

## Science Advisory Committee Recommendations for 2020 - Executive Summary

The Science Advisory Committee (SAC) 2020 recommendations focus on independent projects and elementary outdoor learning, driven by the objectives of **equity, student support and well-being**, and **enhanced curriculum delivery**. The SAC recommendations also further the Science Program mission and vision, which emphasize enthusiasm, inquisitive spirit, and inquiry in everyday contexts.<sup>1</sup> These recommendations are also consistent with the 2017 Community Questionnaire results, which prioritized STEM and project-based learning as the highest areas of interest for instruction.

### Independent Projects (IP)

**Challenges.** The science IP delivery model, while well-intentioned, has several critical and inter-related limitations. First, project work occurs in a primarily ‘extracurricular’ environment, not integrated with curriculum delivery, with subject matter often different from course content. This creates a time and resource conflict for students and teachers in an already constrained teaching and learning context. The extracurricular approach also creates equity challenges for students without external resources to provide project infrastructure and support—which is not consistent with APS’ equity goals and policies.

These challenges are compounded by the compressed project delivery schedule, driven by ‘science fair’ timelines and processes<sup>2</sup>, which results in unreasonably short data collection and project reporting windows in November and December that affect the depth and value of the work and add considerable student workload during high coursework demand periods.

The Arlington Tech ‘project-based learning’ (PBL) model represents a fundamentally contrasting approach. Under the PBL model, the project *is* the curriculum delivery, more engaging for students and teachers while making the most of finite teaching and learning resources. For the science program, the PBL model expands beyond traditional ‘experimental and engineering design’ projects (i.e., hypothesis testing<sup>3</sup>), increasing content relevance to real-world problems while still providing students the critically important technical writing and presentation skills that they need.

**Recommendation #1:** SAC recognizes that transition to a PBL model for science curriculum delivery across APS will take additional planning and professional development. This will be the focus of future SAC work. In the interim, SAC recommends the following framework as a bridging strategy for IPs:

Integrate IPs required for any course with curriculum delivery and support the projects within the school.<sup>4</sup>

Expand eligible IP types beyond experimental design to include research investigations (e.g., climate change impacts on ocean chemistry) and PBL efforts (e.g., water quality-friendly campus grounds management).

Move project due dates to spring and conduct a ‘science symposium,’ where projects of various types can be presented.

Consider requiring all science students (intensified and standard) to conduct an IP.

Consider multiple options to offer to students that continue to be interested in science fair participation: status quo if students and teachers can meet the tight deadlines; winter/spring data collection for participation in following year’s science fair; move science fair to a ‘club’ format (this would allow for subjects beyond curriculum content).

<sup>1</sup> <https://www.apsva.us/science/>

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

<sup>3</sup> While SAC understands the importance of hypothesis testing, students can be exposed to these principles in a variety of ways beyond extracurricular independent projects (especially through course-driven laboratory exercises).

<sup>4</sup> Exceptions for junior or senior year work that is intended to integrate and build upon prior coursework, such as AP Capstone and similar.

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.*** Research and technical writing skills are essential for our students as they prepare for college and beyond. 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.** Structured, on-campus, and consistent outdoor learning, with dedicated instructional resources, is provided at only a few of APS' 24 elementary schools.

SAC believes that the well-established benefits of outdoor learning—which include inspiring 'scientific enthusiasm'—should be available to all students, starting with all APS elementary schools. This position is reinforced by, and consistent with, APS' equity objectives. While SAC greatly appreciates the funding to keep the Outdoor Lab and its unique 'science retreat' environment going strong, outdoor learning opportunities should also be a regular offering for the benefits to accrue and deepen.

**Recommendation #2:** Beginning in the 2021-22 school year, provide funding and support for one full-time Outdoor Classroom Coordinator (OCC) to ensure that elementary learners across all schools have frequent and sustained outdoor learning opportunities and experiences. This position will work across APS' 24 elementary schools to develop and deliver curriculum materials and activities, working in conjunction with and supporting teachers to complement in-class teaching and learning. Further, this position will provide a critical resource for hands-on science teaching and learning at the elementary level—where we can begin to inspire our youngest learners with a 'love of science' that is central to the Science Program's mission and vision.

## **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<sup>5</sup>.

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.

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<sup>5</sup> 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.