

# Appendix: Cost Analysis of Model Systems of Support for Screening, Identification and Remediations for Students with, or at Risk for, Dyslexia



**PROVIDED BY JULIE MORRISON, PH.D. – UNIVERSITY OF CINCINNATI**

## Cost Analysis

To ascertain the financial costs incurred by school districts to implement universal screening, identification and remediation services for improving outcomes of students with dyslexia, House Bill 436 mandates the Ohio Department of Education to complete a cost analysis of those services. Specifically, HB 436 required the Department to conduct a cost analysis for not more than four districts that have implemented dyslexia screening, identification and remediation services similar to those required in Ohio's dyslexia support laws. House Bill 436 also required the Department to submit a report with recommendations based on the cost analysis by Dec. 31, 2021.

The four districts selected for the cost study were Clermont Northeastern Schools, Cincinnati Public Schools, Marysville Exempted Village School District and Upper Arlington City Schools. Clermont Northeastern Schools was selected because in 2020 they were awarded a \$1 million Comprehensive State Literacy Development federal grant to develop their multi-tiered system of supports for reading guided by the science of reading pedagogy and structured literacy approach to reading instruction and intervention. Cincinnati Public Schools was selected based on their past participation in the Dyslexia Pilot Project, which was established by House Bill 96 in 2011, to evaluate the effectiveness of early screening and reading assistance programs for children at risk for reading failure including those students exhibiting risk factors associated with dyslexia. Cincinnati Public school buildings Mount Washington Elementary and Pleasant Ridge Elementary were used as individual models in the cost analysis. Marysville Exempted Village Schools was selected because they were awarded a Comprehensive State Literacy Development federal grant and their existing implementation of screening, intervention and remediation measures similar to Ohio's dyslexia support laws. Upper Arlington City Schools was selected because of its developed capacity for early identification and intervention for students with dyslexia in response to the advocacy of a parent group formed within the district in 2011. Although four districts were selected for the cost analysis, five models were used in the study.

The Department sought the expertise of Dr. Julie Morrison, a professor in the School Psychology Program at the University of Cincinnati. Dr. Morrison was the lead evaluator for Ohio's Dyslexia Pilot Project, which involved an analysis of the cost effectiveness of universal screening, identification and intervention for students with, or at risk for, dyslexia (Morrison et al., 2018). She is a member of the Joint Committee on Standards in Educational Evaluation (JCSEE) representing the National Association of School Psychologists and currently serves as the vice chair of the JCSEE. Her book, co-authored with Dr. Anna Harms, *Advancing Evidence-based Practice through Program Evaluation: A Practical Guide for School-based Professionals*, was published in 2018 by Oxford University Press.

## Method

### Model School Districts

As outlined above, four districts were selected for the cost analysis. Throughout this analysis, five models are represented. Four of the five districts have established district-wide models. Cincinnati Public Schools does not have a district wide model in place; therefore, this analysis includes two elementary schools as urban models. A summary of each model is outlined below.

**Clermont Northeastern Schools.** Clermont Northeastern Schools serves 1,379 students in southern Ohio. The district has one elementary school, Clermont Northeastern Elementary, supporting 603 learners in kindergarten through Grade 5. More than a third (35.9%) of the students met the criteria for Economic Disadvantage and 12.6% of the students had an educational disability, according to the Department's School Report Card data. Less than 10 students were identified as English Learners. The Department awarded Clermont Northeastern Elementary more than \$1 million in 2020 through the Comprehensive State Literacy Development grant competition to develop its multi-tiered system of supports for reading guided by the science of reading pedagogy and structured literacy approach to reading instruction and intervention.

**Cincinnati Public Schools.** Cincinnati Public Schools serves 35,266 students in southeastern Ohio. The district has 44 elementary schools that support learners in K-6 or K-8 grade configurations. Cincinnati Public

Schools was one of eight school districts selected to participate in the Dyslexia Pilot Project, which was established by House Bill 96 to evaluate the effectiveness of early screening and reading assistance programs for children at risk for reading failure including those students exhibiting risk factors associated with dyslexia. This three-year project began in 2012-2013. Mt. Washington Elementary was one of three schools in Cincinnati Public Schools' Dyslexia Pilot Project. The Department also selected Cincinnati Public Schools to participate in Ohio's State Systemic Improvement Plan (SSIP), which focused on improving early language and literacy outcomes for all students beginning in the 2016-2017 school year. Pleasant Ridge Montessori School was one of two schools in Cincinnati Public Schools' SSIP.

*Mt. Washington Elementary.* Mt. Washington Elementary serves 276 students in preschool through Grade 6. Nearly all (99.7%) of the students met the criteria for Economic Disadvantage according to the Department's School Report Card data. Sixteen percent (16.3%) of the students had an educational disability. Less than 10 students were identified as English Learners. It offers an Elementary College Preparatory magnet program in Grades 4-6. For the Dyslexia Pilot Project, it partnered with the Mount St. Joseph University's Reading Science Program for professional learning (training and coaching) in the science of reading pedagogy that emphasizes explicit, systematic and sequential reading instruction within a multi-tiered system of support framework.

*Pleasant Ridge Montessori School.* Pleasant Ridge Montessori School serves 623 students in preschool through Grade 6 focused on a Montessori style of teaching. Nearly all (99.5%) of the students met the criteria for Economic Disadvantage, 80.0% of the students had an educational disability and 4.5% were English Learners according to the Department's School Report Card data. Pleasant Ridge Montessori School received professional learning (training and coaching) through the Department's SSIP from a Regional Early Literacy Specialist at State Support Team 13 in the science of reading and the structured literacy approach to instruction.

**Marysville Exempted Village School District.** Marysville Exempted Village School District serves 4,968 students in central Ohio. The district has five elementary schools. District-wide, 18.6% of the students met the criteria for Economic Disadvantage, 16.9% of the students had an educational disability and 0.6% were identified as English Learners according to the Department's School Report Card data.

**Upper Arlington City Schools.** Upper Arlington City Schools serves 5,862 students in central Ohio. The district has five elementary schools that serve students in kindergarten through Grade 5. District-wide, 3.4% of the students met the criteria for Economic Disadvantage, 18.2% of the students had an educational disability and 1.4% were identified as English Learners according to the Department's School Report Card data. The school district developed its capacity for early identification and intervention for students with dyslexia in response to the advocacy of a parent group that formed within the district in 2011, named the Upper Arlington Kids Identified with Dyslexia (UA-KID).

## Procedures

The procedures employed in this cost analysis are based on the ingredients method. The ingredients method (Levin et al., 2018) is considered the gold standard for quantifying costs in economic evaluations (i.e., cost analysis, cost-benefit analysis). Ingredients include any and all resources needed for an initiative to be implemented with full fidelity to obtain the intended effects. The ingredients method includes the following steps: (a) identify all resources needed for implementation (e.g., personnel time for various activities), (b) determine the units for each ingredient from prospective data (e.g., the number of teachers receiving training and/or the number of hours of training), (c) assign monetary values to each unit for each ingredient (e.g., hourly wages plus benefits for teachers, tangible costs of materials), (d) multiply the number of units by the assigned monetary values and (e) sum the total costs for each ingredient. Resources include tangible materials (e.g., program manuals/materials, licenses for web-based programs, assessment tools) and opportunity costs for personnel time associated with activities, such as training, preparing, implementing and monitoring.

Opportunity costs represent the lost opportunity to use that resource for another purpose (Levin et al., 2018). Opportunity costs include personnel costs for time spent in training, coaching, implementation or monitoring, because that time could have been spent in another activity potentially accruing associated benefits. Implementation costs associated with the teacher's time dedicated to the delivery of instruction were not included as an opportunity cost as core instruction is considered part of their contractual responsibilities. In this cost analysis, resources and opportunity costs were only included when they are required for the implementation of a model screening and early intervention process above and beyond business as usual, consistent with the research literature (Belfield et al., 2015).

The cost analysis of the early identification and intervention for students with, or at risk for, dyslexia in four district models in Ohio is based on the guidelines put forth by Barrett and colleagues (2020). According to Barrett and colleagues (2020), previous attempts to determine the costs of supporting assessment and early intervention have failed to capture all costs needed to deploy and sustain a multi-tiered system of interventions and supports. A comprehensive cost analysis must include a number of implementation variables that directly affect student intervention outcomes, such as implementation fidelity, progress monitoring and training and coaching for teachers and interventionists.

The context is also relevant. In schools where a high percentage of young students are performing at or above grade level on indicators of early literacy, screening tools will generally be more accurate in identifying students with dyslexia, which is neurobiological in origin. In contrast, in schools where most young students demonstrate early literacy skills in the "some risk" or "at risk" ranges, ensuring students receive high-quality, effective instruction using the structured literacy approach that emphasizes explicit, systematic and sequential reading instruction is critical to rule out access to evidence-based instruction and intervention as a contributing factor to class-wide reading concerns. Cost analysis, therefore, must account for the percentage of students who are successful in the core reading curriculum with universal instructional support, the percentage of students who demonstrate "some risk" and require targeted interventions and the percentage of students who are assessed to be "at risk" and require more intensive, individualized intervention. Finally, sensitivity analyses are conducted to reflect varying assumptions related to the local context upon which costs are estimated, such as varying the value of teachers' salary rates. In this cost analysis, sensitivity analysis was used in the cost analysis of the early identification and intervention for students with, or at risk for, dyslexia to account for district salary rates in the low, medium and high range relative to other Ohio school districts. All text in the report and the analysis were verified with each of the four districts.

**Salary Rates.** Costs associated with personnel time are typically the largest component in cost analysis in educational settings (Barrett et al., 2020). In order to provide an accurate estimate of salary rates in Ohio, careful attention was paid to the annual salary by role (e.g., teacher, school psychologist, principal) given the varied number of days under contract and number of hours per day stipulated. Salary figures for personnel involved in the screening and early intervention of students with, or at risk for, dyslexia were obtained from a publicly accessible database created by The Buckeye Institute (<https://www.buckeyeinstitute.org>). The Buckeye Institute is an independent research and educational institution whose mission is to advance free-market public policy in the states. The database contains salaries for employees of public primary and secondary schools imported from the Department as submitted to the Department by individual school districts, public charter/community schools and educational service centers. Salary information (i.e., annual salary, number of days per week, number of days under contract) was obtained for the 2019 calendar year, which includes contracts for the 2018-2019 and 2019-2020 school years. Personnel benefits were included in the hourly salary rate at 33%.

**Teacher Salary Rate.** The teacher salary rate was based on a sample of 1,050 teachers in elementary level buildings from 400 school districts, public charter/community schools and educational service centers. Among the teachers in the sample, 39.1% had earned a bachelor's degree, 60.4% held a master's or Education Specialist degree and less than 1% had earned a doctorate degree. The number of days in their annual contracts ranged from 56 to 209. The average number of days was 184. The median salary rate with benefits

was \$61.16 per hour. The salary rate of \$48.11 represented the 25<sup>th</sup> percentile and the salary rate of \$72.65 marked the 75<sup>th</sup> percentile.

**Intervention Specialist/Special Education Teacher Salary Rate.** The salary rate for teachers who provide supplemental, special education services to students with disabilities was based on a sample of 150 teachers in elementary and middle school level buildings from 115 school districts, public charter/community schools and educational service centers. Among the intervention specialists in the sample, 38.7% had earned a bachelor's degree and 60.7% held a master's degree. The number of days in their annual contracts ranged from 87 to 200. The average number of days was 183. The median salary rate with benefits was \$55.30 per hour. The salary rate of \$43.83 represented the 25<sup>th</sup> percentile and the salary rate of \$67.85 marked the 75<sup>th</sup> percentile.

**School Psychologist Salary Rate.** School psychologists conduct assessments and provide consultation with regard to data-based decision making to match students to appropriate reading interventions. The salary rate for these professionals was based on a sample of 100 school psychologists from 56 school districts, public charter/community schools and educational service centers. Among the school psychologists in the sample, 87.0% had earned a master's or Education Specialist degree and 9% had earned a doctorate degree. The number of days in their annual contracts ranged from 76 to 260. The average number of days was 186. The median salary rate with benefits was \$63.22 per hour. The salary rate of \$52.41 represented the 25<sup>th</sup> percentile and the salary rate of \$56.74 marked the 75<sup>th</sup> percentile.

**Speech and Language Pathologist Salary Rate.** Speech and language pathologists conduct assessments and provide consultation with regard to early language and literacy concerns. The salary rate for these professionals was based on a sample of 100 speech and language pathologists from 80 school districts, public charter/community schools and educational service centers. Among the speech and language pathologists in the sample, 99% had earned a master's or Education Specialist degree and 1% had earned a bachelor's degree. The number of days in their annual contracts ranged from 37 to 206. The average number of days was 177. The median salary rate with benefits was \$57.72 per hour. The salary rate of \$50.09 represented the 25<sup>th</sup> percentile and the salary rate of \$65.34 marked the 75<sup>th</sup> percentile.

**Instructional Paraprofessional Salary Rate.** The salary rate for paraprofessionals who provide instructional supports to students was based on a sample of 200 "instructional paraprofessionals" from 86 school districts, public charter/community schools and educational service centers. Among the paraprofessionals in the sample, 4.5% had an associate degree, 8.5% had earned a bachelor's degree and 1% had earned a master's degree. The majority of the same had no degree (70.5%) or a high school diploma or equivalent (13.5%). The number of days in their annual contracts ranged from 55 to 206. The average number of days was 183. The median salary rate was \$18.94 per hour, which reflected salary figures that included benefits and figures that did not include benefits. The salary rate of \$16.40 represented the 25<sup>th</sup> percentile and the salary rate of \$22.76 marked the 75<sup>th</sup> percentile.

**Principal Salary Rate.** Elementary school principals are involved in the screening and early intervention of students with, or at risk for, dyslexia through their engagement in data-based decision making, resource allocation and intervention delivery. The salary rate for principals was based on a sample of 100 principals of elementary schools from 63 school districts, public charter/community schools and educational service centers. Among the principals in the sample, 91.0% had earned a master's or Education Specialist degree and 5% had earned a doctorate degree. The number of days in their annual contracts ranged from 204 to 261. The average number of days was 230. The median salary rate with benefits was \$71.96 per hour. The salary rate of \$63.51 represented the 25<sup>th</sup> percentile and the salary rate of \$79.70 marked the 75<sup>th</sup> percentile.

## Findings

The cost analysis of the screening process is presented first for all four model school districts. Cost per 100 students was used as a common metric across districts that vary in the number of students they serve. The cost analysis of ensuring all students have access to core curriculum and instruction based on the science of reading pedagogy and a structured language approach to instruction is also presented using the cost per 100 students metric. Targeted intervention for students demonstrating “some risk” and intensive, individualized intervention for students identified as being “at risk” was quantified in terms of cost using a cost per student metric.

### Cost Analysis of Screening at Clermont Northeastern Schools

Teachers and paraprofessionals were trained in the use of Acadience Reading (Good et al., 2013), a standardized curriculum-based assessment for universal screening and progress monitoring. Teachers and the school psychologist also received training in two intervention-based diagnostic assessment tools, the Heggerty Phonemic Awareness assessment (Literacy Resources, 2021) and the CORE Phonics Surveys (Consortium On Reading Excellence, 2008).

The screening process used multiple measures that combined universal curriculum-based assessments and intervention-based diagnostic assessment tools. Acadience Reading was used for universal screening in kindergarten through Grade 3 three times a year (fall, winter and spring). Costs associated with Acadience Reading included teacher time for administration, data entry and data analysis. The Heggerty Phonemic Awareness assessment (Literacy Resources, 2021) and the CORE Phonics Surveys (Consortium On Reading Excellence, 2008) were administered to students with elevated risk as indicated by the Acadience Reading assessment results. The MAP, a computer-administered assessment, was also used district-wide three times a year.

**Table 1. Cost per 100 Students of the Screening Process at Clermont Northeastern Schools**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Training	Acadience Reading Heggerty Assessment CORE Phonics	\$231.89	\$293.01	\$348.59
Screening	Acadience Reading	\$4,137.83	\$5,034.56	\$5,906.61
	Heggerty Assessment	\$323.10	\$409.13	\$484.88
	CORE Phonics Survey	\$505.91	\$640.60	\$759.19
	MAP	\$1,200.60	\$1,213.49	\$1,224.84
<b>Cost per 100 Students</b>		<b>\$6,399.33</b>	<b>\$7,590.79</b>	<b>\$8,724.11</b>
<b>Training Cost per Educator</b>		<b>\$33.54</b>	<b>\$42.38</b>	<b>\$50.42</b>

### Cost Analysis of Screening at Cincinnati Public Schools’ Mt. Washington Elementary

Teachers and paraprofessionals were trained in the use of Acadience Reading (Good et al., 2013), a standardized curriculum-based assessment for universal screening and progress monitoring. Acadience Reading was used for universal screening in kindergarten through Grade 3 three times a year (fall, winter and spring). Costs associated with Acadience Reading included teacher time for administration, data entry and data analysis.

**Table 2. Cost per 100 Students of the Screening Process at Cincinnati Public Schools' Mt. Washington Elementary**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Training	Acadience Reading	\$1,193.43	\$1,330.57	\$1,453.94
Screening	Acadience Reading	\$4,812.69	\$5,727.72	\$6,533.36
<b>Cost per 100 Students</b>		<b>\$6,006.12</b>	<b>\$7,058.29</b>	<b>\$7,987.30</b>
<b>Training Cost per Educator</b>		<b>\$224.36</b>	<b>\$250.15</b>	<b>\$273.34</b>

**Cost Analysis of Screening at Cincinnati Public Schools' Pleasant Ridge Montessori**

Teachers, paraprofessionals, a reading specialist and a transition coordinator were trained in the use of Acadience Reading (Good et al., 2013), a standardized curriculum-based assessment for universal screening and progress monitoring. Acadience Reading was used for universal screening in kindergarten through Grade 3 three times a year (fall, winter and spring). Costs associated with Acadience Reading included teacher time for administration, data entry and data analysis.

**Table 3. Cost per 100 Students of the Screening Process at Cincinnati Public Schools' Pleasant Ridge Montessori**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Training	Acadience Reading	\$649.30	\$1,188.42	\$1,411.68
Screening	Acadience Reading	\$3,322.41	\$4,009.43	\$4,614.32
<b>Cost per 100 Students</b>		<b>\$3,971.71</b>	<b>\$5,197.85</b>	<b>\$6,026.00</b>
<b>Training Cost per Educator</b>		<b>\$66.83</b>	<b>\$122.32</b>	<b>\$145.30</b>

**Cost Analysis of Screening at Marysville Exempted Village School District**

School psychologists, reading specialists, speech and language pathologists and instructional coaches were trained in the standardized administration of the Comprehensive Test of Phonological Processing, 2<sup>nd</sup> Edition (CTOPP-2; Wagner et al., 2013), a norm-referenced assessment designed to provide clinical diagnostics of phonological processing skills within three major categories: phonological awareness, phonological memory and rapid naming.

The screening process used multiple measures that combined universal curriculum-based assessments, intervention-based diagnostic assessment tools and a clinical diagnostic test. Acadience Reading (Good et al., 2013), standardized curriculum-based assessments for universal screening and progress monitoring were used for screening in Grades 1-3 three times a year (fall, winter and spring). The Phonological Awareness Screening Test (PAST; Kilpatrick, 2016) an intervention-based diagnostic assessment tool, was administered to all students in kindergarten through second grade three times a year (fall, winter and spring).

A second intervention-based diagnostic assessment tool, the LETRS Phonics and Word-Reading Survey (Moats & Tolman, 2018), was administered to all students in kindergarten (fall and spring), Grade 1 (fall), Grade 2 (fall and again in the winter only for students with elevated risk) and Grade 3 (fall and again in the winter only for students with elevated risk). LETRS Spelling Screeners (Moats & Tolman, 2019) were administered to students annually in the fall in Grades 1-3. The CTOPP-2 was administered annually in March to kindergarten students who demonstrated elevated risk for dyslexia (approximately 20% of the kindergarten students). District-wide, students were also screened using i-Ready, a computer-administered assessment, three times a year.

**Table 4. Cost per 100 Students of the Screening Process at Marysville Exempted Village School District**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Training	CTOPP-2	\$154.36	\$190.44	\$224.94
Screening	Acadience Reading	\$1,631.84	\$1,997.02	\$2,325.36
	PAST	\$1,592.31	\$2,020.31	\$2,420.09
	LETRS Phonics and Word Reading Survey, LETRS Spelling Screeners	\$2,501.03	\$3,176.65	\$3,787.87
	CTOPP-2	\$4,865.60	\$5,455.40	\$6,019.42
	i-Ready	\$255.88	\$255.88	\$255.88
<b>Cost per 100 Students</b>		<b>\$11,001.02</b>	<b>\$13,095.70</b>	<b>\$15,033.56</b>
<b>Training Cost per Educator</b>		<b>\$98.53</b>	<b>\$121.56</b>	<b>\$143.58</b>

**Cost Analysis of Screening at Upper Arlington Schools**

School psychologists were trained in the standardized administration of the Comprehensive Test of Phonological Processing, 2<sup>nd</sup> Edition (CTOPP-2; Wagner et al., 2013), a norm-referenced assessment designed to provide clinical diagnostics of phonological processing skills within three major categories: phonological awareness, phonological memory and rapid naming. The CTOPP-2 was administered annually to all kindergarten and first grade students in the fall.

**Table 5. Cost per 100 Students of the Screening Process at Upper Arlington Schools**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Training	CTOPP-2	\$130.59	\$150.87	\$170.35
Screening	CTOPP-2	\$2,984.33	\$3,524.83	\$4,200.83
<b>Cost per 100 Students</b>		<b>\$3,114.92</b>	<b>\$3,675.70</b>	<b>\$4,371.18</b>
<b>Training Cost per Educator</b>		<b>\$151.41</b>	<b>\$174.92</b>	<b>\$197.50</b>

**Cost Analysis of Prevention and Early Intervention at Clermont Northeastern Schools**

Grant funding was used to strengthen the core curriculum and instruction to prevent reading concerns by focusing on a Structured Literacy approach to reading instruction that emphasizes explicit, systematic and sequential reading instruction. Heggerty Phonemic Awareness (<https://heggerty.org>) and an online reading program, Headsprout (<https://www.headsprout.com/>) were selected to supplement the core curriculum in kindergarten through Grade 2. Reading A to Z (<https://www.learninga-z.com>) instructional materials and books were selected to supplement the core curriculum in Grade 3. Decodable readers were purchased for the K-3 grade levels and LETRS materials were purchased for kindergarten through grade 2. All the teachers (that is, four teachers per grade level) participated in LETRS training, for which they each received a \$1,600 stipend. An instructional coach provided embedded professional learning to support the application of new practices in the classroom. There were no additional costs associated with the delivery of the newly learned instructional practices during the school day.

**Table 6. Cost per 100 Students for Strengthening the Core Curriculum and Instruction at Clermont Northeastern Schools**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Program	Heggerty Phonemic Awareness Headsprout (K-2) Reading A to Z (Gr. 3)	\$922.60	\$922.60	\$922.60
Materials	Decodable readers LETRS (K-2)	\$3,375.80	\$3,375.80	\$3,375.80
Training	LETRS Training LETRS Online Teacher Stipends	\$11,188.15	\$11,188.15	\$11,188.15
Coaching	Instructional Coach	\$4,938.27	\$4,938.27	\$4,938.27
Delivery	Core instruction with supplements	\$ -	\$ -	\$ -
Fidelity	Reading-Tiered Fidelity Inventory Peer Walkthroughs	\$1,650.73	\$2,089.16	\$2,480.18
Progress Monitoring	Data Review Team Meetings (3x year)	\$1,697.08	\$2,107.11	\$2,500.14
<b>Cost per 100 Students</b>		<b>\$23,772.63</b>	<b>\$24,621.09</b>	<b>\$25,405.14</b>
<b>Training Cost per Educator</b>		<b>\$2,832.00</b>	<b>\$2,832.00</b>	<b>\$2,832.00</b>

Fidelity of implementation was assessed using the Reading-Tiered Fidelity Inventory (St. Martin et al., 2015) and through teacher/peer walkthroughs. Teachers and the school psychologist progress-monitored student growth as a means of determining the effectiveness of the core curriculum and instruction and to identify students in need of intervention.

Clermont Northeastern Schools offered a system of intervention supports matched to the individual specific skill needs of students. Students assessed and determined to be at “some risk” or “at risk” received targeted intervention using Sound Partners, an explicit, phonics-based tutoring program that boasts an Every Student Succeeds Act (ESSA) Evidence Level of “Strong” (Vadasy & Sanders, 2010; 2011). Students in need of support also received intervention using the Systematic Instruction in Phonological Awareness, Phonics and Sight Words (SIPPS), which uses a structured literacy approach to foundational skills instruction through explicit instructional routines focused on phonological awareness, spelling sounds and sight words, with immediate application to reading connected text and to spelling. In addition, students at “some risk” or “at risk” received targeted intervention using Heggerty Phonemic Awareness (<https://heggerty.org>).

**Table 7. Cost per Student for Targeted Intervention and Intensive, Individualized Intervention at Clermont Northeastern Schools**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Program	Sound Partners (Gr. 1-3) SIPPS (Gr. 1-3) Heggerty (Gr. 1-3)	\$105.06	\$105.06	\$105.06
Materials	LETRS	\$10.06	\$10.06	\$10.06
Training	LETRS	\$ -	\$ -	\$ -
Coaching		\$ -	\$ -	\$ -
Delivery	Targeted Intervention Groups	\$1,122.57	\$1,427.07	\$1,695.17
	Individualized Intervention	\$1,728.75	\$2,197.68	\$2,610.56
Fidelity	Observations by School Psychologist	\$75.26	\$90.78	\$110.19
Progress Monitoring	Acadience Reading	\$109.80	\$134.69	\$162.35
<b>Cost per Student: Targeted</b>		<b>\$1,422.75</b>	<b>\$1,767.66</b>	<b>\$2,082.83</b>
<b>Cost per Student: Individualized</b>		<b>\$2,028.75</b>	<b>\$2,538.27</b>	<b>\$3,027.42</b>

*Note: Heggerty program costs for K-2 are accounted for in Tier 1 costs. Training cost for LETRS are accounted for in Tier 1 costs.*

The school psychologist weekly assessed intervention fidelity. Teachers and the school psychologist progress-monitored student growth to determine each student's response to the intervention.

### **Cost Analysis of Prevention and Early Intervention at Cincinnati Public Schools' Mt. Washington Elementary**

A concerted effort was made to strengthen the core curriculum and instruction to prevent reading concerns by focusing on a Structured Literacy approach reading instruction that emphasizes explicit, systematic and sequential reading instruction. Wilson Foundations®

(<https://www.wilsonlanguage.com/programs/fundations>) was selected to supplement the core curriculum in kindergarten through Grade 2. The Wilson Foundations® package includes the program, teacher materials, student materials and one-day access to teacher training through virtual workshops offered for \$289 per person. Decodable texts were purchased to supplement the core curriculum in kindergarten through Grade 3. An instructional coach provided embedded professional learning to support the application of new practices in the classroom. There were no additional costs associated with the delivery of the newly learned instructional practices during the school day. Fidelity of implementation was assessed through direct observation by the reading specialist. Teachers, the reading specialist and the intervention specialist progress-monitored student growth to determine the effectiveness of the core curriculum and instruction and to identify students in need of intervention.

**Table 8. Cost per 100 Students for Strengthening the Core Curriculum and Instruction at Cincinnati Public Schools' Mt. Washington Elementary**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Program	Wilson Foundations	\$3,498.56	\$3,498.56	\$3,498.56
Materials	Geodes Library (K-2)	\$5,896.28	\$5,896.28	\$5,896.28
	Decodable texts	\$950.48	\$950.48	\$950.48
	Consumables: 1 year	\$1,127.23	\$1,127.23	\$1,127.23
	Photocopies	\$106.38	\$106.38	\$106.38
Training		\$614.89	\$614.89	\$614.89
Coaching	Instructional Coach	\$23,404.26	\$23,404.26	\$23,404.26
Delivery	Core instruction with supplements	\$ -	\$ -	\$ -
Fidelity	Conducted by Reading Specialist	\$307.09	\$390.38	\$463.72
Progress Monitoring	Acadience: winter & spring Benchmark	\$800.68	\$1,016.09	\$1,216.17
<b>Cost per 100 Students</b>		<b>\$36,705.85</b>	<b>\$37,004.55</b>	<b>\$37,277.97</b>
<b>Training Cost per Educator</b>		<b>\$289.00</b>	<b>\$289.00</b>	<b>\$289.00</b>

Cincinnati Public Schools' Mt. Washington Elementary offered a system of intervention supports matched to the individual specific skill needs of students. Teachers received Orton-Gillingham training/practicum and, together with the reading specialist, implemented Orton-Gillingham with students demonstrating "some risk" or "at risk." Orton-Gillingham is a direct, explicit, multisensory, structured, sequential, diagnostic and prescriptive way to teach literacy specifically designed for students with, or at risk for, dyslexia (<https://www.ortonacademy.org>). The reading specialist weekly assessed intervention fidelity. Teachers and the reading specialist progress-monitored student growth using Acadience Reading to determine each student's response to the intervention.

**Table 9. Cost per Student for Targeted Intervention and Intensive, Individualized Intervention at Cincinnati Public Schools' Mt. Washington Elementary**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Program	Orton-Gillingham Card Decks	\$18.00	\$18.00	\$18.00
Materials	Photocopies	\$6.67	\$6.67	\$6.67
Training	\$1,750 per teacher	\$466.67	\$466.67	\$466.67
Coaching	Instructional Coach	\$ -	\$ -	\$ -
Delivery	Targeted Intervention Groups	\$1,646.43	\$2,093.03	\$2,486.24
	Individualized Intervention	\$1,033.81	\$1,314.23	\$1,561.13
Fidelity	Conducted by Reading Specialist	\$19.24	\$24.46	\$29.06
Progress Monitoring	Acadience Reading	\$75.26	\$95.51	\$114.32
<b>Cost per Student: Targeted</b>		<b>\$2,232.27</b>	<b>\$2,704.34</b>	<b>\$3,120.96</b>
<b>Cost per Student: Individualized</b>		<b>\$1,619.65</b>	<b>\$1,925.54</b>	<b>\$2,195.85</b>

Note: Instructional coaching cost are accounted for in Tier 1 costs.

### Cost Analysis of Prevention and Early Intervention at Cincinnati Public Schools' Pleasant Ridge Montessori

Prevention and early intervention efforts began with a focus on strengthening the core curriculum and instruction to feature a structured literacy approach reading instruction that emphasizes explicit, systematic and sequential reading instruction. Heggerty Phonemic Awareness (<https://heggerty.org>) was selected to supplement the core curriculum. Newly hired teachers received training in Heggerty Phonemic Awareness and an instructional coach provided embedded professional learning to support the application of new practices in the classroom. There were no additional costs associated with the delivery of the newly learned instructional practices during the school day. Fidelity of implementation was assessed by the instructional coach from the regional state support team. Teachers and the school psychologist progress-monitored student growth using Acadience Reading to determine the effectiveness of the core curriculum and instruction and to identify students in need of intervention.

**Table 10. Cost per 100 Students for Strengthening the Core Curriculum and Instruction at Cincinnati Public Schools' Pleasant Ridge Montessori**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Program	Heggerty Phonemic Awareness	\$614.93	\$614.93	\$614.93
Materials	Heggerty Materials	\$680.11	\$680.11	\$680.11
Training	Training Newly Hired Teachers	\$2,408.68	\$2,408.68	\$2,408.68
Coaching	Instructional Coach	\$3,543.84	\$3,543.84	\$3,543.84
Delivery		\$ -	\$ -	\$ -
Fidelity	Conducted by Instructional Coach	\$3,543.84	\$3,543.84	\$3,543.84
Progress Monitoring	Acadience Reading	\$ -	\$ -	\$ -
<b>Cost per 100 Students</b>		<b>\$10,791.40</b>	<b>\$10,791.40</b>	<b>\$10,791.40</b>
<b>Training Cost per Educator</b>		<b>\$2,033.33</b>	<b>\$2,033.33</b>	<b>\$2,033.33</b>

*Note: Costs for assessing students' response to scientifically based reading instruction using Acadience Reading three times a year (fall, winter, spring) are accounted for in the screening costs.*

Cincinnati Public Schools' Pleasant Ridge Montessori offered a system of intervention supports matched to the individual specific skill needs of students. Students assessed and determined to be at "some risk" received targeted intervention selected by the teacher based on the student's specific skill needs. West Virginia Phonics instructional materials created by the West Virginia Department of Education's Reading First initiative were used to intervene with students with skill deficits in phonics. Read Naturally, a research-based program that features teacher modeling, repeated reading and progress monitoring (<https://www.readnaturally.com>) was used to intervene with students with reading accuracy and fluency concerns. Teachers and the reading specialist received training in Orton-Gillingham and implemented Orton-Gillingham with students identified as "at risk." Orton-Gillingham is a direct, explicit, multisensory, structured, sequential, diagnostic and prescriptive way to teach literacy specifically designed for student with, or at risk for, dyslexia (<https://www.ortonacademy.org>). The reading specialist weekly assessed intervention fidelity. The reading specialist progress-monitored student growth to determine each student's response to the intervention.

**Table 11. Cost per Student for Targeted Intervention and Intensive, Individualized Intervention at Cincinnati Public Schools' Pleasant Ridge Montessori**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Program	Read Naturally Orton-Gillingham	\$17.37	\$17.37	\$17.37
Materials	West Virginia Phonics Read Naturally Orton-Gillingham	\$19.21	\$19.21	\$19.21
Training	Orton-Gillingham (\$2,033.33 per Teacher)	\$267.49	\$267.49	\$267.49
Coaching	Instructional Coach	\$393.55	\$393.55	\$393.55
Delivery	Targeted Intervention Groups	\$1,234.82	\$1,569.77	\$1,864.68
	Individualized Intervention	\$1,852.24	\$2,354.66	\$2,797.03
Fidelity	Conducted by Instructional Coach	\$100.09	\$100.09	\$100.09
Progress Monitoring	Acadience Reading	\$75.26	\$95.51	\$114.32
<b>Cost per Student: Targeted</b>		<b>\$2,107.79</b>	<b>\$2,462.99</b>	<b>\$2,776.71</b>
<b>Cost per Student: Individualized</b>		<b>\$2,725.21</b>	<b>\$3,247.88</b>	<b>\$3,709.06</b>

**Cost Analysis of Prevention and Early Intervention at Marysville Exempted Village School District**

Investments were made to strengthen the core curriculum and instruction to prevent reading concerns by focusing on a structured literacy approach to reading instruction that emphasizes explicit, systematic and sequential reading instruction. Heggerty Phonemic Awareness (<https://heggerty.org>) was selected to supplement the core curriculum in kindergarten and Grade 1 and i-Ready Instruction (<https://www.curriculumassociates.com>) was adopted to supplement the core curriculum in Grades 2-3. Instructional materials purchased included phonogram cards, Magna-tiles and dry erase boards. Teachers received three hours of training provided by district personnel and on-going instructional coaching for 30 minutes weekly over the course of the school year to support the application of instructional practices in the classroom. There were no additional costs associated with the delivery of the newly learned instructional practices during the school day as it was assumed to be part of the teachers' job responsibilities.

**Table 12. Cost per 100 Students for Strengthening the Core Curriculum and Instruction at Marysville Exempted Village School District**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Program	Heggerty Phonemic Awareness (K-1) i-Ready Instruction (Gr. 2-3)	\$615.52	\$615.52	\$615.52
Materials	Phonogram cards Magna-tiles Dry erase boards Rewards & Photocopies	\$213.33	\$213.33	\$213.33
Training	Delivered by District Personnel	\$905.00	\$1,150.06	\$1,368.29
Coaching	Instructional Coach	\$3,592.21	\$4,566.61	\$5,424.53
Delivery	Core instruction with supplements	\$ -	\$ -	\$ -
Fidelity	Conducted by Administrator	\$2,015.38	\$2,283.53	\$2,519.15
Progress Monitoring	Conducted by the Reading Specialist	\$426.58	\$542.29	\$644.16
<b>Cost per 100 Students</b>		<b>\$7,768.02</b>	<b>\$9,371.34</b>	<b>\$10,794.98</b>
<b>Training Cost per Educator</b>		<b>\$9.53</b>	<b>\$12.11</b>	<b>\$14.40</b>

Fidelity of implementation was assessed by 15-minute observations conducted for each teacher weekly by the building administrator. The reading specialist progress-monitored student growth to determine the effectiveness of the core curriculum and instruction and to identify students in need of intervention.

Marysville Exempted Village School District offered a system of intervention supports matched to the individual specific skill needs of students. Students assessed and determined to be at “some risk” or “at risk” received targeted intervention using the S.P.I.R.E.® teacher-led reading intervention program. Reading specialists and intervention specialists received Orton-Gillingham: Level 1 training/practicum and implemented Orton-Gillingham with students demonstrating “some risk” or “at risk.” Orton-Gillingham is a direct, explicit, multisensory, structured, sequential, diagnostic and prescriptive way to teach literacy specifically designed for students with, or at risk for, dyslexia (<https://www.ortonacademy.org>). The reading specialist weekly assessed intervention fidelity. The reading specialist progress-monitored student growth to determine each student’s response to the intervention.

**Table 13. Cost per Student for Targeted Intervention and Intensive, Individualized Intervention at Marysville Exempted Village School District**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Program	S.P.I.R.E.	\$21.63	\$21.63	\$21.63
Materials	Orton-Gillingham Materials Photocopies & Rewards	\$4.59	\$4.59	\$4.59
Training	Orton-Gillingham Level 1 Training (\$287.50 per teacher)	\$39.09	\$44.13	\$48.56
Coaching				
Delivery	Targeted Intervention Groups	\$1,351.63	\$1,711.35	\$2,068.52
	Individualized Intervention	\$2,782.77	\$3,523.37	\$4,258.71
Fidelity	Monitored by School Administrator	\$15.08	\$17.09	\$18.93
Progress Monitoring	Conducted by the Reading Specialist	\$22.85	\$29.05	\$34.51
<b>Cost per Student: Targeted</b>		<b>\$1,454.87</b>	<b>\$1,827.84</b>	<b>\$2,196.74</b>
<b>Cost per Student: Individualized</b>		<b>\$2,886.01</b>	<b>\$3,639.86</b>	<b>\$4,386.93</b>

**Cost Analysis of Prevention and Early Intervention at Upper Arlington Schools**

A concerted effort was made to strengthen the core curriculum and instruction to prevent reading concerns by focusing on a Structured Literacy approach to reading instruction that emphasizes explicit, systematic and sequential reading instruction. Wilson Foundations®

(<https://www.wilsonlanguage.com/programs/fundations>) was selected to supplement the core curriculum in kindergarten through Grade 2. The Wilson Foundations® package includes the program, teacher materials, student materials and one-day access to teacher training through virtual workshops offered for \$289 per person. The current costs to implement Wilson Foundations® is nominal as Upper Arlington City Schools invested in the training in 2017. Heggerty Phonemic Awareness (<https://heggerty.org>) was also selected as a supplement to the core curriculum for kindergarten through Grade 3. There were no additional costs associated with the delivery of the newly learned instructional practices during the school day as it was assumed to be part of the teachers' job responsibilities. Fidelity of implementation was not formally assessed. STAR, a computer-administered benchmarking assessment, was administered to all students in the school district three times a year to determine the effectiveness of the core curriculum and instruction.

**Table 14. Cost per 100 Students for Strengthening the Core Curriculum and Instruction at Upper Arlington Schools**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Program	Wilson Foundations Heggerty	\$239.38	\$239.38	\$239.38
Materials		\$70.13	\$70.13	\$70.13
Training				
Coaching	Instructional Coach	\$ -	\$ -	\$ -
Delivery	Core instruction with supplements	\$ -	\$ -	\$ -
Fidelity	Implementation Fidelity Checks	\$ -	\$ -	\$ -
Progress Monitoring	STAR	\$1,187.00	\$1,187.00	\$1,187.00
<b>Cost per 100 Students</b>		<b>\$1,496.51</b>	<b>\$1,496.51</b>	<b>\$1,496.51</b>
<b>Training Cost per Educator (Foundations)</b>		<b>\$289.00</b>	<b>\$289.00</b>	<b>\$289.00</b>

**Cost Analysis of Prevention and Early Intervention at Upper Arlington**

Upper Arlington Schools offered a system of intervention supports matched to the individual specific skill needs of students. Students who demonstrated “some risk” of reading challenges received intervention with Lexia® Core5® Reading, an adaptive blended learning program targeting the development of literacy skills (<https://www.lexialearning.com/core5>). Students identified through screening to be “at risk” received intensive, individualized intervention with Orton-Gillingham, a direct, explicit, multisensory, structured, sequential, intervention specifically designed for student with, or at risk for, dyslexia (<https://www.ortonacademy.org>). There were no costs associated with assessing intervention fidelity and progress monitoring students’ response to intervention.

**Table 15. Cost per Student for Targeted Intervention and Intensive, Individualized Intervention at Upper Arlington Schools**

Component	Element	Low Salary Rate	Medium Salary Rate	High Salary Rate
Program	Lexia® Core5® Reading	\$30.00	\$30.00	\$30.00
Materials	Orton-Gillingham Materials (Individualized Intervention)	\$263.33	\$263.33	\$263.33
		\$75.15	\$75.15	\$75.15
Training	Orton-Gillingham Training (Individualized Intervention)	\$83.33	\$83.33	\$83.33
Coaching		\$ -	\$ -	\$ -
Delivery	Targeted Intervention Groups	\$ -	\$ -	\$ -
	Individualized Intervention: Orton-Gillingham	\$2,782.77	\$3,523.37	\$4,258.71
Fidelity		\$ -	\$ -	\$ -
Progress Monitoring		\$ -	\$ -	\$ -
<b>Cost per Student: Targeted</b>		<b>\$30.00</b>	<b>\$30.00</b>	<b>\$30.00</b>
<b>Cost per Student: Individualized</b>		<b>\$3,204.58</b>	<b>\$3,945.18</b>	<b>\$4,680.52</b>

Table 16. Cost Analysis Summary Table

	Clermont Northeastern	Cincinnati Public: Mt. Washington	Cincinnati Public: Pleasant Ridge	Marysville	Upper Arlington
<b>Screening Process</b>					
Universal Screening	✓	✓	✓	✓	✗
Intervention-based Diagnostic Assessment	✓	✗	✗	✓	✗
Clinical Diagnostic Assessment	✗	✗	✗	✓	✓
Cost per 100 Students (Median Salary Rate)	\$7,590.79	\$7,058.29	\$5,197.85	\$13,095.70	\$3,675.70
<b>Multi-tiered System of Instructional and Intervention Supports</b>					
Strengthening Core Curriculum and Instruction - Cost per 100 Students (Median Salary Rate)	\$24,621.09	\$37,004.55	\$10,791.40	\$9,371.34	\$1,496.51
Targeted Intervention - Cost per Student (Median Salary Rate)	\$1,767.66	\$2,704.34	\$2,462.99	\$1,827.84	\$30.00
Intensive, Individualized Intervention - Cost per Student (Median Salary Rate)	\$2,538.27	\$1,925.54	\$3,247.88	\$3,639.86	\$3,945.18

Key:

- ✓ Administered universally to all students
- ✓ Administered selectively to students demonstrating elevated risk
- ✗ Not administered as part of the screening process

## Glossary of Terms

**Curriculum-based assessments** – Brief, short-cycle assessments of academic skill fluency valid for universal screening (typically three times a year: fall, winter and spring benchmarks) to identify students in need of additional diagnostic assessment and possible intervention. Also used for progress monitoring a student’s response to intervention. Examples include: Acadience Reading, aimswebPLUS, EasyCBM and Fastbridge.

**Clinical diagnostic test** – Norm-referenced assessment designed to provide diagnostic information for the purposes of identification and classification. Example includes the Comprehensive Test of Phonological Processing, 2<sup>nd</sup> Edition (CTOPP-2).

**Intervention-based diagnostic assessment tools** – Criterion-referenced assessments used to pinpoint specific academic skill weaknesses for the purposes of identifying academic skill targets for intervention and selecting appropriate, evidence-based interventions. Examples include: Phonological Awareness Screening Test (PAST), CORE Phonics Surveys, LETRS Phonics and Word-Reading Survey and Heggerty Phonemic Awareness assessment.

**Progress monitoring** – Assessment procedures used on a frequent basis (e.g., monthly, weekly, daily) to measure student growth in response to targeted or intensive intervention. Progress monitoring data are used to determine whether the intervention is having the intended effect or if the intervention needs to be modified or intensified to meet the student’s unique needs.

**Universal screening** – A process that involves administering measures to all students to identify students who are at risk for future difficulties and thus should be considered for prevention or early intervention services. Universal screening data can also be used to assess the overall effectiveness of the academic instruction in meeting the needs of students.

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