MEMORANDUM

TO: Advisory Council on Teaching & Learning

FROM: Science Advisory Committee

DATE: November 15, 2022

SUBJECT: Fall 2022 Report and Recommendations

COMMITTEE CHAIR: Melody Starya Mobley
COMMITTEE MEMBERS: Jim Egenrieder, Lida Anestidou, Kristen Parsons, Steve Cordle, Victoria Forlini
STAFF LIAISON: Dr. Dat Le, Science Supervisor

This report presents the Science Advisory Committee (SAC) recommendations to improve science instruction in the Arlington Public Schools (APS). Because the recommendation is submitted relatively early in the school year, the SAC focused their recommendations based on the recently released 2021-2022 Science SOL scores.

While there have been many successes with science instruction in APS, the SAC remains concerned about the elementary science program. This includes the lack of instructional time and resources to foster scientific literacy for all of our young learners. The SAC recommendations are based on the most urgent priorities for this school year that will result in the greatest impact to student learning and reducing the opportunity gap. Consistent to our previous years' recommendations, the SAC would like to focus on two areas that align with the principles of equity and inclusion for all students: 1) providing adequate science instructional time for elementary schools and 2) ensuring that all students and staff have sufficient instructional resources in order to support a high-quality K-12 science program.

According to the SOL pass rate data, scores dropped across the Commonwealth of Virginia and in Arlington after the pandemic between 2018-2019 and 2020-2021. The Virginia Department of Education (VDOE) cancelled SOL testing in 2019-2020 due to the pandemic and virtual instruction. When comparing APS Science SOL pass rates, Grade 5 Science experienced large drops of 23% between 2018-2019 and 2020-2021 (See **Science SOL Performance by SOL Test: Three Year History data table**). However, the pass rate has only modestly improved from 58% in 2020-2021 to 65% in 2021-2022. Pass rates for Grade 8 Science and Biology are not impacted as much as Grade 5 Science.

Science SOL Performance by SOL Test: Three Year History			
	2018-2019	2020-2021	2021-2022
Science SOL	Pass%	Pass%	Pass%
Grade 5 Science	81%	58%	65%
Grade 8 Science	84%	73%	72%
Biology	86%	76%	78%

Source: Virginia Department of Education

Providing high quality science instruction at the elementary level is critical for shaping students' curiosity, interest, and passion for learning science at the secondary level and beyond. The elementary school years provide a window of opportunity for students to experience and love science. Inconsistent and insufficient elementary science instructional time widens the learning gap and disproportionately affects Black, Hispanic, Students with Disabilities (SWD), English Language Learners (EL) and Economically Disadvantaged students. The significant drop in the 5th Grade Science SOL pass rates in the 2020-2021 school year were more significant in these groups.

Grade 5 Science SOL Performance: Three Year History				
		2018-2019	2020-2021	2021-2022
Test Name	Race/Ethnicity	Pass% Total	Pass% Total	Pass% Total
Grade 5 Science	Asian	84%	67%	68%
	Black	72%	35%	43%
	Hispanic	61%	25%	35%
	Multiple Races	94%	73%	83%
	White	92%	78%	84%
	Total	81%	58%	65%
Test Name	Students with Disabilities (SWD) Status	2018-2019	2020-2021	2021-2022
		Pass%	Pass%	Pass%
Grade 5 Science	SWD	52%	33%	41%
	Non SWD	87%	63%	69%
	Total	81%	58%	65%
Test Name	English Learner (EL) Status	2018-2019	2020-2021	2021-2022
		Pass%	Pass%	Pass%
Grade 5 Science	English Learner	61%	24%	29%
	Non English Learner	91%	73%	79%
	Total	81%	58%	65%

Test Name	Socioeconomic Status (SES) Status	2017-2018 Pass%	2018-2019 Pass%	2020-2021 Pass%
Grade 5 Science	Econ. Disadvantaged	60%	23%	32%
	Non-Econ. Disadvantaged	91%	75%	81%
	Total	**81%**	**58%**	**65%**

Source: Virginia Department of Education

Recommendation 1: Increased emphasis and support for elementary science instruction.

- Previous SAC reports addressed concerns with science instructional time at the elementary level. Elementary science instruction at the different grade levels were highly variable and unpredictable among APS schools. Many schools focused on Social Studies during the fourth grade and science in the fifth grade, when testing occurs. This practice has not changed.
- The SAC recommends increased emphasis and support for elementary science instruction by ensuring:
    1. All elementary schools provide at least 45 minutes of science instruction each day for all grade levels on a consistent basis (no trade-offs, alternating days, weeks, or months when providing science instruction).
    2. All elementary schools use standards-based grading for science to ensure that the division's curriculum is being taught and to provide parents with a better comprehension of their child's understanding of scientific concepts.
    3. All elementary schools use formative assessments each quarter to measure growth and provide the necessary interventions. This includes using data from formative assessments to reteach concepts, when needed.
    4. Fund a .5 FTE Elementary Science Specialist to provide direct support to elementary schools. This includes working directly in the elementary schools to support Collaborative Learning Teams; provide classroom teaching support; conduct classroom walk-throughs; and monitoring assessments. This recommendation of a .5 FTE Elementary Science Specialist will benefit all elementary schools.
    5. Add science coaches at the elementary level to ensure professional development and training for all teachers, ensuring the implementation of the science curriculum, integrating science in reading materials, and monitoring student progress. Should funding become an obstacle, provide an initial investment of five science coaches, and prioritize the staffing at schools that can yield the greatest return on investment.
    - Budget Implications: 1) The Elementary Science Specialist would cost .5 FTE. The science coaches would be one teacher FTE per elementary school (25 FTE in total). Alternatively, provide an initial investment of five science coaches (5 FTEs).
    - APS Core Values- **Excellence**: Ensure all students receive an exemplary education that is academically challenging and meets their social and emotional needs. **Equity:** Eliminate opportunity gaps and achieve excellence by providing access to schools, resources, and learning opportunities according to each student's unique needs.
    - APS Strategic Goals- 1. Ensure that every student is challenged and engaged while providing multiple pathways for student success by broadening opportunities, building support systems, and eliminating barriers. APS will eliminate opportunity gaps, so all students achieve excellence.
    - Committee Vote: 6 Yes; 0 No

Recommendation #2: Ensuring that all students and staff have sufficient instructional resources in order to support a high-quality science program.

- Currently, the K-12 science resource adoption period has lapsed. Most grade levels and science content areas are without any science textbooks or digital resources.
- Appropriate textbooks and resources should be purchased for elementary and secondary science. Current elementary science digital textbook adoption (i.e., licensing) expired in July 2020. Current secondary digital textbook adoption (i.e., licensing) expired in August 2020.
- In addition to digital text, supplement elementary science with hands-on investigation lab kits to engage students in experiential learning.
- Budget Implications: Elementary textbook and instructional resource adoption costs would be $1,800,000 for a six-year adoption. Secondary textbook and resource adoption costs would be $2,400,000 for a six-year adoption. Total K-12 science adoption would be $4,200,000 for a six-year period.
- APS Core Values- Excellence: Ensure all students receive an exemplary education that is academically challenging and meets their social and emotional needs. Equity: Eliminate opportunity gaps and achieve excellence by providing access to schools, resources, and learning opportunities according to each student's unique needs.
- APS Strategic Goals- 1. Ensure that every student is challenged and engaged while providing multiple pathways for student success by broadening opportunities, building support systems, and eliminating barriers. APS will eliminate opportunity gaps~~,~~ so all students achieve excellence.
- Committee Vote: 6 Yes; 0 No

Acknowledgement: The SAC would like to thank Dat Le, APS Science Liaison, for all of his work in facilitating and supporting our efforts in developing the SAC recommendation report and for his guidance in our day-to-day work.