# Science Advisory Committee Recommendations for 2020 - Executive Summary

The Science Advisory Committee (SAC) 2020 recommendations focus on independent projects and elementary outdoor learning. The recommendations support the Science Program mission and vision; align with the new 2018 Virginia Science Standards of Learning (SOL), which emphasize integrating scientific and engineering practices with curriculum content throughout the school year[1]; calibrate science curriculum delivery with APS equity priorities and policies; act on research-based evidence of the benefits of consistent outdoor and experiential learning; and respond to the 2017 Community Questionnaire results, which prioritized STEM and project-based learning.

## Independent Projects (IP)

**Challenges.** The science IP delivery model is intended as an opportunity for students to apply scientific and engineering practices. While SAC supports APS' intention and goals for IPs, there are three essential and inter-related reasons for the evolution of IPs that will benefit both students and teachers and also facilitate alignment with the 2018 Virginia SOL requirements and APS' equity policies: 1. IP work is not necessarily aligned with the curriculum, with IP subject matter often different from course content. In practice, IPs are conducted in a primarily 'outside the classroom' environment, drawing teacher and student time and energy away from core curriculum instruction and learning. 2. There are clear equity challenges for students without external resources to provide project infrastructure and support. And, 3., the traditional 'science fair' independent/dependent variable hypothesis testing model is only one of several types of scientific investigation.

These challenges are compounded by the compressed IP delivery schedule, driven by 'science fair' timelines[2], which results in unreasonably short project windows in the fall that diminish the depth of scientific inquiry for many students and add considerable student workload during a parallel high 'inside the classroom' workload period. The unintended but adverse effects of the IP resource and timeline challenges on the student experience with this model of scientific investigation are illustrated by the 2014 APS Science Program Evaluation[3] results from middle and high school focus groups.

**Recommendation #1:** SAC recommends a new IP framework that encourages and facilitates all types of scientific investigation; focuses IP topics on course content; allows sufficient time for meaningful investigation; and provides opportunities for students to present project findings to peers and adults.

This framework offers more choice and engagement for students, facilitates students and teachers working together on deeper course content understanding and application, ensures that students have the necessary underlying content knowledge to carry out scientific investigation with competence and confidence, and increases accessibility to scientific investigation experiences for more students. There are also opportunities under this framework to offer 'project-based learning' opportunities, like the curriculum at Arlington Tech.

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[1] Virginia Department of Education. 2018. Virginia Science Standards of Learning Curriculum Framework. http://www.doe.virginia.gov/testing/sol/standards_docs/science/2018/2018-revised-science-curriculum-framework.docx

[2] At both levels, actual science fair participation is not required, but IP timelines are driven by the regional/state/international science fair timelines.

[3] Arlington Public Schools Office of Planning and Evaluation. 2014. Science Evaluation Report.

These SAC recommendations also align with and support the English Language Arts Advisory Committee (ELAAC) recommendation ***to adopt a rigorous secondary writing curriculum incorporating instructional best practices for grades 9-12 that is continuous from year to year***. The SAC recommendations to expand eligible IP project types (all of which will require research and writing) ***and*** to provide more time for project work will facilitate collaborative and resource-efficient delivery of more rigorous and supported writing instruction across the curriculum.

## Outdoor Learning

**Challenges.** On-campus and consistent outdoor learning, with dedicated instructional resources, is provided at a small number of APS' 24 elementary schools. While SAC understands that some schools may have chosen to prioritize resources for these programs, SAC believes that the well-established benefits of outdoor learning should be available to all students, starting with all APS elementary schools.

While SAC greatly appreciates the funding to keep the Outdoor Lab and its unique 'science retreat' environment going strong, additional outdoor learning opportunities should also be ongoing for the benefits to accrue and deepen. This recommendation is reinforced by APS' equity objectives.

The 2018 Virginia SOLs also strongly underpin this recommendation. The new standards not only emphasize more investigation in the curriculum but also establish overall themes for each elementary grade level that correlate directly with outdoor learning methods and objectives

**Recommendation #2**: Beginning in the 2021-22 school year (FY 2022), provide funding to hire a consultant to train elementary teachers how to incorporate outdoor and experiential learning into delivery of the updated Virginia science curriculum. This consultant will work across APS' 24 (to be 25) elementary schools to develop and deliver curriculum materials and activities, working in conjunction with and supporting teachers. This training and curriculum investment will build on and 'multi-task' the internal training that the science program will begin in the 2020-21 school year to prepare for new SOL implementation required in 2021-22. The goal is for each elementary school to establish an outdoor learning model that is supported and sustained going forward.

### Past recommendations

Over recent recommending cycles (2013-14, 2015-16, and 2017-18), SAC has focused on several main themes: middle school independent projects consistency and support; outdoor lab funding; outdoor learning coordinator; and integrative learning across the curriculum.

Implementation progress has been made on the first two recommendation areas: Middle school progression approach for independent projects leading to completion of an independent project in 8th grade[4] and funding and resources to keep the Outdoor Lab going (although pressures continue with growth). SAC greatly appreciates the support and work of the School Board and Science Program staff and teachers in these efforts to date.

[4] SAC's 2020 IP recommendations build on this prior SAC-supported improvement to ensure that IP delivery at all levels meets the fundamental objectives of equity, student support and well-being, and enhanced curriculum delivery.