

## MEMORANDUM

TO: Advisory Council on Teaching & Learning

FROM: Science Advisory Committee

DATE: November 1, 2021

SUBJECT: Draft Report and Recommendations

COMMITTEE CHAIR: Melody Starya Mobley

COMMITTEE MEMBERS: Jim Egenrieder, Lida Anestidou, Kristen Parsons

STAFF LIAISON: Dat Le, Science Supervisor

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Over the past year, APS students and staff have transitioned from virtual to hybrid, and now to predominately in-person instruction. The Science Advisory Committee (SAC) members are supportive of efforts to engage students in daily in-person instruction and face-to-face interaction with their peers and teachers again. There is much value for in-person instruction, including opportunities for hands-on scientific investigations and experiences. In this context, SAC members are discussing the most urgent priorities for this school year and identifying recommendations that will result in the greatest impact to student engagement, learning, and well-being. While the SAC believes that there are many important areas that merit attention, the group is focused on two areas that align with the principles of equity and inclusion for all students: 1) equitable science instruction at the elementary level, and 2) outdoor learning opportunities to support science and social emotional learning.

### **Recommendation #1: A Renewed Emphasis on Elementary Science**

- The SAC remains concerned about the elementary science SOL pass rates. During the height of the pandemic when students were engaged in virtual learning, it appears that elementary science instruction was impacted. Anecdotal information from parents and teachers consistently points to the limited or lack of science instruction. According to the SOL pass rate data, scores dropped across the Commonwealth of Virginia and in Arlington. 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, below**). Science instructional time at the elementary level has been a challenge for many years. Efforts by APS to ensure equitable science instruction time have not been successful. This includes the Office of Academics efforts to develop an elementary master schedule with allotted times for each subject. In addition to providing adequate science instructional time, we recommend the integration of science topics in the selection of elementary reading materials to engage young learners in these important subjects, provide stories of the achievements of people of diverse backgrounds in the curriculum, and to help learners create a vision of themselves proficient in these subjects and accomplished in relevant, in-demand career fields.
- Science instruction at the elementary level is critical for shaping students' curiosity, interest, and passion for learning science at the secondary level and beyond.

Science SOL Performance by SOL Test: Three Year History						
Science SOL	2017-2018		2018-2019		2020-2021	
	Pass%	Total	Pass%	Total	Pass%	Total
Grade 5 Science	81.6%	2,158	81.4%	2,154	58.4%	1,828
Grade 8 Science	83.1%	1,797	84.1%	1,942	72.7%	1,639
Biology	82.1%	1,851	85.9%	1,862	76.0%	1,773

Source: Virginia Department of Education

- Inconsistent and insufficient elementary science instructional time widens the learning gap and disproportionately affects Black, Hispanic, Students with Disabilities (SWD), English Learner (EL), and Economically Disadvantaged students. The significant drop in the 5<sup>th</sup> 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							
Test Name	Race/Ethnicity	2017-2018		2018-2019		2020-2021	
		Pass%	Total	Pass%	Total	Pass%	Total
Grade 5 Science	Asian	84.6%	157	84.1%	197	66.0%	168
	Black	73.5%	204	72.0%	186	34.9%	189
	Hispanic	62.9%	615	61.1%	592	25.2%	473
	Other	88.4%	138	94.3%	192	70.5%	163
	White	92.8%	1,044	92.3%	987	78.6%	835
	<b>Total</b>		<b>81.6%</b>	<b>2,158</b>	<b>81.4%</b>	<b>2,154</b>	<b>58.4%</b>
Test Name	Students with Disabilities (SWD) Status	2017-2018		2018-2019		2020-2021	
		Pass%	Total	Pass%	Total	Pass%	Total
Grade 5 Science	SWD	47.1%	308	52.0%	344	32.0%	278
	Non SWD	87.3%	1,850	87.0%	1,810	63.1%	1,550
	<b>Total</b>	<b>81.6%</b>	<b>2,158</b>	<b>81.4%</b>	<b>2,154</b>	<b>58.4%</b>	<b>1,828</b>
Test Name	English Learner (EL) Status	2017-2018		2018-2019		2020-2021	
		Pass%	Total	Pass%	Total	Pass%	Total
Grade 5 Science	EL 1-4	31.5%	302	31.7%	325	4.4%	276
	EL 6	83.4%	379	87.3%	347	44.3%	262
	Proficient	96.3%	27	92.9%	14	54.4%	11
	Non-EL	91.3%	1,450	90.9%	1,468	72.9%	1,279
	<b>Grade 5 Science Total</b>	<b>81.6%</b>	<b>2,158</b>	<b>81.4%</b>	<b>2,154</b>	<b>58.4%</b>	<b>1,828</b>
Test Name	Socioeconomic Status (SES) Status	2017-2018		2018-2019		2020-2021	
		Pass%	Total	Pass%	Total	Pass%	Total
Grade 5 Science	Econ. Disadvantaged	61.1%	684	60.0%	663	22.1%	564
	Non-Econ. Disadvantaged	91.1%	1,474	90.9%	1,491	74.5%	1,264
	<b>Total</b>	<b>81.6%</b>	<b>2,158</b>	<b>81.4%</b>	<b>2,154</b>	<b>58.4%</b>	<b>1,828</b>

Source: Virginia Department of Education

- 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. This practice has not changed.
- While the SAC applauds APS for focusing on reading and math, science instruction should also be a priority.
- 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 on a consistent basis (no trade-offs, alternating days, weeks, or months).
  2. Appropriate textbooks and resources are provided for elementary science. Current elementary science digital textbook adoption (i.e., licensing) has expired.
  3. All elementary schools use standards-based grading for science to ensure that the division’s curriculum is being taught and to provide parents with better understanding of their child’s understanding of scientific concepts.
  4. All elementary schools use formative assessments each quarter to measure growth and provide the necessary interventions.
  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 of 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: Elementary textbook adoption would cost would be \$900,000; coaches would cost one teacher FTE per elementary school. 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: 4 Yes; 0 No

**Recommendation #2: Expanding Outdoor Learning Opportunities for APS Students**

- Expand Outdoor Learning options through professional learning, new resources, and collaboration with community organizations. This recommended priority supplements the important experiences provided to APS students in the third, fifth, seventh, and some high school courses at the Outdoor Lab with no-cost or low-cost strategies often well-suited for community collaboration and successful grant funding led by highly engaged teachers and teacher specialists. This recommended priority recognizes the challenges of limited bus availability, and restricted capacity of previous field trip destinations.
- Examples of such activities include school-grounds dendrology (woody plant identification and investigation), phenology studies (plant and animal life cycles) observation and investigation, nearby watershed walks and storm-sewer mapping, a wide variety of integrated science and math measurement activities, traditional and wireless microelectronics environmental monitoring, outdoor and environmental clubs (4-H and others) and of course existing school garden activities and student-PTA outdoor learning spaces design and development.

- Examples of community organizations, most of which already serve as APS school partners, include local colleges and universities (GMU, GW, NVCC, and VT), NoVa Outside, Virginia Cooperative Extension (4-H, Tree Stewards, Master Gardeners, Master Naturalists, Urban Agriculture), Earth Force, the Student Environmental Action Showcase (SEAS), Four Mile Run Conservatory Foundation, Potomac Riverkeepers, Arlington Living Schoolyard Initiative, National Park Service, Northern Virginia Regional Park Authority, and Arlington County Government.
- As previously shared, the SAC strongly believes that outdoor learning should not be viewed as solely an enrichment activity, but rather as a core educational focus that can build onto students' understanding of the natural world. These experiences can help students develop a sense of connection to nature and the physical environment where they live, play, and learn.
- The SAC recommends:
  1. Continued partnership with the Arlington Education Outdoor Association and support of the Outdoor Lab program.
  2. Focus on partnerships with community organizations to expand outdoor learning opportunities for APS students.
  3. Maximize the use of the school yard to provide students with opportunities to interact and appreciate nature. Significant research supports the correlation between outdoor learning and student well-being. Outdoor learning also promotes sustainability education and practices, which is embedded in the APS strategic plan.
- Budget Implications: There are no costs to this recommendation.
- APS Core Values- **Collaboration**: Foster partnerships with families, community, and staff to support the success of our students. **Stewardship**: Manage our resources to honor the community's investment in our schools; create safe, healthy, and environmentally sustainable learning environments; support civic and community engagement; and serve current and future generations.
- APS Strategic Goals- 1. Create an environment that fosters the growth of the whole child. APS will nurture all students' intellectual, physical, mental, and social-emotional growth in healthy, safe, and supportive learning environments. 2. Develop and support strong connections among schools, families, and the community to broaden opportunities for student learning, development, and growth.
- Committee Vote: 4 Yes; 0 No