The Ridgewood Public Schools Curriculum and Program Review

Five-Year Cycle 2020-2025

Science Department Study Findings & Recommendations June 2021

Curriculum Study Timeline

- **Year One: 2020-2021: Program Review, Research, and Recommendation.**
  - *Administrators researched best practices in the content area, and reviewed current program, student achievement results, and input from staff, parents, and students. A recommendation is made to reaffirm or revise curricula and/or program. The curriculum was simultaneously being revised to address a change in standards to focus on climate change.*
- **Summer of Year One: 2021: Curriculum Writing, Revising, and/or Reaffirmation.**
  - *A committee of teachers and administrators develop new or revised curricula, research and recommend professional development and instructional materials to support implementation. The focus will be on standards alignment and the inclusion of best practices.*
- **Year Two: 2021-2022: Implementation of New or Revised Curriculum and Materials, with consistent professional development as needed.**
- **Year Three and Four 2022-2024: Monitoring and Revising as needed**
  - *Implementation continues. Achievement and feedback are monitored. Modifications are made if needed.*
- **Year Five 2024-2025: Begin to prepare for next study of department**

Year-One Research Study Process

- Research on best practices in science education
  - Review of current Ridgewood District science education practices in Grades 6-12 to identify and vertically align essential skills
- Review of student achievement data
- Survey data from teachers, students and parents
- Recommendations and work in progress
  - Data Analysis
  - Engineering
  - Writing
  - Standard Alignment: Climate Change

Standards Guiding Study

District Department Vision/Mission

- Continue to align to the NJSLS
  - Further integrate interdisciplinary content (ELA and Math) into science
  - Embed additional engineering practices and real-world problem-solving
  - Focus on student-centered learning experiences

State Standards and or Content/Practice Professional Standards

- Standard revisions for 2021
  - Addition of climate change and human activity to MS and HS standards (MS-ESS3-5, HS-ESS3-1, HS-ESS3-4, HS-ESS3-6)

Best Practices

NGSS (NJSLS) was a huge shift in instructional practice that takes significant time to implement correctly

- Continuation of previous 5-year study best practices
  - 3-dimensional learning
    - Science is a body of knowledge that is continually revised due to evidence
  - Scientific Investigation and Argumentation
  - Real-world application of content

As Defined by National Groups and Research Institutes

- Scientific & Technological literacy for an educated society
  - Ability to make informed decisions about societal concerns and important events
- Essential preparation for all careers
  - Many of the fastest growing careers require science and math

Benchmark Districts and Their Practices

Common Course Offerings

Graduation Requirements (3 years of lab science)

- Sequence of standards covering all NJSLS standards with
  - Biology (mandatory); Chemistry; and one of the following (Environmental Science or Physics)

Many districts have started to articulate STEM Programs:

- Engineering & Technology programs and/or CAD/Engineering courses
- Science Engineering Research programs

Findings based on Review of Peer District Curriculum Guides and Interviews

Our Practices: Middle School

Core Program

- Curriculum spirals with Life Science, Physical Science, & Earth Science taught each year.
- Three to four units of study are covered each year in each grade with one hour classes.
- Environmental Science elective is taught to all 6th-grade students

Findings being addressed:

- *Vertical alignment of essential science skills*
- *Further incorporation of engineering practices*

Our Practices: High School

Core Program

- Environmental Science
- Biology
- Chemistry
- Physics

Enriched Program

- RAHP Program with Valley Hospital
  - Addition of AP Capstone Program (2020-2021)
- Career Pathways in Medicine Program
  - 2-year CP level program

Elective Course Offerings

AP Courses and other electives offered

- AP Physics 1, AP Physics 2, AP Physics C, AP Biology, AP Chemistry, AP Environmental Science

STEM-RELATED

- Physics, Engineering and Art H, Genetics & Biotechnology H, Forensic Science CP & H, Anatomy & Physiology H

Enhancements Since Previous Study

Enhancements made since previous 5-year study

- **New Courses/Programs**
  - Biology Advanced (2016-2017)
  - AP Environmental Science (2016-2017)
  - AP Physics C (2018-2019)
  - Career Pathways in Medicine Program (2017-2018)
  - AP Capstone program incorporated into RAHP (2020-2021)

- **Sustainable NJ Schools - Bronze-level certification**

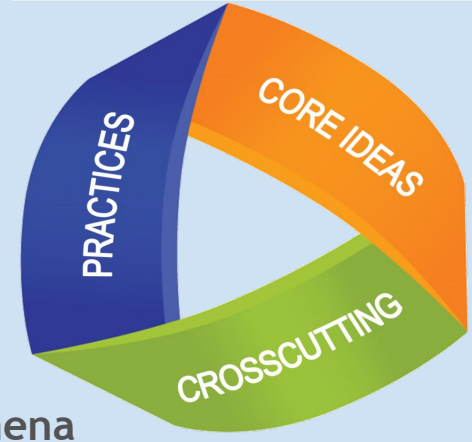
Enhancements Since Previous Study

- **Lab Facilities & Equipment - Community Donations**
  - **Jones Family Donation**
    - Anatomage Table, Microscopes, Greenhouse, Outdoor Classroom, general lab equipment
  - **REF**
    - 4-year grant for improved Physics lab equipment
    - Teacher use of MakerSpace

Our Program Delivery

Class Size

- HS science courses follow state recommendations of no more than 24 students



Pilot Programs

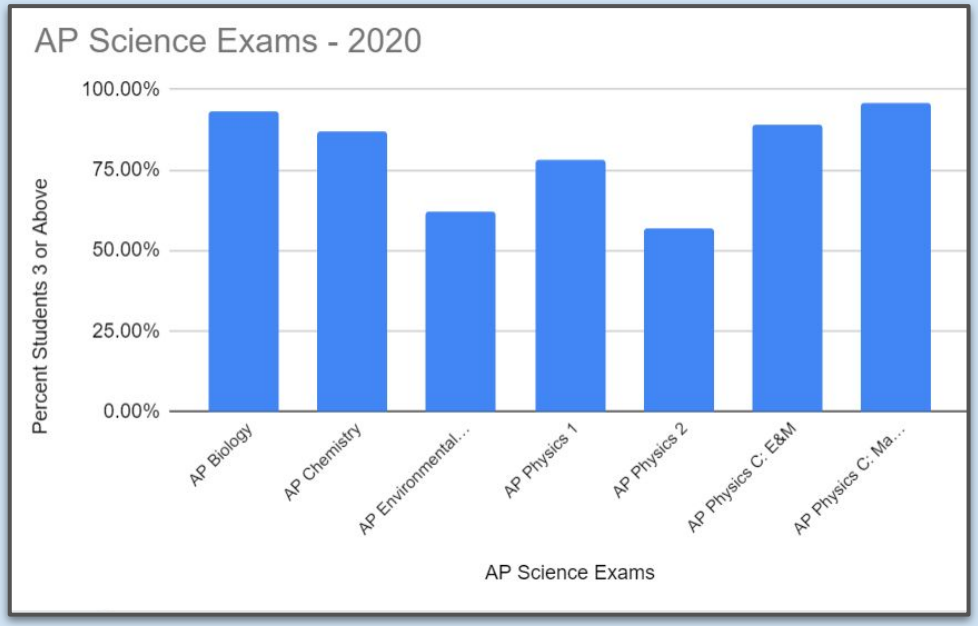
- MosaMack (MS)
  - Online Inquiry/Engineering Modules
- RocketLit (MS)
  - Differentiated Reading Program for Science
- Storylining (HS - Biology) - continuing for 2021-2022
  - Investigation through questions surrounding phenomena
  - 3-dimensional Science: Engineering Practices, Disciplinary Core Ideas, Crosscutting Concepts (Cause & Effect, Patterns, etc)
  - Ex: Africa Storyline: Lion

How are we doing? - Student Data

- 74% of 12th-grade students have taken at least 4 years of science
- 43% of 11th & 12th grade students have taken or are currently enrolled in 4 or more science courses
- 30% of seniors are taking at least 1 AP Science course

NJSLA (2018-2019)

- Ridgewood's scores far surpass statewide results
- Comparison across similar districts shows that our results are strong



How are we doing? Community Perceptions

Survey Methodology

- Surveys were sent to the following groups:
  - MS & HS Parents
  - MS & HS Students
  - Staff

How are we doing? Community Perceptions

MS Parent Survey responses

Total: 318

Statement	Strongly Agree	Agree	Total
Student is interested in science	26.4%	36.8%	63.2%
Student enjoys science program	16%	62.9%	78.9%
Student is successful in science	37.4%	54.7%	92.4%
Student is appropriately challenged	17.3%	57.9%	75.2%
Overall satisfaction with science program	16.7%	55.7%	72.4%

How are we doing? Community Perceptions

MS Student Survey

Total: 282 responses

Statement	Strongly Agree	Agree	Total
Student enjoys science program	63.8%	17.4%	81.2%
Student is appropriately challenged	26.6%	57.8%	84.4%
Program increased student interest in science.	13.8%	50.4%	64.2%

Program Perceptions

Comments from Parent, Student, and Teacher Surveys

MS Parent & Student Responses

- Would like more hands-on experiences, though understand COVID restrictions
- Program is challenging
- “A fun year even with COVID!”

Would like to see…

- Engineering Opportunities
  - Plans to vertically align with 6-8 as HS program is implemented
- Extra help period
- Additional differentiation

How are we doing? Community Perceptions

HS Parent Survey responses

Total: 188

Statement	Strongly Agree	Agree	Total
Student is interested in science	30.3%	33.5%	63.8%
Student enjoys science program	18.1%	64.9%	83%
Student is successful in science	33.5%	57.4%	90.9%
Student is appropriately challenged	20.7%	64.4%	84.9%
Satisfied with science choices offered	23.4%	59%	82.4%

How are we doing? Community Perceptions

HS Student Survey

Total: 249 responses

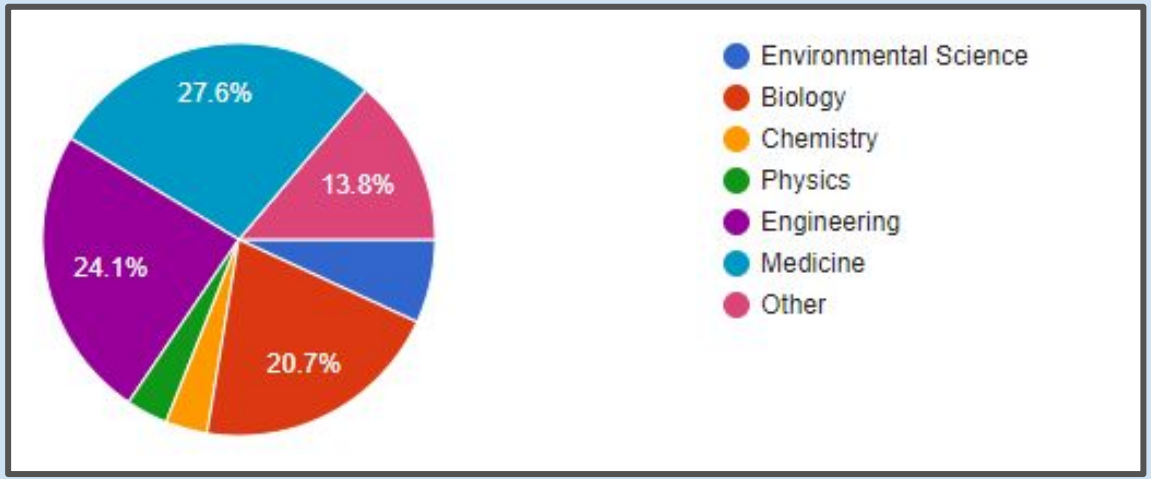
Statement	Strongly Agree	Agree	Total
Student enjoys science program	14.9%	70.3%	85.2%
Student is appropriately challenged	25.7%	61.4%	87.1%
Student is satisfied with overall experience	12.9%	73.9%	86.8%
Student is successful in science courses	34.5%	57.4%	91.9%
Satisfied with available lab equipment	34.9%	55.4%	90.3%

How are we doing? Community Perceptions

HS Student Survey

Total: 249 responses

- 37.2% of respondents plan on majoring in science
- 93.1% are very satisfied or satisfied that they are prepared to major in science



Program Perceptions

Comments from Parent, Student, and Teacher Surveys

HS Parent & Student Responses

- Would like more hands-on experiences, though understand COVID restrictions
- “Great course offerings!”
- “Really enjoy my science class!”, “Great program!”
- “You’re killing the game. Keep up the good work!”

Would like to see…

- Additional labs and experiments
- More real-world discussions
- STEM/Engineering
- Engineering Program

Program Perceptions

Comments from Parent, Student, and Teacher Surveys

Staff Responses

- Staff value lab time and are committed to offering students opportunities to engage in hands-on science experiments
- Staff are interested in continually enhancing the program
  - Staff-generated pilots
  - Additional course and program options
- Thrilled with support to obtain equipment and instructional resources
- Staff would like to see more applied science engineering opportunities for students
- Continue to work towards common proficiency expectations 6-12

Summary of our Findings

6-12 Science Findings

- Overall program is very strong
- Student achievement is high and have a strong academic foundation that prepares them for college and careers in the science fields
- Staff are committed to the continued enhancement of the program
- Many students demonstrate an interest in pursuing science after high school
- Exploration of additional opportunities in engineering is encouraged by staff, students and parents

Recommendations for 2021-2022

6-12 Science Recommendations

- Continue to explore instructional resources and best practices that will continue to enhance student experiences in the sciences
- Continued use of MosaMack and RocketLit in grades 6-8
- 6-12 Vertical alignment essential science skills (data analysis, writing)
- Development of HS Engineering Program
    - Plans to vertically align engineering in 6-8 once HS program is implemented
    - Align to the Strategic Plan by enhancing student educational experiences with community involvement beyond the classroom setting

Work Planned for Summer 2021

Curriculum Writing

- Standard alignment & Revisions

Exploration of Next Steps for the Engineering Program

- Meet with community leaders and local colleges/universities
  - NJIT; Sandvik Coromant; Rutgers; NYU
    - Explore potential for Dual-enrollment opportunities
    - Explore opportunities for a partner to facilitate student internship opportunities
- Continue to research options for expansion of the program