study schools. The findings suggest that, on average, $9,552 was spent on a student participating in an ELA and/or a mathematics intervention under the TI program. Of this figure, $8,515 (89%) was spent on providing non-intervention services to the typical 12th-grade student enrolled in the six study schools. Spending on the average student participating in one or more (ELA and/or mathematics) interventions was $1,037 (11%), which included $852 (9%) to cover instruction costs and $185 (2%) for costs associated with the other four activity categories (administration, monitoring, professional development, and referrals).

In sum, the results suggest that the cost of the TI program over the study period accounted for about 11% of the overall current spending on the average student, with the bulk of this cost going toward instruction. However, it would be incorrect to infer that the cost of delivering TI program services was in addition to spending that existed before implementation of the program. Rather, referrals to TI program instruction likely replaced other programming (courses or other intervention services) that students otherwise would have taken.

Exhibit 19. Average per-Student Spending on Program Intervention and Non-intervention Services Across Study Schools Over the Study Period (in 2015 Dollars)

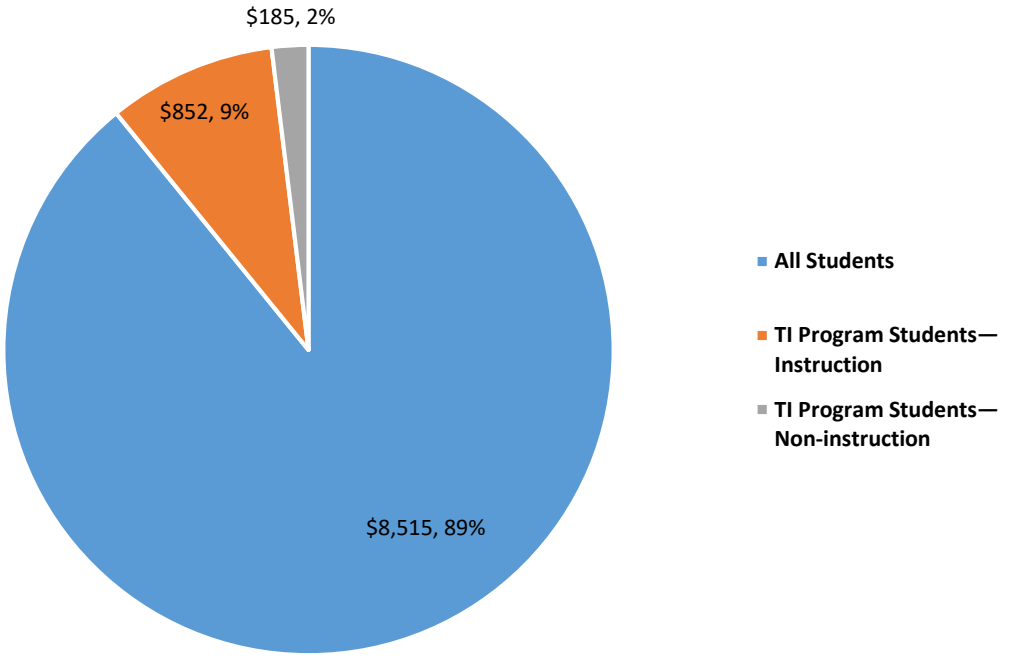
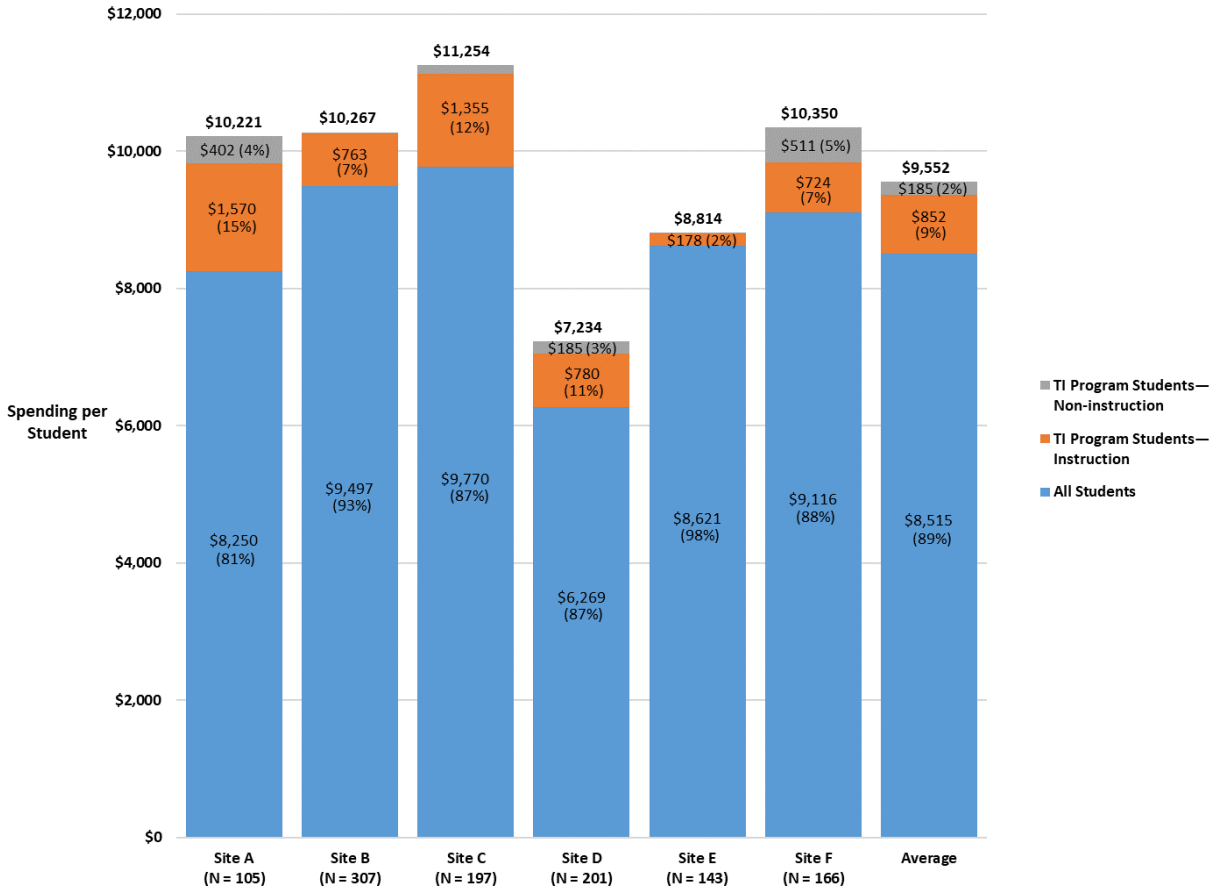


Exhibit 20 shows per-student spending on non-intervention services assumed to be spread across all students and those services associated with the ELA and mathematics interventions provided to students under the TI program. Overall per-student spending on those taking an ELA and/or mathematics intervention ranged from $7,234 to $11,254 across the study schools. The amount spent

on providing intervention services ranged from $193 to $1,972 per student (2% to 19% of overall per-student spending), a majority of which was attributed to instruction costs.

Exhibit 20. Per-Student Spending on Program Intervention and Non-intervention Services Across Study Schools Over the Study Period (in 2015 Dollars)



Note. Overall spending per student is shown in boldface. Labels for dollar values less than $175 are not shown.

4. Conclusion

Kentucky's TI program mandated that all students be evaluated in Grades 8, 10, and 11 using the ACT suite of assessments. If students did not demonstrate college and career readiness using these measures, they were referred to the TI program to receive appropriate supports. Districts and schools had flexibility in how they provided and monitored those interventions. Some chose to incorporate intervention programming into existing courses, while others opted to provide additional programming to meet students' needs.

The cost analysis presented in this study serves as a companion to AIR's TI program impact study. The goal of this cost analysis was to capture the resources used to implement the program for students receiving intervention referrals in the 12th grade to aid KDE staff and district- and school-level TI program developers, as well as other stakeholders, in developing a better understanding of the policy and its associated costs. To this end, we used the ingredients approach to produce comprehensive estimates of the cost of the individual programs implemented by schools by resource type and activity for the 2-year study period (school years 2014–15 and 2015–16). This approach enabled the study team to separate time spent by staff on the TI program from their other duties and to further break out intervention-related activities.

The study found that the average per-student cost of TI program ELA interventions across the study schools was $569; the corresponding average per-student cost of TI program mathematics interventions was $613. However, there was substantial variation in the TI program per-student costs across the individual study schools. Specifically, the per-student cost of the ELA interventions implemented as part of the TI program ranged from $123 to $1,228 across the study schools. The corresponding figures for the TI program mathematics interventions ranged from $110 to $1,076. It should be noted that across the study schools, many students participated in both types of interventions.

As the study team expected, the costs associated with personnel accounted for the largest portion of intervention costs. On average, personnel accounted for 93% of the ELA intervention costs and 94% of the mathematics intervention costs. On average, instruction composed 82% of the overall costs of the ELA interventions and 85% of the overall mathematics intervention costs. Putting the TI program costs in the context of spending, the findings suggest that the amount spent on the average 12th-grade student receiving an ELA and/or mathematics intervention under the TI program across the study schools was $9,552, of which $1,037 (11%) could be attributed to intervention services. However, intervention spending on these students varied widely across the study sites, ranging from $193 to $1,972 per student (equal to 2% and 19% of overall spending, respectively).

Future research activities may include pairing the cost calculations with estimates of the program impacts on various student outcomes generated by the companion study (Backes, Oliveira, & Goldhaber, 2020) to better understand the extent to which the benefits of implementation outweigh its costs. For example, the findings in the impact study measure the degree to which the intervention was effective in reducing the probability that a student enrolled in a college program requires a remedial course in English or mathematics. These results could be used in concert with the TI program cost calculation estimates to better understand whether the cost savings associated with ameliorating the need for students to take remedial courses outweigh investments in the TI program.

References

Barnett, E., Chavarín, O., & Griffin, S. (2018). *Math transition courses in context: Preparing students for college success*. New York, NY: Community College Research Center, Teachers College, Columbia University.

Duncombe, W., Nguyen-Hoang, P., & Yinger, J. (2015). Measurement of cost differentials. In H. Ladd & M. Goertz (Eds.), *Handbook of research in education finance and policy*. New York, NY: Routledge, Taylor & Francis.

Kentucky Department of Education. (2016). Kentucky education facts. Retrieved from https://education.ky.gov/comm/edfacts/Pages/default.aspx

Kentucky Department of Education. (2018). Targeted interventions. Retrieved from https://education.ky.gov/educational/int/Pages/default.aspx

Kentucky Department of Education. (2019a). Transitional interventions. Retrieved from https://education.ky.gov/educational/int/hscf/Pages/default.aspx

Kentucky Department of Education. (2019b). *Our kids, our future: 2018–23 strategic plan*. https://education.ky.gov/CommOfEd/CDU/Documents/Strategic%20Plan%2020191213.pdf

Kentucky Revised Statute § 158.6453 – Definitions — Review of academic standards and assessments — Revisions to content standards — Review committees — Advisory panels — Standards and assessments process review committee — Administrative regulations — …. (2017).

Kentucky Revised Statute § 158.6459 Intervention strategies for accelerated learning — Individualized learning plan — Support and technical assistance. (April 10, 2017).

Legislative Research Commission. 704 Kentucky Administrative Regulation § 3:305. Minimum requirements for high school graduation. (2018).

Levin, H., & Belfield, C. (2015). Guiding the development and use of cost-effectiveness analysis in education. *Journal of Research on Educational Effectiveness, 8*(3), pp. 400–418.

Levin, H., McEwan, P., Belfield, C., Bowden, B., & Shand, R. (2018). *Economic evaluation in education: Cost-effectiveness and benefit-cost analysis*. New York, NY: SAGE Publications.

Reardon, S. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. In G. Duncan & R. Murnane (Eds.), *Whither opportunity? Rising inequality, schools, and children's life chances*. New York, NY: Russell Sage Foundation.

Xu, Z., Backes, B., Oliveira, A., & Goldhaber, D. (2020). *Targeted Interventions in High School: Preparing Students for College.* (CALDER Working Paper No. 232-0220). Washington, DC: American Institutes for Research.

Appendix A. TI Program Online School Survey

Questions	Response Details
Involvement in Targeted Intervention	
1) Please select the school year(s) in which you were involved in administering the Targeted Interventions Program or delivering instructional interventions to 12th graders under the program at your school.	
2) During the 2014–15 or 2015–16 school years, were you responsible for working directly with students to deliver instructional interventions to 12th graders under the Targeted Interventions Program?	
3) During the 2014–15 or 2015–16 school years, were you responsible for any administrative duties under the Targeted Interventions Program?	
4) During the 2014–15 or 2015–16 school years, were you involved in any professional development required to perform administrative or instructional duties under the Targeted Interventions Program?	
Involvement in Targeted Intervention	
5) Check the box that best describes your primary job title in the 2014–15 school year.	
6) Check the box that best describes your primary job title in the 2015–16 school year.	
7) Including the 2014–15 and 2015–16 school years, how many years did you serve in the job title(s) specified?	• Total years • Years in this district • Years in this school
8) What percentage of full-time did you work at this school in the 2014–15 and 2015–16 school years?	• Percentage of full-time worked
9) How many instructional/non-instructional days per year and hours per day under contract were you required to work in the 2014–15 and 2015–16 school years?	• Instruction days per year • Hours per instructional day • Non-instruction days per year • Hours per non-instructional day
10) In the typical week, how many total hours did you work onsite and off-site at your school over the 2014–15 and 2015–16 school years?	• Onsite Hours • Offsite Hours
Instructional Activities	
11) Were you involved in English/Reading, Math, or both interventions?	• English/Reading • Math • Both subjects

Questions	Response Details
12) During the typical week in the 2014–15 and 2015–16 school years how many hours did you spend on each of the following activities delivering English/Reading Targeted Interventions to 12th-grade students?	• Direct contact with students delivering intervention instruction during the regular instructional day • Direct contact with students delivering intervention instruction outside the regular instructional day (before or after school) • Grading, preparing, and planning for intervention instructional sessions • Meeting with intervention students outside of regularly scheduled instructional sessions • Interacting with parents of intervention students
13) How many weeks did the typical English/Reading Targeted Intervention you delivered in the 2014–15 and 2015–16 school years last?	• Lengths in weeks
14) How many students were enrolled in the typical English/Reading Targeted Intervention session delivered during or outside the regular school day in the 2014–15 and 2015–16 years?	• During regular school day • Outside regular school day
15) During the typical week in the 2014–15 and 2015–16 school years how many hours did you spend on each of the following activities delivering Math Targeted Interventions to 12th-grade students?	• Direct contact with students delivering intervention instruction during the regular instructional day • Direct contact with students delivering intervention instruction outside the regular instructional day (before or after school) • Grading, preparing, and planning for intervention instructional sessions • Meeting with intervention students outside of regularly scheduled instructional sessions • Interacting with parents of intervention students
16) How many weeks did the typical Math Targeted Intervention you delivered in the 2014–15 and 2015–16 school years last?	• Length in weeks

Questions	Response Details
17) How many students were enrolled in the typical Math Targeted Intervention session delivered during or outside the regular school day in the 2014–15 and 2015–16 years?	• During regular school day • Outside regular school day
Non-Personnel Resources	
18) How many different English/Reading Targeted Interventions did you deliver in the 2014–15 and 2015–16 school years?	• Number of interventions
19) How many English/Reading Targeted Interventions did you deliver in each type of location in the 2014–15 and 2015–16 school years?	• Classroom • Library • Auditorium • Room in the district office • Multipurpose room
20) For the typical English/Reading Targeted Intervention you delivered in the 2014–15 and 2015–16 school years, please use an "X" to indicate which materials and equipment were used by students.	• Art supplies • Computer • Internet connection • Office Supplies • Textbooks • Workbooks
21) For the typical English/Reading Targeted Intervention you delivered in the 2014–15 and 2015–16 school years, please use an "X" to indicate which materials and equipment you used.	• Computer • Internet connection • Interactive display • Office supplies • Overhead projector • Smartboard • Textbook (teacher edition) • Workbook (teacher edition)
22) How many different Math Targeted Interventions did you deliver in the 2014–15 and 2015–16 school years?	• Number of interventions
23) How many Math Targeted Interventions did you deliver in each type of location in the 2014–15 and 2015–16 school years?	• Classroom • Library • Auditorium • Room in the district office • Multipurpose room
24) For the typical Math Targeted Intervention you delivered in the 2014–15 and 2015–16 school years please us an "X" to indicate which materials and equipment were used by students.	• Art supplies • Computer • Internet connection • Office Supplies • Textbooks • Workbooks

Questions	Response Details
25) For the typical Math Targeted Intervention you delivered in the 2014–15 and 2015–16 school years please us an "X" to indicate which materials and equipment you used.	• Computer • Internet connection • Interactive display • Office supplies • Overhead projector • Smartboard • Textbook (teacher edition) • Workbook (teacher edition)
Professional Development	
26) How many total hours did you spend on the following professional development or collaboration activities required for your Targeted Interventions Program duties in the 2014–15 and 2015–16 school years?	• Attended formal training workshops offered within district • Attended formal training workshops outside of district or college courses • Attended conferences • Received formal or informal coaching or mentoring from another teacher or staff member • Collaborated with other teachers to review individual student work
27) What were the total approximate costs of the formal training workshops, courses, and conferences in which you participated in the 2014–15 and 2015–16 school years?	• Formal training workshops or college courses • Conferences
Administrative Activities	

Questions	Response Details
28) How many total hours did you spend on the following administrative activities for the Targeted Interventions Program at your school in the 2014–15 and 2015–16 school years?	• Providing training to staff on the Targeted Intervention Program • Reviewing ACT data to identify students requiring interventions • Determining school demand for different types of targeted interventions • Working with instructors to plan and adopt targeted interventions • Scheduling targeted interventions • Selecting and referring students to targeted interventions • Supervising delivery of targeted intervention instruction • Monitoring student compliance with attending assigned targeted interventions • Collecting, analyzing, and/or reporting data on student completion of targeted interventions
Personal Information	
29) What is your gender? 30) Which best describes you? (Please check all that apply) 31) What is the highest level of schooling you have completed?	
Compensation	
32) What was your approximate annual gross salary (before taxes and deductions) in 2014–15 or 2015–16?	
33) If relevant, please list the amounts of the following types of additional compensation you received for performing administrative and/or instructional duties under the Targeted Interventions Program in the 2014–15 and 2015–16 school years.	

Appendix B. TI Program School and School District Interview Protocol

Questions
Program Administration
1. [**SCHOOL DISTRICT AND SCHOOL**] I would first like to ask you about how the Targeted Intervention Program was administered in your district in the study years (2014–15 and 2015–16). a. Which staff were primarily in charge of covering the administration of the program? b. Please describe how students were referred to different interventions. i. Was this primarily a district- or school-level function or shared between the central district office and schools? ii. What data were used and where did these come from? iii. Which district-level staff were involved and approximately how much time did they spend coordinating student referrals to different interventions? c. [**SCHOOL DISTRICT**] Please describe the monitoring of student attendance and completion of the interventions to which they are referred. i. Was this primarily a district- or school-level function or shared between the central district office and schools? ii. Which district-level staff were involved and approximately how much time did they spend monitoring student attendance and completion? iii. How much staff time was dedicated to compiling and reporting data on intervention attendance and completion to the district and/or state? c. [**SCHOOL**] Please describe the monitoring of student attendance and completion of the interventions to which they are referred. i. Which staff were involved and approximately how much time did they spend monitoring student attendance and completion? ii. How much staff time was dedicated to compiling and reporting data on intervention attendance and completion to the district and/or state? d. [**SCHOOL**] Were there meetings surrounding the initial implementation and regular operation of the Targeted Intervention Program at your school? i. If so, which staff members were involved and how much time did they spend preparing and participating in these meetings?
2. [**SCHOOL DISTRICT AND SCHOOL**] Did your school/district invest in any computer hardware or software solutions to implement the Targeted Intervention Program? Probe for: *Software installation process, training for administrators and/or teachers to use the hardware/software, etc*.
3. [**SCHOOL DISTRICT AND SCHOOL**] Were there any other investments in non-personnel (materials, supplies or equipment) associated with the implementation of the Targeted Intervention Program?
4. [**SCHOOL DISTRICT AND SCHOOL**] Please describe the administration of the ACT exams? Which district-level staff were involved in coordinating the ACT assessment process and how much time did they spend? Probe for: *Scheduling exam, administering exam, data collection and reporting.*
Intervention Delivery Questions

Questions
5. **[SCHOOL DISTRICT AND SCHOOL]** Can you please provide a general description of interventions implemented for 12th graders at [high school here] during 2014–15 and 2015–16 school years as part of the Targeted Intervention Program? Probe for: Please list the interventions that were provided for Reading/Writing and Mathematics. a. How did your district or the school decide on which interventions would be offered each year? Probe for: Were there internal meetings to discuss this? If so, how many meetings were there, how long were they, and who from the district was in attendance? For each intervention listed ask the following in order: a. Was the intervention offered in one or both of the study years (2014–15 and 2015–16)? If both: Were there differences in how the intervention was delivered between the years? b. Was the intervention branded (off-the-shelf) or developed by your district or school? Probe for: Was the intervention delivered by school or district staff, or by staff external to the school and district (i.e., privately contracted)? c. Was the intervention delivered as part of an existing class, as a stand-alone (whole period) course, or through some other arrangement? d. When and where did the intervention take place? Probe for: Within regular school day, before/after school, during summer. Probe for: Classroom, library, auditorium, other space. What was the room size/capacity and what would it be used for instead of the intervention? e. Was the intervention delivered by school/district staff or contracted out to a third party? Listen for, but don't necessarily probe: Types of personnel that were involved in delivering the intervention (teachers, instructional support, etc.) and how much time these staff spent in delivering the intervention. Did the Targeted Intervention Program effect scheduling and staffing for regular school programming and operations? f. Did the district office require any professional development for staff (administrative or instructional) for the particular intervention before or during the study years (2014–15 and 2015–16)? Probe for: Types of professional development required to provide the intervention and corresponding time invested by district/school staff or contractors. g. Were there any investments in non-personnel (materials, supplies or equipment) associated with the targeted intervention? Probe for: Types of non-personnel required to provide intervention services and corresponding time invested by district/school staff or contractors. Were the non-personnel resources provided by your school or by your district?
Miscellaneous Questions
6. [**SCHOOL DISTRICT AND SCHOOL**] Did the district or school require any more general (i.e., not intervention-specific) professional development for staff (administrative or instructional) involved with the Targeted Intervention Program before or during the study years (2014–15 and 2015–16)?
7. [**SCHOOL DISTRICT AND SCHOOL**] Besides the costs we've just talked about, what other district-level personnel or non-personnel resources were required to deliver the Targeted Intervention Program courses?
8. [**SCHOOL DISTRICT AND SCHOOL**] What challenges did the district face implementing the Targeted Intervention Program and how were these addressed? Probe for: *How much time was spent on addressing the challenges and who was involved?*

Appendix C. Study Overview Used for District/School Recruitment

Overview:
Kentucky Targeted Interventions Cost Study

Targeted Interventions (TI) are an important component of Kentucky's comprehensive system of education reform and represent one of the key levers to fulfilling the Commonwealth's commitment to college- and career-readiness for all students. In 2014–15 and 2015–16, the program required students in Kentucky's public education system who were deemed to need additional support in reading, writing and/or mathematics to be referred to targeted instructional interventions. The American Institutes for Research (AIR) has partnered with the Kentucky Department of Education to conduct the **TI Cost Study** to investigate the time, effort, and subsequent costs involved in providing instructional services at Kentucky high schools under the TI program.

STUDY PURPOSE

The study will enhance an existing statewide research evaluation of the effects of TI services on student college readiness outcomes being conducted by AIR by adding a cost analysis of the effort involved in implementing these services. Specifically, the TI Cost Study will identify the personnel (e.g. time spent by staff) and non-personnel used to deliver TI services in a selected number of school sites and translate these specified resources into dollar values. The findings of this study will be used in concert with those of the outcome evaluation findings to develop measures of *cost-effectiveness* (i.e., the cost per-unit of outcome generated by the services delivered under TI).

Specific study questions include:

1. What types of targeted interventions were provided to 12th graders across Kentucky high schools in the study years?
2. What personnel and non-personnel resources were devoted to implementing targeted interventions and what were their costs?
3. How cost-effective are targeted interventions as a means of improving college and career readiness?

DATA COLLECTION AND ANALYSIS

AIR has randomly selected 12 districts and one high school in each district to serve as the study sample. Participation in the study is entirely voluntary. The study will involve the administration of a 30-minute interview with one staff member at each sample district and high school, respectively. In addition, an online survey taking no longer than 30 minutes will be administered to certificated school staff at each sample high school. The information to be gathered will identify personnel time and non-personnel resources used to implement TI services at each study site. These data will be used in conjunction with average salary rates and market prices of non-personnel items to calculate the costs associated with providing TI services.

EFFORTS TO MINIMIZE BURDEN

The study team has extensive experience in conducting interviews and administering surveys to district- and school-level certificated staff and will make every effort to minimize burden to all staff providing information for the study. As mentioned above, the length of both the district and school staff interviews will be 30 minutes. Also, the burden associated with the school staff survey is expected to be minimal, given most certificated school-level staff will not have been involved in delivering TI services and therefore will be exited from the survey after an initial filter question. For those staff who have been involved in the delivery of TI services the expected survey will be a maximum of 30 minutes.

TIMELINE

The target date for completion of the data collection is by the end of February 2019. A final report for the study is expected in mid-2019.

STUDY LEADERSHIP

The study will be conducted by the American Institutes for Research, a well-established and reputable behavioral and social science research organization. The cost study research team will be led by Principal Research Economist, Dr. Jesse Levin, Ph.D. who is collaborating with Chief Performance Officer, Karen Dodd of the Kentucky Department of Education Office of the Commissioner.

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