

EARLY CHILDHOOD EDUCATION PROGRAM COST COMPARISON

Prepared for Arlington Public Schools

September 2016



In the following report, Hanover Research compares the demographics, staff allocations, and personnel costs of early childhood education programs at Arlington Public Schools. Additionally, the report also examines costs related to Pre-K transportation.

TABLE OF CONTENTS

Executive Summary	3
Introduction	3
Key Findings	4
Section I: Methodology	6
Student Income Levels.....	7
Section II: Demographics	8
Total Enrollment	8
Enrollment by Income Threshold	10
Staffing Allocations	11
Section III: Program Costs and Cost Comparisons	15
Staff Salaries and Cost per Student	15
Start-Up Costs	16
Montessori.....	17
VPI Pre-K	18
Additional Costs	19
External Program Funding: Tuition Revenue and Grants	20
Montessori Program	20
VPI Pre-K	21
Section IV: Transportation Estimates	24
Background	24
Estimated Pre-K Transportation Costs.....	25
Bus Attendants	26
Appendix A: Data Catalog	27

EXECUTIVE SUMMARY

INTRODUCTION

The following report reviews budgetary and enrollment information for two of Arlington Public Schools' (APS) full-day early childhood education (ECE) programs: Virginia Preschool Initiative (VPI) and the Montessori Primary Program. The results of this research will be considered as part of a larger evaluation of ECE offerings in the district.

While this report aims to inform a discussion of the costs of ECE programming at APS, this report does not comment on the value of each program for meeting district goals or community needs. For example, this analysis confirms that Montessori classrooms require substantially higher starting costs than VPI Pre-K classrooms. This is consistent with literature that suggests that “starting a public Montessori school requires a large initial investment for teacher education, materials, furniture, and so on” because the selection of materials that adhere to Montessori principles is critical to the functioning of the program.¹ By contrast, the VPI Pre-K program commands a higher per-pupil personnel cost than the Montessori program, largely due to smaller class sizes and a lower student-staff ratio. However, the higher costs associated with establishing a Montessori classroom or maintaining small VPI Pre-K class sizes may align to APS goals, positive student outcomes, and/or parent preferences.

The report comprises four sections, and is accompanied by a Data Supplement:

- **Section I: Methodology** reviews the programs included in this report, as well as major topics and data sources.
- **Section II: Demographics** explores enrollment, student characteristics, and staff allocation in the Montessori and VPI Pre-K programs.
- **Section III: Program Costs and Cost Comparisons** identifies cost and revenue information associated with each ECE program.
- **Section IV: Transportation Estimates** provides an estimate of bus ridership and transportation costs for Montessori and VPI Pre-K students.
- **Data Supplement** presents a comprehensive overview of student and teacher data included in this report, as well as a summary of cost and revenue data and transportation information.

¹ Chattin-McNichols, J. “The Hard Work of Public Montessori.” *Montessori Life*, 28:3, 2016, p. 35. Accessed through: EBSCO.

KEY FINDINGS

ENROLLMENT

- Overall, the VPI Pre-K program enrolls a larger number of Pre-K students and a higher proportion of low-income students than the Montessori program. This is likely due to VPI eligibility requirements that target low-income students. The Montessori program reserves two thirds of seats for students below a specified income level (\$86,000), but is a fee-based program for all three-year-old students and those four-year-olds who exceed income requirements. Enrollment characteristics for each program are summarized in Figure ES.1 below.

Figure ES.1: Student Enrollment Characteristics by Program, 2015-2016*

PROGRAM	TOTAL PRE-K ENROLLMENT	INCOME BELOW 130% FPL	INCOME 131-200% FPL	INCOME 201-350% FPL	INCOME ABOVE 350% FPL
VPI Pre-K	547	38.9%	24.9%	2.7%	0.2%
Montessori Program	312	23.1%	12.2%	11.5%	27.2%

*Note: Household income data is not available for 33 percent of VPI and 26 percent of Montessori Pre-K students.

STAFF & PERSONNEL COSTS

- Teachers in the Montessori program are, on average, more experienced than those in the VPI Pre-K program. A summary of staff allocation and costs are provided in Figure ES.2 below.
- Per-pupil personnel costs are slightly higher for the VPI Pre-K program (\$8,702) than for the Montessori program (\$7,331). However, average salary and benefits costs for Montessori teachers are higher than the average observed among VPI teachers (\$117,401 and \$97,196, respectively). Higher per-pupil costs for the VPI program can be attributed to slightly higher average salary and benefits costs for Pre-K assistants as well as smaller class sizes and lower student-teacher and student-assistant ratios. The VPI Pre-K program requires a maximum class size of 16 to 18 students, while the maximum class size for Montessori Primary classrooms is 23 Pre-K and K students. It should be noted that the average class size for mixed-age Montessori Primary classrooms is 21.5 students, suggesting that some school sites may be under-enrolled, particularly among Kindergarten students.

ES.2: Personnel Characteristics and Costs by Program, 2015-2016

PROGRAM	NUMBER OF TEACHERS	AVERAGE YEARS OF TEACHER EXPERIENCE	STUDENT-TEACHER RATIO	NUMBER OF ASSISTANTS	TOTAL STUDENT-STAFF RATIO	PER-PUPIL PERSONNEL COSTS**
VPI Pre-K	34	14.4 years	16.1: 1	34	8: 1	\$8,702
Montessori Program*	19	20.6 years	21.5: 1	19	10.7: 1	\$7,331

*Note: Student-staff ratios and per-pupil costs for the Montessori program are calculated using the full program enrollment, including both Pre-K and Kindergarten students.

**Note: Per-pupil personnel costs include total salary and benefits for all teachers and assistants in each program.

OTHER PROGRAM COSTS AND EXTERNAL INCOME

- **Start-up costs at the individual classroom level, including furniture and instructional material purchases, are significantly higher for the Montessori program than for the VPI Pre-K program.** This is largely because Montessori classrooms require specialized materials that adhere to program principles. For example, one Montessori classroom established in the district in academic year 2013-2014 required \$31,391 for furniture and supplies. Comparatively, a VPI Pre-K classroom established in the district in 2011 required an investment of about \$10,761 for furniture and supplies.
- **Each program derives a proportion of total spending from external revenue sources, including Montessori program tuition and a state grant to support the VPI Pre-K program.** In academic year 2015-2016, all three-year-old Montessori students and one-third of four-year-old Montessori students paid tuition based on their household income, ultimately resulting in tuition revenue of \$1,070,244 in FY 2016. Comparatively, the VPI Pre-K program received \$1,677,000 in external grant funding for academic year 2015-2016. The majority of grant funding (82 percent) supported personnel costs, while the remaining 18 percent supported investments in parental involvement, field trips and food services, professional development, and other program operating expenses.

TRANSPORTATION

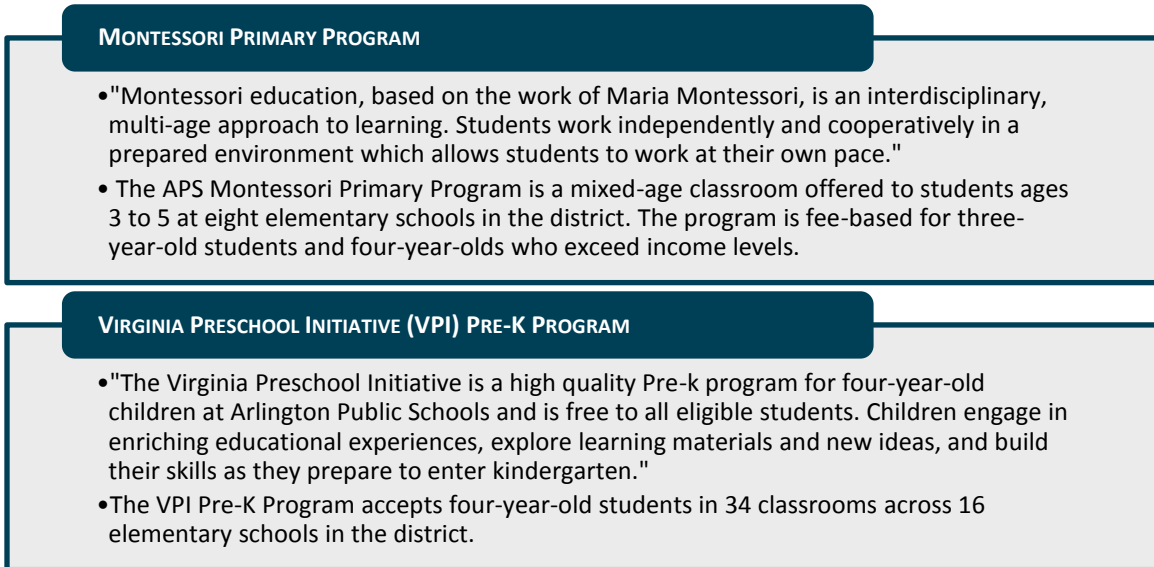
- **Approximately one-third of Montessori Pre-K students and one-half of VPI Pre-K students receive transportation services at APS.** Based on an estimate of per-pupil costs provided by APS, the total cost of Pre-K transportation is \$171,661, including \$45,026 for the Montessori program and \$126,635 for the VPI program. Note that this cost estimate does not include students who receive exclusive transportation (SPED) bus services, or incorporate the added cost of bus attendants, who are required at three school sites: Campbell Elementary, Drew Elementary, and Hoffman-Boston Elementary

SECTION I: METHODOLOGY

The following report examines two of APS’s Early Childhood Education (ECE) programs: Montessori Primary Program and Virginia Preschool Initiative (VPI) Pre-K. These programs serve Pre-K students throughout the district, as described in Figure 1.1 below. Ultimately, this review compares program enrollment and costs for the two program structures, which will inform further program evaluation currently underway in the district.

While this analysis compares programmatic information where possible, it should be noted that data points are not necessarily comparable across programs. The program costs examined in this report are meant to provide further information on the expenses associated with the VPI and Montessori programs, rather than to comment on the relative value of different ECE formats. Accordingly, program costs should be considered in the context of district goals for early childhood programming, community needs, student outcomes, and parent preferences.

Figure 1.1: Early Childhood Education Program Descriptions



Source: Arlington Public Schools²

The following sections analyze the data provided by APS to provide an overview of program enrollment, demographic, and costs, including the following:

- Total program enrollment and enrollment by student population and income threshold;

² Language in quotes verbatim from:

[1] "Montessori Program." Arlington Public Schools. <https://www.apsva.us/early-childhood-prek/montessori-program/>

[2] "Virginia Preschool Initiative (VPI)." Arlington Public Schools. <https://www.apsva.us/early-childhood-prek/virginia-preschool-initiative-vpi/>

- Staff allocation by program, including number of teachers and assistants, student-staff ratios, and teacher experience levels;
- Personnel costs, including average salary and benefit costs and average per-pupil spending;
- Sample start-up costs for individual classrooms, including past examples of spending on classroom furniture and instructional equipment;
- Additional cost information by program as available;
- External program funding, including Montessori program tuition and VPI grant allocations; and
- Estimates of Pre-K transportation costs.

A complete list of data files provided by APS and used in this report can be found in Appendix A.

STUDENT INCOME LEVELS

The income data provided by APS offers a household income threshold as a percentage of the Federal Poverty Level (FPL) for each student. This income threshold varies by household size (see Figure 1.2). Four-year-old students in Arlington County whose household incomes fall below 350 percent FPL are eligible for participation in the VPI Pre-K program, although enrollment priority is given to those students at the lowest income levels. It should be noted that the income eligibility level for reserved seating in the Montessori program is a fixed point: 80 percent of the median income of Arlington County (\$86,000 in 2015-2016). Because the FPL threshold varies by household size and does not indicate actual student household income, this analysis cannot demonstrate which Montessori students qualify for reserved enrollment in the program. Because program fees charged for three-year-old and four-year-old enrollment in the Montessori program vary by actual income rather than FPL threshold, this analysis does not identify which students pay fees to participate in the Montessori program.

Figure 1.2: FPL Income Levels by Household Size, 2015

HOUSEHOLD SIZE	100% OF FPL	130% OF FPL	200% OF FPL	350% OF FPL
1	\$11,770	\$15,301	\$23,540	\$41,195
2	\$15,930	\$20,709	\$31,860	\$55,755
3	\$20,090	\$26,117	\$40,180	\$70,315
4	\$24,250	\$31,525	\$48,500	\$84,875
5	\$28,410	\$36,933	\$56,820	\$99,435
6	\$32,570	\$42,341	\$65,140	\$113,995
7	\$36,730	\$47,749	\$73,460	\$128,555
8	\$40,890	\$53,157	\$81,780	\$143,115

Source: U.S. Department of Health & Human Services³

³ Figure created using the Federal Poverty Guidelines for households with up to eight members provided by the U.S. Department of Health & Human Services: "2015 Poverty Guidelines." U.S. Department of Health & Human Services, September 3, 2015. <https://aspe.hhs.gov/2015-poverty-guidelines#thresholds>

SECTION II: DEMOGRAPHICS

The following section explores enrollment and demographic information for the VPI and Montessori Pre-K programs at APS. Furthermore, the section reviews staff allocation information, including staff-student ratios and average teacher experience across programs.

It should be noted throughout this analysis that demographics vary widely across programs largely due to state and district policies surrounding student eligibility. VPI enrollment is offered to four-year-old students whose household incomes are lower than 350 percent of FPL; students at the lowest poverty thresholds receive priority placement, and all placement is conducted at the district level. In contrast, Montessori enrollment is determined by lottery at each school site; while two thirds of seats are reserved for students with household incomes below 80 percent of the county median income, final enrollment is determined by lottery for both reserved and unreserved seats.

TOTAL ENROLLMENT

Figure 2.1 and Figure 2.2 display the overall enrollment and enrollment by school for Pre-K students in the Montessori and VPI programs. Montessori Pre-K includes both three-year-old and four-year-old students, while the VPI program only enrolls four-year-old Pre-K students. It should be noted that the APS Montessori Primary Program also includes 96 Kindergarten students, who are excluded from this analysis unless otherwise noted.

As displayed in the figures, the VPI program enrolls more than 200 more Pre-K students than the Montessori program. Furthermore, the VPI program serves students across 34 classes and 16 elementary schools. Comparatively, the Montessori program consists of 19 classrooms across eight elementary schools. The average class size for the Montessori program is 21.5 Pre-K and K students—lower than the program’s maximum class size of 23 three-, four-, and five-year-old students. Montessori average class size is lowest at Jamestown Elementary School (19.7 students per class) and Hoffman-Boston Elementary School (20.8 students per class). The VPI program, which caps enrollment at 16 to 18 students per classroom, reported an average class size of 16.1 students in academic year 2015-2016.⁴

Figure 2.3 displays a breakdown of the mixed-age Montessori Primary programs at APS, by grade-level and age of students on September 30, 2015. As shown in the figure, Montessori Primary programs currently enroll an unbalanced mix of students; while high-quality Montessori programs are designed to enroll an even distribution of students at each age level, APS Montessori programs enroll a disproportionately high number of Pre-K students compared to K students at many school sites, including Discovery Elementary (0 percent K students), Jamestown Elementary (14 percent), and Carlin Springs Elementary (18 percent). More evenly distributed enrollment is observed at Drew Elementary, the county-wide

⁴ “Virginia Preschool Initiative.” Arlington Public Schools. <https://www.apsva.us/early-childhood-prek/virginia-preschool-initiative-vpi/>

Montessori site, where three-, four-, and five-year old students each comprise about one third of the program’s enrollment. Balanced mixed-age classrooms are also observed among the single-classroom Montessori sites at Campbell and Barrett Elementary School.

Figure 2.1: Total Pre-K Enrollment by Program, 2015-2016

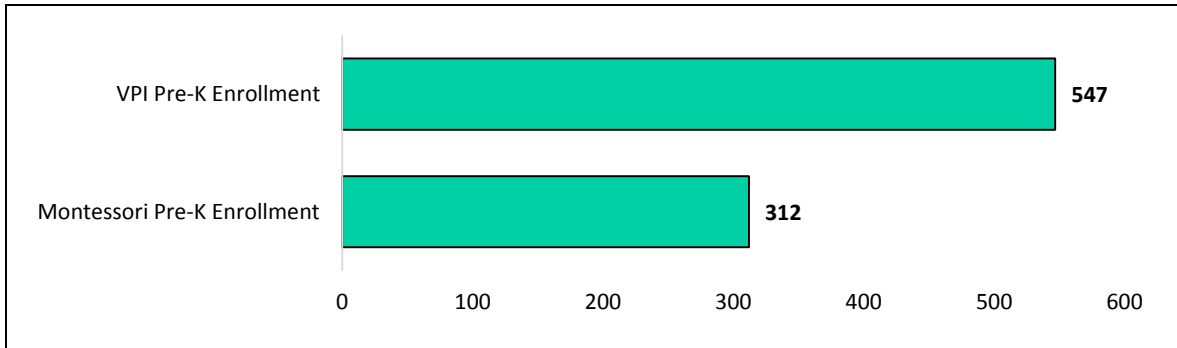


Figure 2.2: Enrollment and Average Class Size by Program and School, 2015-2016

SCHOOL	NUMBER OF CLASSES	TOTAL PRE-K ENROLLMENT	TOTAL K ENROLLMENT	AVERAGE CLASS SIZE
Montessori Programs				
Barrett Elementary School	1	15	6	21.0
Campbell Elementary School	1	16	7	23.0
Carlin Springs Elementary School	1	18	4	22.0
Discovery Elementary School	1	23	0	23.0
Drew Elementary School	7	107	49	22.3
Hoffman-Boston Elementary School	4	66	17	20.8
Jamestown Elementary School	3	51	8	19.7
McKinley Elementary School	1	16	5	21.0
All Montessori Programs	19	312	96	21.5
VPI Pre-K				
Abingdon Elementary School	2	33	--	16.5
Arlington Science Focus Elementary School	1	13	--	13.0
Arlington Traditional School	1	16	--	16.0
Ashlawn Elementary School	1	16	--	16.0
Barcroft Elementary School	2	35	--	17.5
Barrett Elementary School	2	31	--	15.5
Campbell Elementary School	3	46	--	15.3
Carlin Springs Elementary School	4	62	--	15.5
Claremont Elementary School	2	32	--	16.0
Drew Elementary School	2	34	--	17.0
Hoffman-Boston Elementary School	5	85	--	17.0
Key Elementary School	2	30	--	15.0
Long Branch Elementary School	1	18	--	18.0
Oakridge Elementary School	1	15	--	15.0
Patrick Henry Elementary School	2	35	--	17.5
Randolph Elementary School	3	46	--	15.3
All VPI Pre-K Programs	34	547	--	16.1

Figure 2.3: Montessori Mixed-Age Classroom Enrollment, 2015-2016

SCHOOL	3-YEAR PRE-K STUDENTS	4-YEAR PRE-K STUDENTS*	KINDERGARTEN STUDENTS	TOTAL ENROLLMENT
Barrett Elementary School	7	8	6	21
Campbell Elementary School	8	8	7	23
Carlin Springs Elementary School	9	9	4	22
Discovery Elementary School	11	12	0	23
Drew Elementary School	51	56	49	156
Hoffman-Boston Elementary School	35	31	17	83
Jamestown Elementary School	26	25	8	59
McKinley Elementary School	7	9	5	21
All Montessori Programs	154	158	96	408

*One student enrolled in Pre-K was 5 years old on September 30, 2015. This student is counted with four-year-old Pre-K students.

ENROLLMENT BY INCOME THRESHOLD

In addition to total enrollment, this analysis provides some information regarding family income levels for Pre-K students. However, it should be noted that this data is limited. As displayed in Figure 2.4, income threshold data are unavailable for one-third of VPI Pre-K students and about one-quarter of Montessori Pre-K students.

Among those students whose family income threshold is provided, VPI students are more likely to be low-income (130 percent of the federal poverty level or less) than their Montessori counterparts. This signifies a maximum annual household income of \$31,525 for a family of four.⁵ Just one student enrolled in VPI Pre-K reported a family income of 350 percent of the FPL or more (household income of \$84,875 or higher for a family of four); this is likely due to income requirements surrounding eligibility for the VPI program. The 2016-2017 VPI application provided by APS indicates that “families whose income does not exceed 350% on the Federal Poverty chart... are eligible for the VPI program,”⁶ although 2016-2017 guidance from the Virginia Department of Education confirms that other factors may influence student eligibility for the VPI program, including homelessness, educational attainment of student’s parents (high school dropout status), student placement in foster care, and special education or English language learner (ELL) status, among other factors.⁷

Comparatively, more than one-quarter of Montessori students report family incomes higher than 350 percent of the FPL or, as previously noted, \$84,875 or higher for a family of four. However, because reserved seats are available for students with household incomes up to \$86,000 and non-reserved seats are available for students from households at any income level, these data may not accurately capture disparities in income levels between the two programs.

⁵ See Section I Methodology for additional information.

⁶ “Virginia Preschool Initiative (VPI) Application 2016-2017,” Op. cit.

⁷ “Virginia Preschool Initiative: Guidelines for the Virginia Preschool Initiative Application 2016-2017.” Virginia Department of Education, 2016, p. 7.
http://www.doe.virginia.gov/instruction/early_childhood/preschool_initiative/guidelines.pdf

Figure 2.4: Enrollment by Income Threshold, 2015-2016

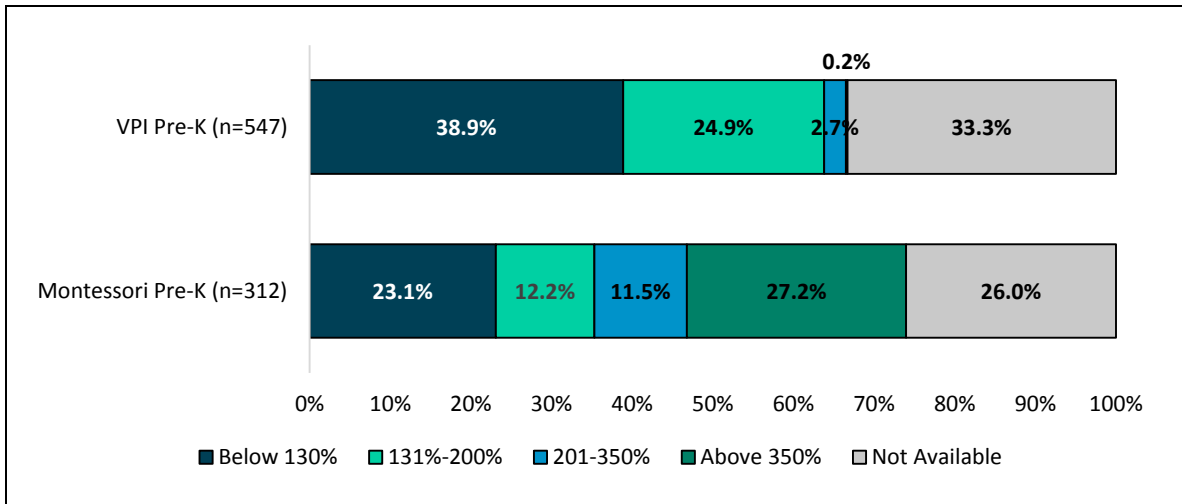
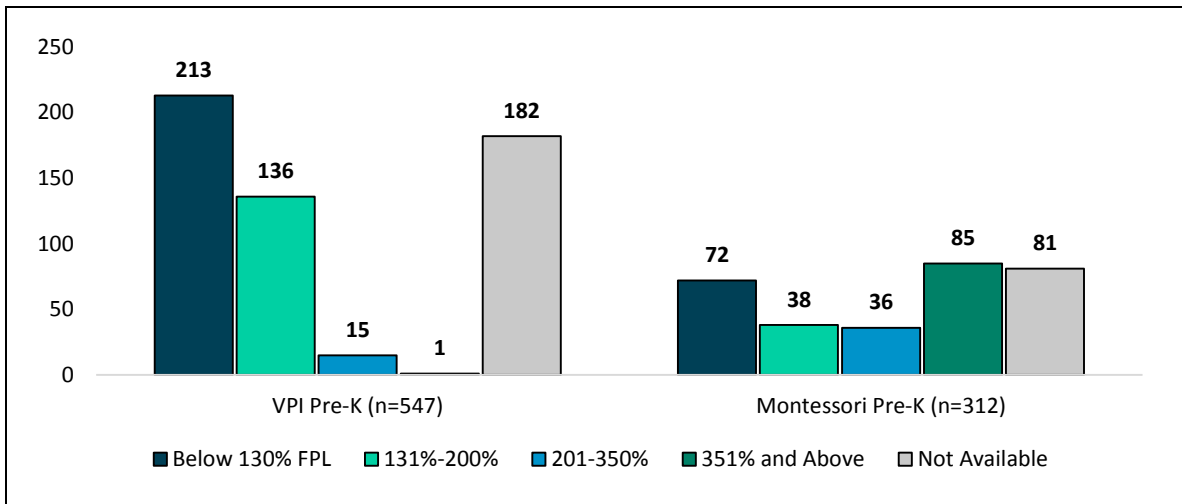


Figure 2.5: Distribution of Students by Income Level, 2015-2016



STAFFING ALLOCATIONS

Figure 2.6 and Figure 2.7 display the overall number of staff for each Pre-K program, as well as estimated average student-staff ratios. It should be noted that the student-teacher and student-assistant ratios calculated for the Montessori Primary Program includes the 96 Kindergarten students enrolled in 2015-2016, in order to provide a more accurate estimate of staffing levels.

As shown in the figures, the Montessori Primary Program has a higher student-teacher ratio (21.5:1) than the VPI program (16.1:1). Overall, the student-staff ratio—including both teachers and assistants—is 10.7:1 for the Montessori program and 8:1 for the VPI program.

Figure 2.6: Total Number of Staff Members by Program, 2015-2016

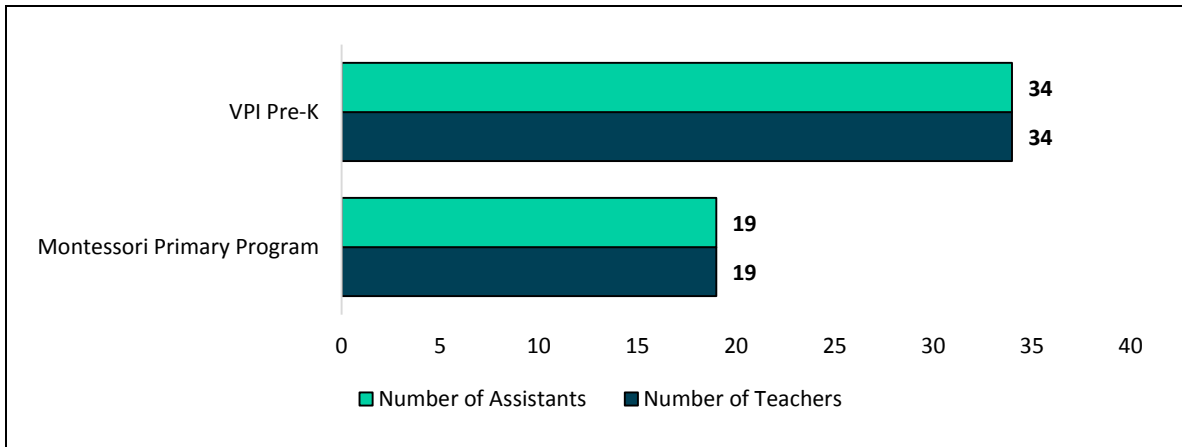
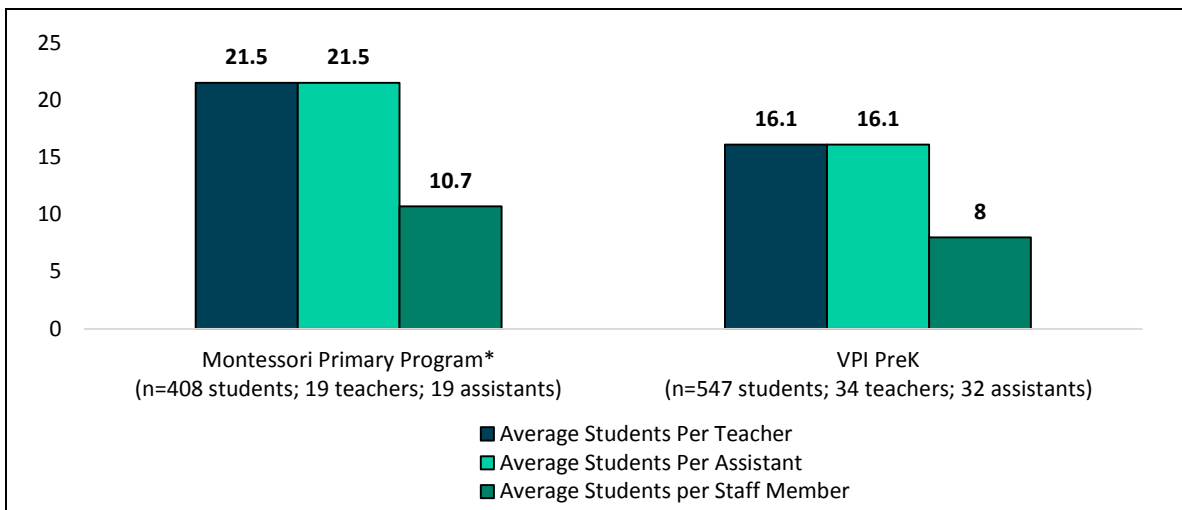


Figure 2.7: Student-Staff Ratios by Program, 2015-2016

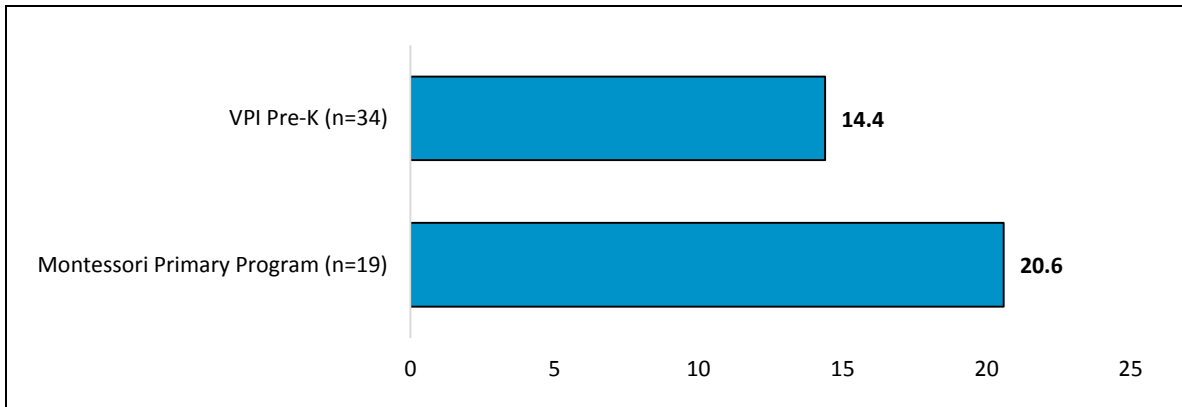


*Note: Student-staff ratios for the Montessori program are calculated using the full program enrollment, including both Pre-K and Kindergarten students.

Average staff experience also varies significantly by Pre-K program. Montessori teachers tend to have more experience (20.6 years) than their counterparts in the VPI program (14.4 years). As displayed in Figure 2.9, approximately one in four VPI Pre-K teachers had six to 10 years of teaching experience, and more than half of VPI teachers have 15 years of experience or less. Comparatively, just one-quarter of Montessori teachers have 15 years of experience or less; nearly one in three Montessori teachers have 21 to 25 years of teaching experience.

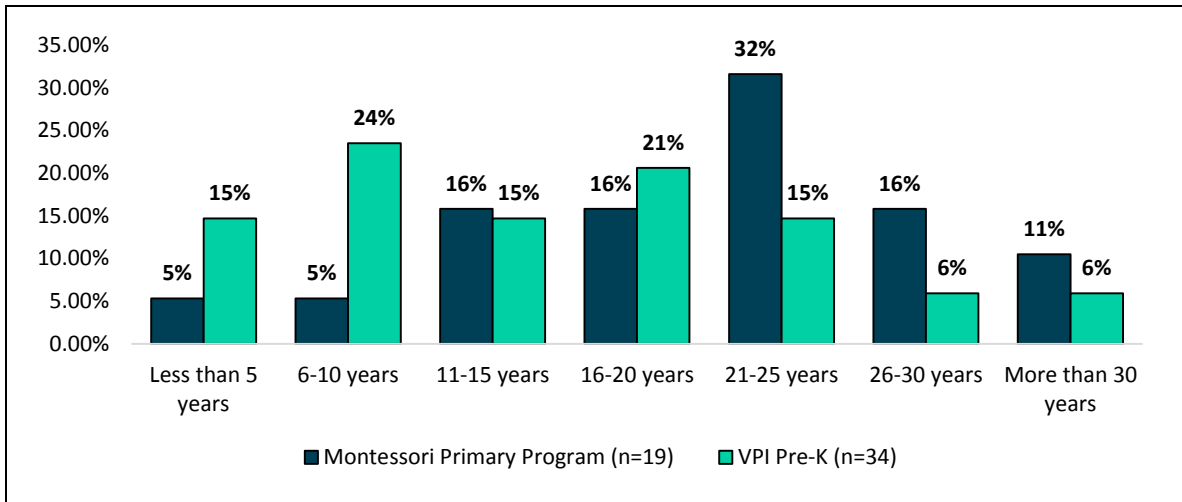
ECE teachers hold a variety of licenses and teaching endorsements (Figure 2.10). All ECE teachers in both programs report holding one or more endorsements related specifically to early childhood education. Most often, this endorsement was Early/Primary Education Pre-K-3 (53 percent of Montessori teachers and 44 percent of VPI teachers). Another 10 VPI teachers hold an endorsement for Elementary Education PreK-6 (nearly 30 percent).

Figure 2.8: Average Years of Teaching Experience*, 2015-2016



*Averages include all years teaching experience, including in APS, Virginia, and other states.

Figure 2.9: Distribution of Years of Teacher Experience by Program*, 2015-2016



*Averages include all years teaching experience, including in APS, Virginia, and other states.

Figure 2.10: Teacher Licenses and Endorsements by Program

ENDORSEMENT/LICENSE	MONTESSORI TEACHERS		VPI PRE-K TEACHERS	
	NUMBER	PERCENT	NUMBER	PERCENT
License Type				
Collegiate Professional	5	26%	13	38%
Postgraduate Professional	13	68%	20	59%
Provisional	1	5%	1	3%
Teacher Early Childhood Education Endorsements*				
Early/Primary Education PreK-3	10	53%	15	44%
Elementary Education PreK-6	2	11%	10	29%
Early Education NK-4	3	16%	5	15%
Early Childhood Special Education	1	5%	3	9%
Early Education Pre K-3	3	16%	1	3%
Elementary Grades Pre K-6	0	0	3	9%
Elementary Grades NK-8	1	5%	0	0%
Total Teachers with a Pre-K Endorsement (Unduplicated)	19	100%	34	100%

*Note: Number of teachers may sum to more than the total for each program because teachers may hold more than one endorsement.

SECTION III: PROGRAM COSTS AND COST COMPARISONS

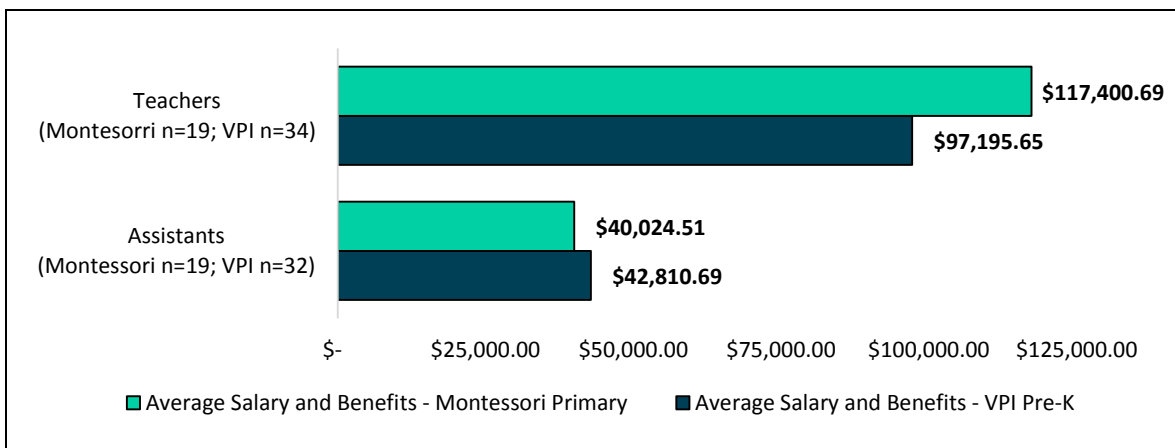
The following section examines costs associated with the VPI and Montessori Pre-K programs, including current personnel costs, estimated start-up costs for individual classrooms, and additional program operation costs and considerations as available. The section also examines external funding sources unique to the two programs. As noted in the methodology section, these data points are not always comparable across programs and are meant to inform discussion surrounding the expenses associated with each, rather than to determine or compare the value of different ECE programs.

STAFF SALARIES AND COST PER STUDENT

Figure 3.1 and Figure 3.2 display the average teacher and assistant salary and benefit costs and estimated per-student costs for the VPI and Montessori programs. As shown in the figures, the average total cost of salary and benefits for Montessori teachers is considerably higher than the average total cost for VPI teachers (\$117,400.69 and \$97,195.65, respectively). In contrast, average salary and benefits for Pre-K assistants is slightly higher among VPI assistants (\$42,810) than among Montessori assistants (\$40,024). A further breakdown of average and median salary and benefits costs is provided in the accompanying data supplement.

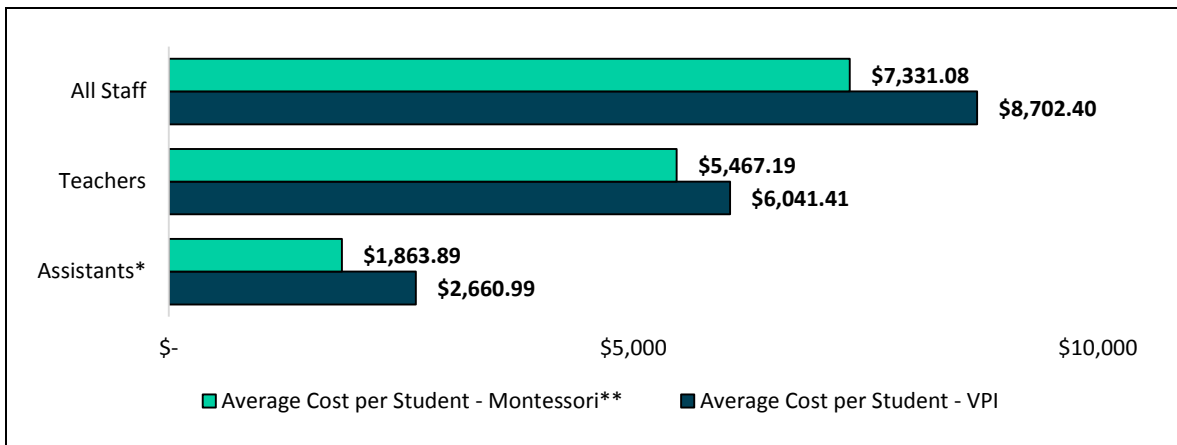
Despite higher average salaries among Montessori teachers, the average per-student personnel cost is slightly higher for the VPI Pre-K program than the Montessori Pre-K and K program (Figure 3.2). This is likely due to the lower student-staff ratio observed in the Pre-K program. As displayed in the figure, the average per-student cost for all instructional staff salary and benefits is approximately \$7,331 for K and Pre-K students in the Montessori program and \$8,702 for Pre-K students in the VPI program.

Figure 3.1: Average Teacher and Assistant Staff Salary and Benefit Costs by Program*



*Note: Salary data is only available for 32 VPI assistants, although 34 assistants were employed for the program in academic year 2015-2016.

Figure 3.2: Average Instructional Personnel Cost per Student by Position and Program



*Note: Per-student costs for instructional assistants in the VPI program were calculated assuming an average salary for the two assistants for whom no salary and benefits data were available. Thus, actual personnel costs and per-pupil costs may vary slightly.

**Note: Average cost per student for Montessori programs is calculated *including* Kindergarten students.

START-UP COSTS

In addition to ongoing personnel and other operation costs, the VPI and Montessori Pre-K programs differ in cost of creating an initial classroom. As displayed in Figure 3.3 below, estimated starting costs for classroom furniture and instructional materials for a Montessori classroom is significantly higher than for a VPI Pre-K classroom. It is a widely recognized challenge for public school Montessori programs that such classrooms require a specific selection of materials, which may cost more than traditional classroom materials. This is because the Montessori philosophy requires classroom materials that foster independent, student-led learning. One Montessori expert involved in creating public school Montessori programs writes:

Montessori educators know how important an appropriate selection of materials is; without such a selection, how will children find work that draws them into concentration? Without materials that work for them, they can't "do Montessori."

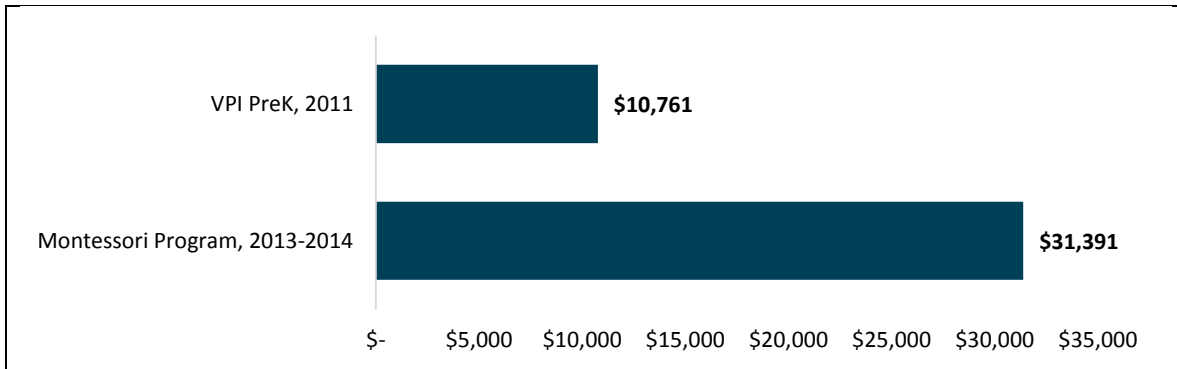
.... The room layout, wall coverings, the arrangement of materials on shelves, and all of the other details are much more central to the effective operation of the classroom in Montessori schools than in traditional education.⁸

The following subsections examine the classroom-level start-up costs for items such as instructional materials and classroom furniture. It must be noted that these costs are not directly comparable, as Montessori classroom costs were reported from academic year 2012-2013, while VPI classroom costs were reported in 2011.⁹ Furthermore, each estimate of classroom start-up costs uses its own unique categories for purchasing instructional and other classroom materials.

⁸ Chatten-McNichols, J, Op. cit., pp. 38-40.

⁹ This estimate is based on dates within the file "VPI Startup Costs," provided by APS.

Figure 3.3: Estimated Start-up Costs for Individual Classroom by Program

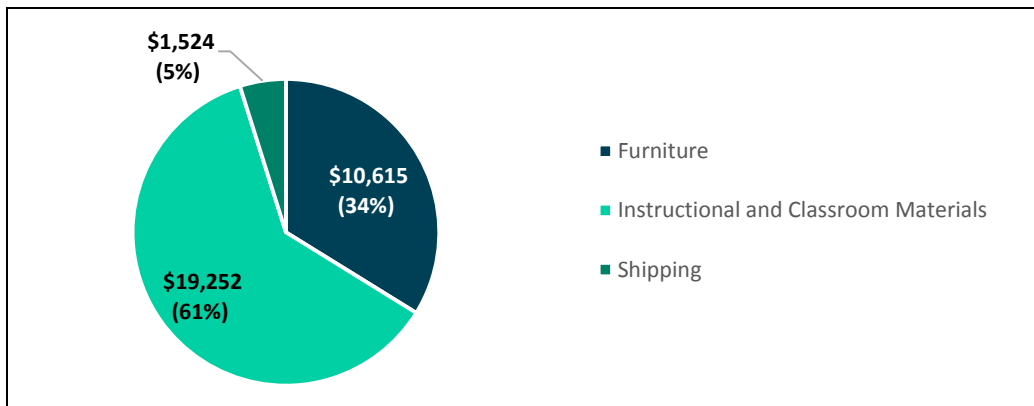


MONTESSORI

As previously noted, the estimated classroom start-up cost for a Montessori classroom is approximately \$31,000. Figure 3.4 below displays a breakdown of these costs; approximately one-third of costs are allocated to classroom furniture, while nearly two-thirds are allocated to instructional and classroom materials. A small portion of the budget—about \$1,524 or five percent—was spent on shipping the furniture and instructional materials to the school site during the 2013-2014 academic year.

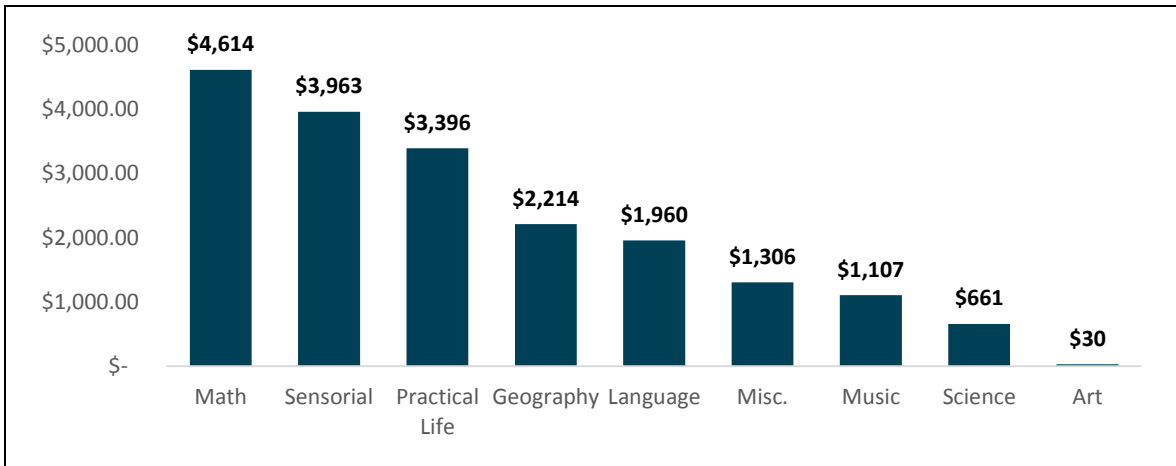
Figure 3.5 provides an overview of spending on instructional and classroom materials by category. Notably, the largest percentage of spending on instructional materials related to supplies and equipment related to math, followed by sensorial classroom materials, which are specialized materials for Montessori classrooms “specifically designed to help the child develop discrimination, order, and to broaden and refine the senses.”¹⁰ Other categories for instructional materials required for Montessori classroom start-up include Practical Life, Geography, Language, Music, Science, and Art.

Figure 3.4: Montessori Single Classroom Start-up Costs, 2013-2014



¹⁰ “Sensorial.” Just Montessori. <http://www.justmontessori.com/sensorial/>

Figure 3.5: Montessori Instructional and Classroom Material Start-up Costs by Category



VPI PRE-K

In contrast to the Montessori program, start-up costs for a VPI Pre-K classroom in 2011 were significantly less (about \$10,761 overall). As shown in Figure 3.6 below, about 28 percent of start-up costs (\$3,000) were allocated to classroom furniture. Furthermore, 70 percent of start-up costs (\$7,550) were spent on instructional materials and classroom supplies, and \$200—or two percent of total costs—were spent on shipping costs to the school site for purchased furniture and instructional materials.

Figure 3.7 displays a breakdown of initial VPI instructional and classroom materials spending for a single classroom in 2011 across several broad categories. The category with the greatest level of spending for the VPI classroom is Dramatic Play (\$1,658), which includes about \$371 in costs related to Dramatic Play furniture, such as play kitchens. Following dramatic play, start-up costs include nearly \$1,500 each for material related to language arts and math instruction, as well as \$989 on general curriculum spending. Materials related to physical education, rest time, arts, science, and music comprised about one quarter of the remaining spending on instructional materials.

Figure 3.6: VPI Single Classroom Start-up Costs, 2011

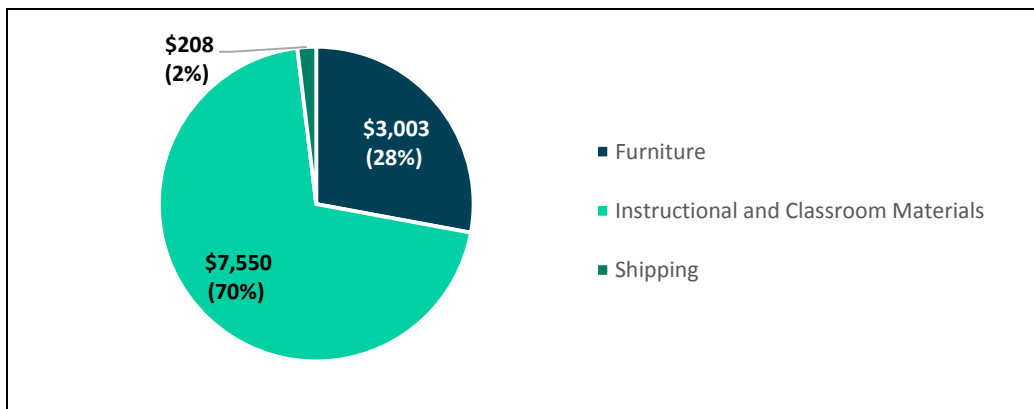
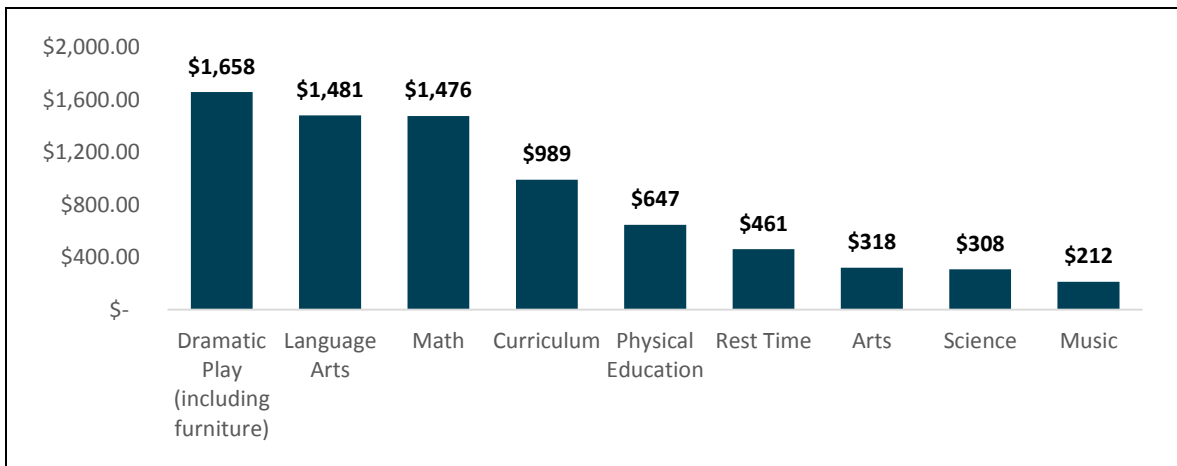


Figure 3.7: VPI Instructional and Classroom Material Start-up Costs by Category



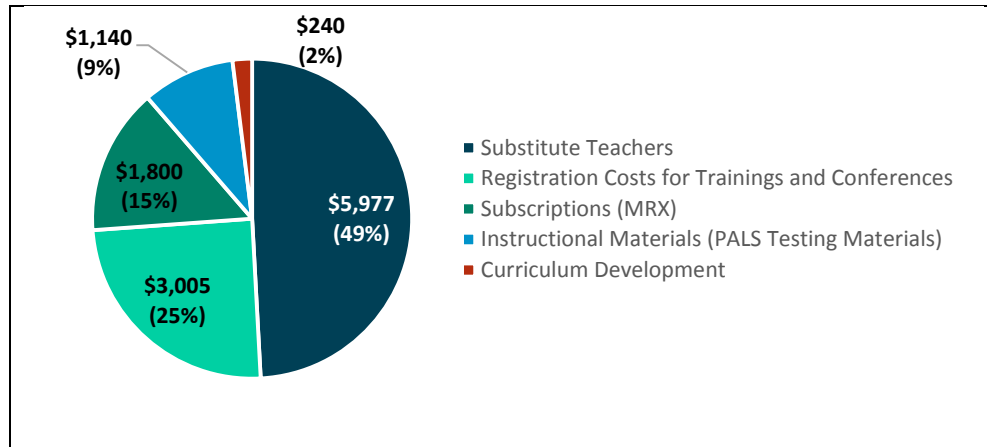
ADDITIONAL COSTS

Limited data are available about operating costs beyond personnel salaries for the day-to-day operation of Pre-K programming, largely because these funds are derived from the school and district’s overall instructional budget and may not be directly tied to Montessori or VPI programs. However, APS provides some information about non-personnel costs. For example, Figure 3.8 below displays a breakdown of professional development spending from the Montessori program for academic year 2015-2016.

Overall, Montessori spending on curriculum and professional development in 2015-2016 totaled \$12,161.92, although it should be noted that Montessori teachers also receive additional funds for supplies and professional development through their respective school sites. Nearly half of spending—almost \$6,000—was allocated to covering the costs of substitute teachers during PALS testing, which takes place in the fall, midyear, and spring. Instructional materials for PALS testing comprised about \$1,140, or 9 percent, of the overall budget. Registration for professional conferences and trainings comprised about one quarter of spending on curriculum and professional development. Subscription costs were allocated to six teacher subscriptions for MRX, a record-keeping systems designed especially for Montessori classrooms,¹¹ which cost about \$1,140. Finally, spending categorized as “curriculum development” totaled about \$240.

¹¹ “About MRX.” Montessori Records Express (MRX). <https://montessorirecordsxpress.com/>

Figure 3.8: Montessori Curriculum and Professional Development Spending, 2015-2016



EXTERNAL PROGRAM FUNDING: TUITION REVENUE AND GRANTS

The following subsection examines sources of external income for the Montessori and VPI Pre-K programs.

MONTESSORI PROGRAM

Two-thirds of seats in Montessori classrooms are reserved for children with family incomes “at or less than 80% of the median income for a family of four in Arlington County.”¹² In academic year 2015-2016, this income level was set at \$86,000.¹³ Children attending four-year-old Pre-K through this reserved enrollment program do not pay tuition. The remaining third of four-year-old Pre-K students and all students enrolled in three-year-old Pre-K in the Montessori program make income-based payments (see Figure 3.8 for income-based fees required in academic year 2015-2016). Note that children enrolled in Montessori Kindergarten do not pay tuition.

As shown in the figure, tuition fees required for the Montessori Primary program vary widely by income level. It is worth noting that families earning between \$51,000 and \$110,000 per year pay fees that consist of approximately 10 percent of their household income or more to enroll. This percentage shrinks to 5.7 percent of household income or less for families that earn more than \$200,000 per year. Because families who pay the full tuition amount (\$11,443) do not have to provide income verification information, APS is not currently aware of the total income levels for full-paying students.

¹² “Policy Implementation Procedures: 40-1.20.2 External Funding – 2015-2016 Fee Schedules.” Arlington Public Schools, p. 2. https://www.apsva.us/wp-content/uploads/legacy_assets/www/7fd81dbdf4-Montessori_PIP_Fee_2015-2016.pdf

¹³ “Policy Implementation Procedures: 40-1.20.2 External Funding – 2016-2017 Fee Schedules.” Arlington Public Schools, p. 2. <http://www.apsva.us/wp-content/uploads/2015/02/40-1-20-2-Fee-Schedule-PIP-2016-2017-Effective-July-2016.pdf>

As of July 2016, the Montessori program collected approximately \$1,070,244 in tuition revenue for students enrolled in the Pre-K program during FY 2016, although the distribution of tuition-paying students by income level and fee requirement is unavailable.

Figure 3.9: Montessori Program Income-Based Fee Schedule, 2015-2016

INCOME LEVEL	FULL-DAY FEE	PERCENTAGE OF HOUSEHOLD INCOME*
Income to \$24,000	\$741	3.1% or more
\$24,001 - \$27,000	\$1,010	4.2%
\$27,001-\$30,000	\$1,310	4.9%
\$30,001 - \$33,000	\$1,737	5.8%
\$33,001 - \$37,000	\$2,217	6.7%
\$37,001 - \$41,000	\$2,847	7.7%
\$41,001 - \$46,000	\$3,556	8.7%
\$46,001 - \$51,000	\$4,345	9.4%
\$51,001 - \$57,000	\$5,212	10.2%
\$57,001 - \$62,000	\$6,290	11.0%
\$62,001 - \$67,000	\$7,463	12.0%
\$67,001 - \$72,000	\$8,734	13.0%
\$72,001 - \$77,000	\$9,354	13.0%
\$77,001 - \$82,000	\$10,018	13.0%
\$82,001 - \$86,000	\$10,065	12.3%
\$86,001 - \$90,000	\$10,065	11.7%
\$90,001 - \$96,000	\$10,113	11.2%
\$96,001 - \$110,000	\$10,161	10.6%
\$110,001 - \$125,000	\$10,408	9.5%
\$125,001 - \$150,000	\$10,660	8.5%
\$150,001 - \$175,000	\$10,916	7.3%
\$175,001 - \$200,000	\$11,177	6.4%
\$200,001 and up	\$11,443	5.7% or less

*Calculated for the minimum income level within each range, except for household income of \$24,000.

Source: Arlington Public Schools¹⁴

VPI PRE-K

The VPI Pre-K program is free for all eligible students, and thus does not generate tuition revenue. Student eligibility is based on income; eligible students have incomes below 350 percent of the Federal Poverty Level (FPL), although families at the lowest FPL thresholds receive priority in program placement.¹⁵

The VPI Pre-K program is supported by a grant from the Virginia Department of Education. In academic year 2015-2016, this grant amounted to \$1,677,000 (see Figure 3.10 for a breakdown of grant funds). More than 60 percent of grant funding covered expenses

¹⁴ Figure created verbatim from: “Policy Implementation Procedures: 40-1.20.2 External Funding – 2015-2016 Fee Schedules,” Op. cit., p. 2.

¹⁵ [1] “Frequently Asked Questions: Virginia Preschool Initiative (VPI) Pre-Kindergarten.” Arlington Public Schools. <http://www.apsva.us/wp-content/uploads/2015/02/Frequently-Asked-Questions-VPI-2016-2017.pdf>

[2] “Virginia Preschool Initiative (VPI) Application 2016-2017,” Op. cit.

related to personnel services, which is broken down further by specific spending categories in Figure 3.11 on the following page. These funds cover the cost of 10 instructional assistants, five teachers, one administrator, and half a clerical position. In addition to regular positions, grant funds also support hourly pay for teachers and assistants to conduct home visits, as well as the cost of substitute teachers and other hourly staff wages. An additional 20 percent of grant funds (approximately \$330,000) was budgeted for employee benefits.

The remaining 18 percent of grant funds supported other program operational costs, including the Parental Involvement Program (6 percent), Internal Services, such as transportation, field trips, and food services (5 percent), Purchased Contract Services, including professional development, ELL assessment consultants, and program dental services (4 percent), Instructional Materials and Supplies (3 percent), and Professional Conferences (less than 1 percent).

It should be noted that grant funds do not represent the entirety of district spending on operational costs for the VPI program, although the grant does offset some of these costs.

Figure 3.10: VPI Grant Spending Breakdown, 2015-2016

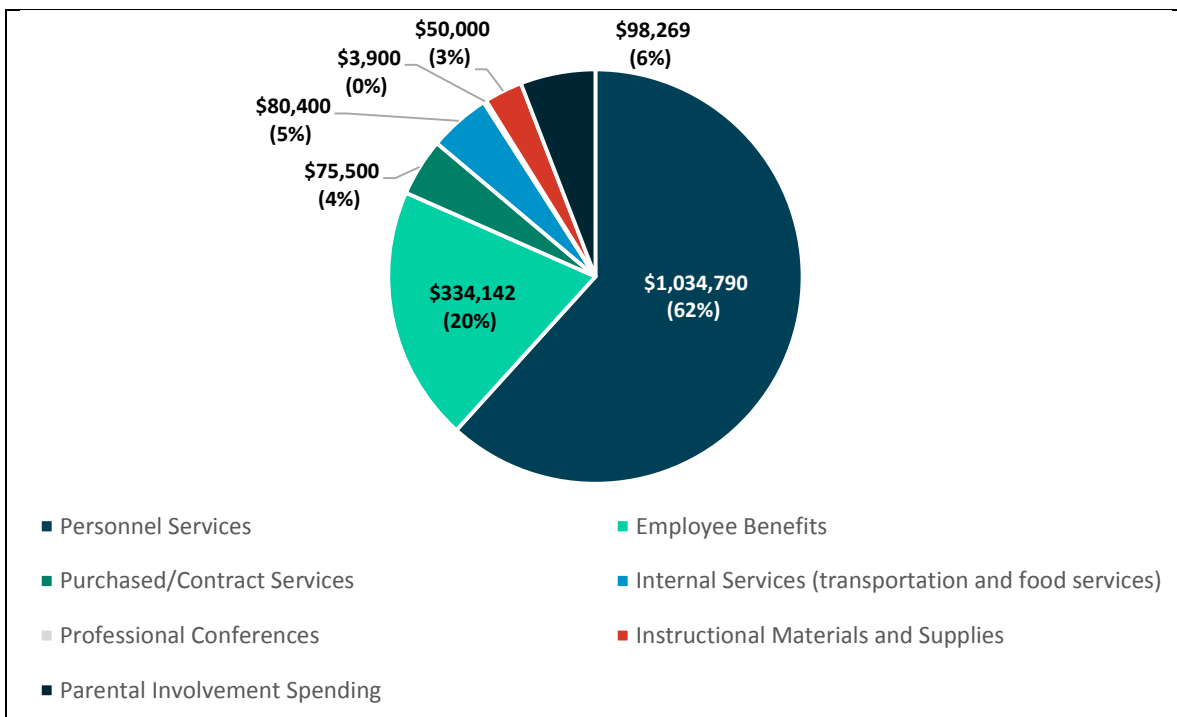
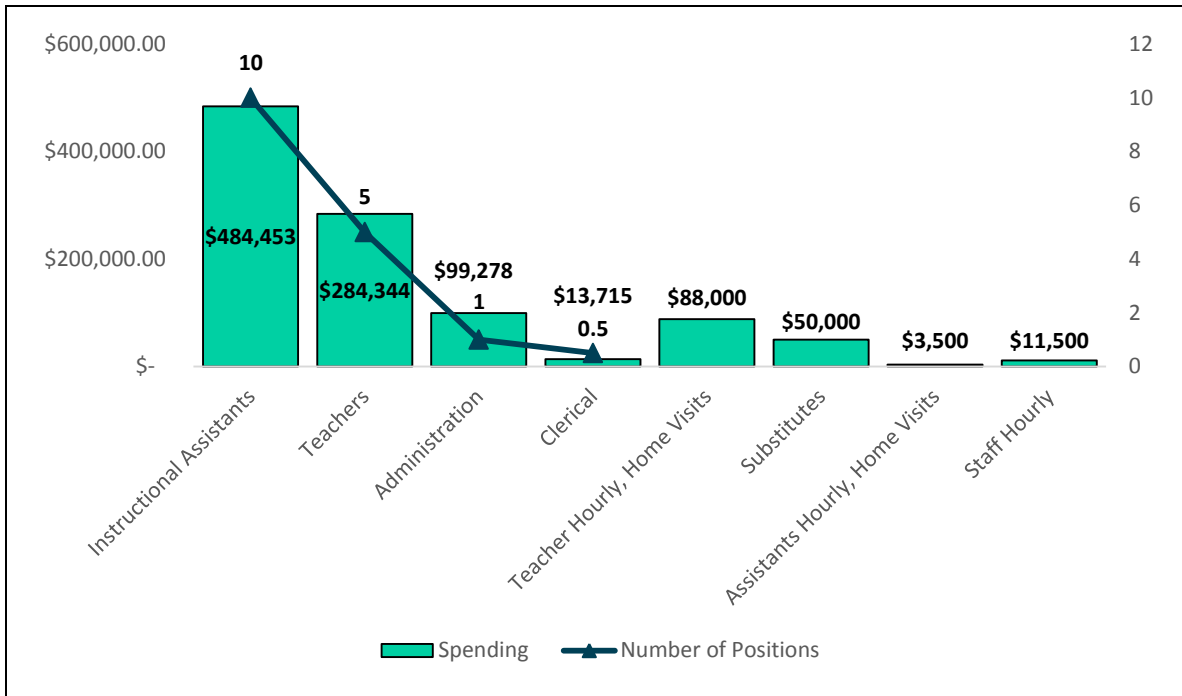


Figure 3.11: VPI Grant Spending on Personnel Services, 2015-2016



SECTION IV: TRANSPORTATION ESTIMATES

The following section estimates transportation costs for students enrolled in Montessori and VPI Pre-K programs at APS.

BACKGROUND

Four-year-old VPI Pre-K students are eligible for bus transportation when they “live in the attendance zone of the school or use bus stops established for K-12 students attending the same school,”¹⁶ and live outside of a one-mile radius of the school. APS also confirms that VPI Pre-K students attending Hoffman-Boston Elementary are eligible for transportation regardless of where they live in the county. Similarly, four-year-old students attending Montessori Pre-K programs at APS are also eligible for bus transportation if they live more than one mile but within the attendance area of the school. Three-year-old students are offered bus transportation at two selected Montessori sites: Drew Elementary and Campbell Elementary.¹⁷

In order to estimate transportation costs, Hanover uses data collected at the classroom level to determine rates of bus ridership in 2015-2016. It must be noted that the most recent year of data for per-pupil transportation cost estimates is academic year 2014-2015. **Thus, this analysis provides a general estimate of total Pre-K transportation costs and cannot account for changes in cost over the last two years or actual costs for individual students.** Furthermore, as data on Pre-K ridership is limited, this analysis assumes that all VPI and Montessori Pre-K students who ride the bus do not require special transportation accommodations. Thus, this analysis does not consider the average per-pupil cost for exclusive transportation, although some students enrolled in the program during the 2015-2016 year may have received these services.

In addition to regular transportation costs, certain Pre-K students may be associated with higher costs based on the need for bus attendants. APS confirms that bus attendants are required at Drew and Campbell Elementary to oversee the transportation of three-year-old students, and that Pre-K bus attendants are also employed at Hoffman-Boston, the county-wide site for VPI Pre-K. It must be noted that, because more specific student-level transportation data is not currently available, this analysis considers Pre-K bus attendants in aggregate, although some are designated as SPED and may actually work with a smaller population of students.

¹⁶ “Virginia Preschool Initiative,” Op. cit.

¹⁷ “Frequently Asked Questions: Primary Montessori Program 2015-2016.” Arlington Public Schools. https://www.apsva.us/wp-content/uploads/legacy_assets/www/88aaedc81c-Frequently_Asked_Questions_Montessori_2015-2016.pdf

ESTIMATED PRE-K TRANSPORTATION COSTS

APS provides teacher-reported bus-riding information for Pre-K students at each elementary school with a VPI or Montessori program. Figure 4.1 below displays the estimated rates of bus-riding reported by teachers. While ridership among Pre-K students varies widely by school, approximately half of VPI students and nearly one third of Montessori students were bus riders in academic year 2015-2016.

Figure 4.1: Estimated Bus Ridership Among Pre-K Students, 2015-2016

SCHOOL	REPORTED BUS-RIDERS*	TOTAL PRE-K ENROLLMENT**	ESTIMATED RIDERSHIP
Montessori Programs			
Barrett Elementary School	2	15	13%
Campbell Elementary School	10	16	63%
Carlin Springs Elementary School	4	18	22%
Discovery Elementary School	6	23	26%
Drew Elementary School	44	107	41%
Hoffman-Boston Elementary School	17	66	26%
Jamestown Elementary School	11	51	22%
McKinley Elementary School	2	16	13%
All Montessori Programs	96	312	31%
VPI Pre-K			
Abingdon Elementary School	10	33	30%
Arlington Science Focus Elementary School	9	13	69%
Arlington Traditional School	13	16	81%
Ashlawn Elementary School	10	16	63%
Barcroft Elementary School	10	35	29%
Barrett Elementary School	0	31	0%
Campbell Elementary School	27	46	59%
Carlin Springs Elementary School	39	62	63%
Claremont Elementary School	24	32	75%
Drew Elementary School	17	34	50%
Hoffman-Boston Elementary School	57	85	67%
Key Elementary School	23	30	77%
Long Branch Elementary School	9	18	50%
Oakridge Elementary School	8	15	53%
Patrick Henry Elementary School	11	35	31%
Randolph Elementary School	3	46	7%
All VPI Pre-K Programs	270	547	49%

*Note: One student in the analysis is noted as a “1/16” bus rider, and is excluded from this analysis.

**Note: Data on bus ridership is derived from teacher-reported information about which Pre-K students take the bus in each of the 53 ECE classrooms in the district. However, a percentage of students in many of the classrooms were not reported as either “bus riders” or “non-bus riders.” This analysis treats these children as non-bus riders; thus, estimated ridership is calculated as the proportion of students explicitly reported as bus riders compared to the overall Pre-K enrollment of each school. More detailed information is available in the accompanying Data Supplement.

According to data files provided by APS, the average per-pupil cost for regular school transportation in academic year 2014-2015 was \$469.02 per pupil. Based on this estimate, and the reported number of Pre-K riders across both the Montessori and VPI programs, the approximate annual cost of Pre-K bus transportation is \$171,661.32 (Figure 4.2). Note that this estimate excludes students who may receive special education exclusive transportation services, which would significantly alter the estimated cost; the estimated cost of exclusive transportation at APS in 2014-2015 was \$5,562 per student.

Figure 4.2: Estimated Pre-K Transportation Costs

PROGRAM	REPORTED BUS RIDERSHIP	ESTIMATED TOTAL COST
Montessori Programs	96	\$45,025.92
VPI Pre-K Programs	270	\$126,635.40
All Pre-K Programs	366	\$171,661.32

BUS ATTENDANTS

As previously noted, bus attendants are currently employed at three Pre-K school sites in the district: Campbell Elementary, Drew Elementary, and Hoffman-Boston Elementary. According to APS documents, a total of 24 bus attendants—including 18 general education attendants and six SPED attendants—were associated with the Pre-K programs in 2015-2016 (Figure 4.3). Accordingly, the costs associated with Pre-K transportation at these schools will be higher than initially estimated.

Figure 4.3: Pre-K Bus Attendants, 2015-2016

SCHOOL SITE	GENERAL EDUCATION BUS ATTENDANTS	SPECIAL EDUCATION BUS ATTENDANTS
Campbell Elementary	2	3
Drew Elementary	9	2
Hoffman-Boston	4	1
Campbell/Hoffman-Boston	3	--
Total	18	6

APPENDIX A: DATA CATALOG

Figure A.1: ECE Cost Comparison Data Files

FILE NAME	DESCRIPTION
2015-2016 VPI and Montessori PreK and Montessori K Enrollment	Enrollment information for each program, including student age, income level, and other characteristics for academic year 2015-2016.
Copy of 921 FY15 VPI Grand Budget Form 2015-2016	Breakdown of grant funds awarded to the APS VPI Pre-K program in academic year 2015-2016.
Early ChildhoodFY16	Professional development and curricular development budget for the APS Montessori Primary Program for academic year 2015-2016.
EC Teachers and Assistants	Listing of staff members by program, including position, school location, and (for teachers) credentials, endorsements, and teaching experience.
EC Teachers and Assistants for Finance to RV071116	Listing of staff members by program with salary and benefits information for academic year 2015-2016.
Montessori Bus Data Collection Teacher List	Teacher-reported data on which students in each class take the bus for the Montessori Primary Program.
PK Trans Eligible 6 2016	District data on which students in each Pre-K class are eligible for transportation services*
PK Transportation Information	Estimate of per-pupil transportation costs at APS for academic year 2014-2015, as well as estimates of Pre-K bus attendant employment and wages for academic year 2015-2016.
Primary Montessori Classroom Order 2012-13	Record of spending on furniture and instructional/classroom materials for an example Montessori Primary classroom, initially set-up in 2013-2014.
VPI Bus Data Collection Teacher List	Teacher-reported data on which students in each class take the bus for the VPI Pre-K program.
VPI Startup costs	Record of spending on furniture and instructional/classroom materials for an example VPI classroom, initially set-up in 2011.

*Note: because transportation eligibility information from the district is inconsistent with teacher-reported bus riding data, this analysis defaults to teacher-reported data.

Data files provided by APS

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