Arlington Public Schools

SCIENCE

BRIEFING REPORT

APRIL 2017

SCIENCE

The APS Science Program serves to inspire an enthusiasm for scientific literacy, foster an inquisitive spirit in learners through inquiry-based experiences in real-life contexts, and create a community of scientifically literate individuals who are able to make informed decisions.

The major services provided by the Science office are:

- Develop, revise, and enhance curriculum and instructional programs; identify and create teacher resources that support a rigorous curriculum aligned with state standards
- Monitor instruction and program implementation; promote high quality instruction through observation and feedback cycles for teachers
- Facilitate and coordinate high quality professional development for staff
- Sponsor, organize, and manage the Northern Virginia Regional Science Fair
- Organize and support student participation in state and national science competitions, such as Virginia Junior Academy of Science (VJAS), Virginia State Science and Engineering Fair and International Science and Engineering Fair (ISEF)
- Develop and maintain chemical and safety management plan; coordinate the inventory, management and disposal of chemicals at middle and high schools
- Administer and manage the Planetarium and the Outdoor Lab programs, including curriculum, purchasing, transportation, and delivery of services for school field trips

Bright Spots

Implementation of Physics for HILT Students

Beginning in the Fall of 2016, APS began to offer Physics for beginning English Learners. Five sections of this course were offered (at Wakefield, W-L, Yorktown and H-B Woodlawn). The course was developed as a collaboration between the Science and ESOL/HILT offices to provide HILT students with additional course pathway options to meet the graduation requirements. By providing a high school laboratory science credit early in their high school years, HILT students not only develop scientific processing skills, but also build on their academic language and content vocabulary. The course is co-taught with a Physics and an ESOL/HILT teacher.

Planetarium and Outdoor Lab

Since the Planetarium re-opened several years ago, the Science Office has developed a variety of programs for grades K-12. These Planetarium programs are extremely popular and have reached full capacity with over 16,000 APS students visiting the Planetarium this year. In addition, private and evening programs attracted an additional 3,000 visitors from the Arlington community.

The Outdoor Lab continues to be a highlight for many APS students. Over 6,000 students participated in educational programs at the Outdoor Lab. This includes the 5th grade overnight program which served almost 2,000 elementary students. This year, the Science Office has worked with Outdoor Lab staff to develop curriculum to support problem-based learning that also aligns to the Standards of Learning.

These are record numbers for the Planetarium and the Outdoor Lab.

Focus on Environmental Literacy

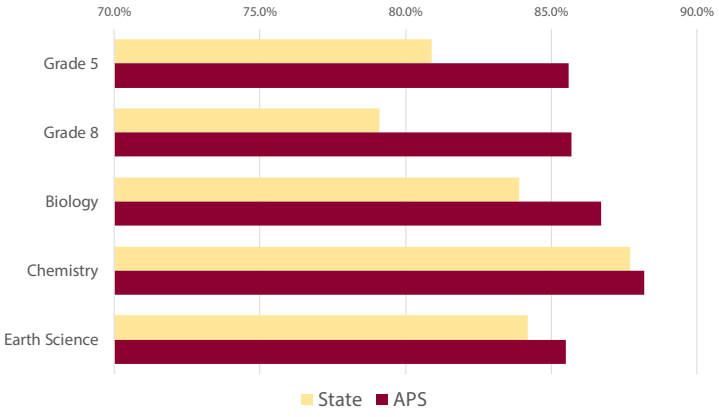
The Science Office has been coordinating a variety of projects to advance environmental literacy for Arlington Public Schools students. This includes working closely with community partners and stakeholders to leverage resources and expertise.

Data that Provides Insight

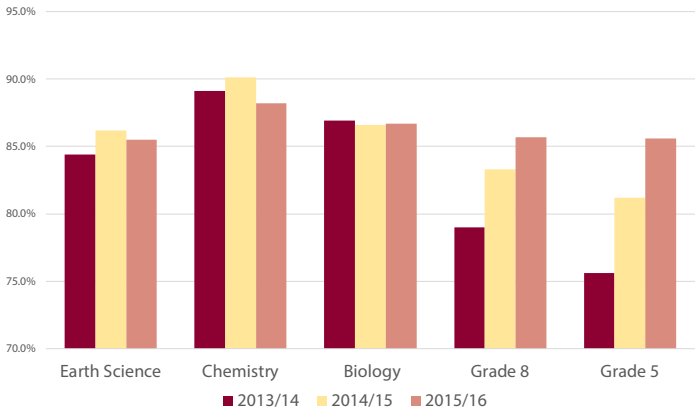
VDOE Standards of Learning in Science

Arlington Public Schools outperforms the state in all five science SOL tests, including Grade 5 Science, Grade 8 Science, Biology, Chemistry and Earth Science. APS has made large gains in Grades 5 and 8 Science. This can be attributed to the increased use of formative assessment tools and the focus on remediation and support.

Science SOL APS vs. State Scores 2015/2016



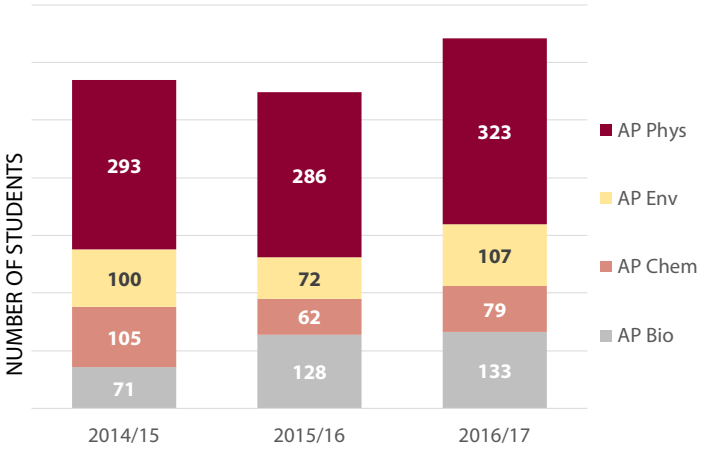
Science SOL Pass Rates- Three Year Trend



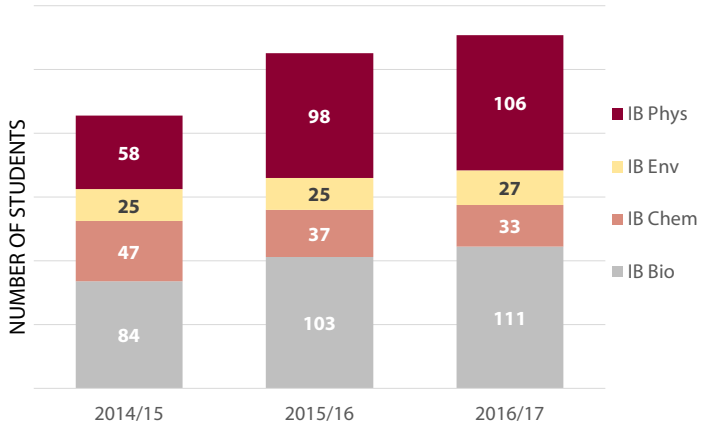
AP/IB Course Enrollments

Enrollment numbers in AP and IB science courses continue to rise. The enrollment in AP Science classes increased by 94 students, as compared to last year. With the addition of the new AP Physics I and 2 courses two years ago, APS is providing even more AP/IB options for students. IB Enrollment also continues to rise, increasing by 23% over the three-year period.

AP Science Enrollment- Three Year Trend



IB Science Enrollment- Three Year Trend



Bright Spots (cont'd.)

B-WET (Bay Watershed Education and Training) Grant: To support environmental literacy in APS, the Science Office received three years of grant funding through a competitive proposal process totaling $375,000. This grant funding through NOAA B-WET has been providing professional development and training for secondary science teachers to implement storm water management projects in their classrooms.

Sustainability Liaisons: Based on the recommendations of the Superintendent's Advisory Committee on Sustainability, APS initiated a pilot for school-based Sustainability Liaisons. This year, eleven schools were selected to have Sustainability Liaisons. These individuals have led, developed, and implemented a variety of school-based projects focusing on environmental and sustainability education.

Outdoor Learning Mini Grants: The Science Office worked with 19 elementary science lead teachers to identify projects that supported outdoor learning. Mini grants were provided to help elementary schools enhance their learning gardens and outdoor classrooms, thereby creating spaces for teachers to teach science outdoors.

APS Students Excel in Science Competitions

On March 4, 2017, 169 APS students participated in the 62nd Northern Virginia Regional Science and Engineering Fair. The annual regional science fair was open to students in grades 7-12 from Arlington Public Schools, Alexandria City Public Schools, Falls Church City Public Schools, and the private schools within those jurisdictions. Twelve APS student projects were nominated and competed in the Virginia State Science and Engineering Fair (VSSEF), which was held at VMI in Lexington, VA on March 25, 2017. At the middle school level, 12 seventh and eighth grade projects were nominated for the Broadcom Masters, a competition sponsored by Society for Science and the Public.

Last May, 232 APS students were selected to compete in the Virginia Junior Academy of Sciences (VJAS). This represents about a third of the VJAS participants among all school divisions statewide. The VJAS competition provides students an opportunity to present their papers to university professors and science experts and engage in scientific discourse to further explore their topics. Students have also benefited from the experience of being on a university campus.

What We Learned

Resource Allocation

This year, the Science Office is going through the secondary resource adoption process, engaging a wide range of stakeholders, including teachers, staff specialists, parents, Science Advisory Committee members, and other community representatives. The new resources will focus on instructional needs that include science content, differentiation, and personalized learning. The Science Office plans to present its recommendation for both core and supplemental print and digital resources to the School Board in May 2017.

Problem-Based Learning

With the elimination of the 3rd Grade Science SOLS, APS identified alternative assessments that focused on problem-based learning, including the integration of engineering design using the Engineering is Elementary (EiE) program. The Science Office has now extended this program to grades 4 and 5, with the goal of extending problem-based learning to all grades at the elementary level. As evident in the SOL data, the focus on inquiry-based instruction and performance-based tasks have helped students develop a deep understanding of science.

Community Partnerships to Support Science Education

APS continues to partner with the American Association for the Advancement of Science (AAAS) to provide scientists in the classroom. This year, there are 21 scientists volunteering in 18 elementary schools. These volunteers have provided teachers with support, while bringing in their expertise to make learning science relevant, engaging, and exciting for elementary school students. In addition to this program, APS also partners with a variety of organizations, including AES, an energy company, and the Children's Science Center to bring hands-on science activities into the elementary schools.

Moving Forward

1. Offer additional pathways to graduation and college preparation: Provide more opportunities for students to fulfill science graduation requirements; focus on dual enrollment (Human Anatomy and Oceanography); and expand summer course offerings
2. Align curriculum documents to new science curriculum resources and upcoming changes (2018) to the science SOLs
3. Provide teachers with support in using the new secondary science curricular resources by providing professional development during the summer and throughout the school year
4. Implement new problem-based learning curriculum at the Outdoor Lab