ONE YEAR SCIENCE PLAN

Program Year:

July 1, 2017 – June 2018

DEPARTMENT of CURRICULUM & INSTRUCTION

Mission Statement

Executive Summary

The One Year Science Plan outlines the activities which will be undertaken during the program year beginning July 1, 2018 and ending June 30, 2019 using district funds granted for use during the 2018-2019 school year. Programs and activities in this plan are intended to provide support and direction to schools in alignment to the Orange Public School district's vision, the Office of Mathematics and Science philosophy for Science, and the district-wide goals for SY2016-17.

Objective: By the year 2021, Orange Public School students will demonstrate improved academic achievement as measured by a 25% increase in the number of students scoring at or above the district's standard for proficient (college ready (9-12); on track for college and career (K-8) i**n** Science.

GOAL 1: CURRICULUM

Provide all students with equitable access to rigorous curriculum with aligned instructional materials and assessments in all grade levels.

Provide opportunities reflective of research and best practices for K-12 students to engage with scientific phenomena through implementation of innovative science curriculum programming that fosters learning, deep understanding, and application of core science content, conceptual understandings, science and engineering practices and cross cutting concepts.

GOAL 2: 21st CENTURY LEARNING AND INSTRUCTION

Facilitate the implementation of STEM-focused instructional models; extended and structured learning experiences that promote the necessary 21st skills to effectively engage all learners, support their unique needs, promote 'passion, play, and purpose,' and adequately prepare students for college and careers (e.g. critical thinking, problem solving, collaboration, oral, written and multimedia communication, etc.)

GOAL 3: ASSESSMENT

Support and advance the development and use of assessments (diagnostic, formative, summative, authentic) that measures student achievement based on the Next Generation Science Standards, and use the data resulting from these assessments to enhance teaching and learning.

GOAL 4: PROFESSIONAL DEVELOPMENT

Initiate, build, and sustain collaborations and partnerships to provide specific and focused professional development to support the teaching and learning of core science content, conceptual understandings, science and engineering practices and cross cutting concepts for grades K-12

GOAL 5: ADMINISTRATIVE AND COMMUNITY SUPPORT GOAL

Build the capacity to enhance science education and ensure career readiness by involving stakeholder partnerships and alliances between school districts, institutions of higher education, science education professional organizations, business and industry, informal education organizations, government agencies, and the larger learning communities: local, regional, state, national, and international arenas.

GOAL 1: CURRICULUM

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Provide opportunities reflective of research and best practices for K-12 students to engage with scientific phenomena through implementation of innovative science curriculum programming that fosters learning, deep understanding, and application of core science content, conceptual understandings, and practices.

Actions	**AFG Standard**	**Person(s) Responsible**	**Timelines for Implementation/ Completion**	**Resources Needed**	**Evaluation/ Evidence/Indicators of Attainment**
Objective 1: Provide revised and enhanced curricula aligned to the Next Generation Science Standards and plans for implementation.		Director K-12 Math Team Science Team Including Science Teachers	SY2018-2019 - SY2020-2021	Funding, curriculum materials and resources, training, scheduling, time	Pacing Calendar, Lesson Plans, Unit Plans, Purchase Orders
1. Continue advancing the effectiveness of FOSS grades K-5		**Director Science Team Including Science Teachers**			
2. Support implement of Discovery Education Techbook grades 6-12.			SY2018/2019		**Lesson Plans, Unit Plans,**
3. Conduct curriculum mapping for grade 6-12					

4. Revise and enhance unit plans anchored in NGSS standards using NJ model curriculum (K-12).		**Science Team Including Science Teachers**			**Lesson Plans, Unit Plans,**
5. Develop and implement a system-wide structure to support 5E's model for science instruction					
6. Explore additional research-based curriculum models.					
7. Identify, create and secure NJ materials for common hands-on investigations.					
8. Identify Common Authentic Assessments (K-12). These assessments will be formative in nature.					
9. Provide strategic support for teachers and administration for intervention strategies, associated data analysis and monitoring for targeted groups of students.					

10. Identify select teachers to: • Facilitate the development of a template for carrying out common intervention plans for targeted groups of students • Model comprehensive intervention plans through peer observations and support					
Objective 2: Develop and implement plan to increase Reading Comprehension of Scientific text.					
1. Ensure that all students in grades 3-8th have access to and make use of Readorium in class and during extended day.					
2. Support schools in providing extended day programs for Readorium and other district approved science focused software programs.					
3. Improve teachers' knowledge and skills in advancing K-8 literacy outcomes.					
4. Regularly review Readorium data and outcomes to ensure it is meeting its objective and is relevant for students.					

Objective 3: Support regular and substantive teaching and learning of core science content, conceptual understandings, and practices through scientific inquiry and authentic engagement with natural phenomena by providing models of effective systems management and dissemination of science materials.					
1. Identify and secure materials to support the implementation of inquiry-centered science for all instructors K-12					
2. Require all teachers in grades K-12 to plan instruction using the district purchased research-based, inquiry-centered materials as primary curiucular resources.					
3. Require teachers to utilize all the tools and materials and components within the science modules not exclusive of: non-consumables, consumables, equipment, living organisms not (K-5).					
4. Develop system to monitor the effectiveness of the modules being implemented by teachers, focusing on common, authentic assessments.					
5. Develop a system to manage the inventory and refurbishment of curricular materials.					

OBJECTIVE 3: Expand, develop and support innovative opportunities for students to engage in science instruction in an extended day setting through the District Science Fair, Science Olympiads, utilization of the District Greenhouses and professional partnerships with community stakeholders.					
1. Implement **Science Olympiad** initiatives in schools throughout the district. Implement/conduct district level Science Olympiad competititons with the vision of future regional and national entries.					
2. Contine advancement of **Community Science Fair** initiatives. • Develop and extend projects to be year-long focus. • Identify advanced students (k-7) for enrichment through participation.					
3. Develop and intergrate the District's **Greenhouses** (Oakwood Avenue Community School, Forest Street School, Orange High School) as sustainable learning laboratories and viable economic entities. • Continue to modify the current high school curricula to engage students in opportunities and experiences that mirror business/entrepreneurial career options. • Establish marketing opportunities for the high shool greenhouse with local entities. • Foster community relations through a Farmers Market and an outreach program. • Use the greenhouses as an extended learning experience for K-12 • Hire students to maintain greenhouse production and maintenance.					

4. Regularly review school programming related to the District's Greenhouses to ensure it is meeting its objectives and remains relevant for students.					
5. Work with science specialist and community partners to enhance curriculum to support programs, (i.e. bring a scientist to class, apprentice opportunities, field trips, and scientist sponsor student programs, etc.). (Structured learning experiences.)					

GOAL 2: 21st CENTURY LEARNING & INSTRUCTION

Facilitate the implementation of STEM-focused instructional models; extended and structured learning experiences that promote the necessary 21st skills to effectively engage all learners, support their unique needs, promote 'passion, play, and purpose,' and adequately prepare students for college and careers (e.g. critical thinking, problem solving, collaboration, oral, written and multimedia communication, etc.)

Actions	AFG Standard	Person(s) Responsible	Timelines for Implementation/ Completion	Resources Needed	Evaluation/ Evidence/Indicators of Attainment
Objective 1: *Infuse 21st Century skills through projects aligned to NGSS.*					
1. Utilize Discovery Education "Creator Studio Design"		8-12 Science Team Discovery Education Support		Materials and resources; scheduling; time;	Creator Studio Designs Board Builders.
2. Infuse Science and Engineering practices and cross-cutting concepts in all learning and teaching practices.		Director K-12 Math Team Science Team Including Science Teachers			
3. Develop and implement a system-wide tool to support the 5E's model for planning and facilitating science instruction.					
4. Increase the use of research based best practices in all classrooms					

GOAL 3: ASSESSMENT

Support and advance the development and use of assessments (diagnostic, formative, summative, authentic) that measures student achievement based on the Next Generation Science Standards, and use the data resulting from these assessments to enhance teaching and learning.

Actions	AFG Standard	Person(s) Responsible	Timelines for Implementation/ Completion	Resources Needed	Evaluation/ Evidence/Indicators of Attainment
Objective 1: Implement an integrated, Standards based common assessments that evaluates student growth; conceptual understanding; science and engineering skills.					
1. Identify, develop and administer common written and performance-based formative and summative assessment which provides immediate feedback for students and teachers.					
2. Convert assessments to an online platform. (FOSS maps and DE assessments).					
3. Collect and analyze formative assessment data (notebook and journal responses, student response sheets and extension sheets, lab reports and lab performance tasks) to identify trends and patterns of individual student performance and needs.					
4. Use formative assessment data to determine professional development needs and technical assistance					
5. Use performance data to identify schools/teachers that are making substantial progress in raising student achievement of the learning standards in science to determine possible models of effective science instruction and best practices.					

GOAL 4: PROFESSIONAL DEVELOPMENT

Provide professional development that supports teaching and learning and is based on student needs, learning styles and results of a variety of assessment data of student performance.

Actions	**AFG Standard**	**Person(s) Responsible**	**Timelines for Implementation/ Completion**	**Resources Needed**	**Evaluation/ Evidence/Indicators of Attainment**
Objective 1: To make our educators knowledgeable of all components associated with district approved programs and curricula..		Director K-12 Math Team	SY2014-2015 - SY2020-2021	Funding, curriculum materials and resources, training, scheduling, time	Pacing Calendar, Lesson Plans, Unit Plans, Purchase Orders
1. Provide ongoing training and support for vendor-based programs (Discovery, FOSS, STC, Gizmos, Readorium).		Director K-7 Science Team 8-12 Science Team			
2. Provide ongoing professional development on the Next Generation Science Standards, especially as it relates to its 3 Domains (Core Disciplinary Ideas, Cross Cutting Concepts and Science and Engineering Practices)					
3. Provide professional development opportunities in the management of science materials that includes the following components: work environment, space planning, equipment, expenses, and staffing.					
Objective 2: Provide models for developing teacher capacity for building science content and pedagogical knowledge, translating standards to practice, practicing teaching, and reflecting.					

Actions	AFG Standard	Person(s) Responsible	Timelines for Implementation/ Completion	Resources Needed	Evaluation/ Evidence/Indicators of Attainment
1. Identify a cadre of professional development institutions and partnerships to service the needs related to science instruction and curriculum. (Currently in place, are: PRISM consultants, 2 Coaches, Conference Opportunities, possible lead teachers)					
2. Establish a model to support and develop newly hired teachers and staff through coaching, peer collaboration, and mentorship.					
3. Develop a protocol for post training implementation of research based strategies, skills, content, practices, etc.					
4. Establish a team of teacher leaders to be involved in district professional development opportunities that support the implementation of standards-based curricula.					
5. Develop staff content and pedagogical capacity through teacher-led professional development.					

Actions	AFG Standard	Person(s) Responsible	Timelines for Implementation/ Completion	Resources Needed	Evaluation/ Evidence/Indicators of Attainment
6. Provide on-going support to Fellows and Residents (WOODROW WILSON, WIPRO, CUSP, NOYCE, etc).		Director K-12 Science Team Associated Universities		Time	Logs, Schedules, Agendas
Objective 3: Provide on-going professional development opportunities for administrative staff.					
1. Develop a plan to support administrative acquisition of current standards, practices, policies.					
2. Develop a plan to keep administrators abreast of new innovations and initiatives.					
3. Provide on-going professional development opportunities for the science supervisor.					

GOAL 5: ADMINISTRATIVE AND COMMUNITY SUPPORT GOAL

Build the capacity to enhance science education and ensure career readiness by involving stakeholder partnerships and alliances between school districts, institutions of higher education, science education professional organizations, business and industry, informal education organizations, government agencies, and the larger learning communities.

Actions	**AFG Standard**	**Person(s) Responsible**	**Timelines for Implementation/ Completion**	**Resources Needed**	**Evaluation/ Evidence/Indicators of Attainment**
Objective 1: Engage Administrators, family and community members in strong relationships and meaningful opportunities to increase participation, trust, and shared responsibility for student success in science.					
1. Build stakeholders knowledge and understanding of the importance of inquiry centered science in practice. 2. Expanded and extend partnerships with business and community members. 3. The improvement of web access to the K-12 curriculum's for parents 4. Proactively communicate the vision of the strategic plan to all stockholders. 5. Define stakeholder's roles within instructional opportunities. 6. Continue to enhance website and community-wide use of digital technology to improve all facets of communication internally and externally					

When you visit my Science class, this is what you will see…

Around the classroom:

- ✓ Science Word Wall with images
- ✓ Student Work posted with meaningful feedback
- ✓ Student Groupings based on data
- ✓ Accessible Resources and tools to use

Planning a Lesson:

- ✓ Lesson plans developed in line with the Ideal Science Block, the NGSS and 5-E Model
- ✓ Lesson activities focused on students Reading, Writing, Thinking and Working like a Scientist
- ✓ High-Level tasks are chosen to build on student prior knowledge and deepen learning
- ✓ Formative assessment planned throughout lesson to assist individual students with content, conceptual knowledge and performance tasks

During Instruction:

- ✓ Routines established
- ✓ Use of wait time
- ✓ Problem solving strategies and manipulatives used to develop concept understanding
- ✓ Integration of technology
- ✓ Higher-Order questions are used to press for reasoning

During Instruction Cont'd:

- ✓ Probing questions are asked to determine student understanding and help move students forward based on their entry point
- ✓ Cooperative grouping that is utilized to promote student discussion, share thinking and collaborative work
- ✓ Use of scientific terms in appropriate context
- ✓ Students self-evaluate and self-monitor their progress
- ✓ Connections between different science content using and emphasizing Cross Cutting Concepts
- ✓ Students engaged in using Science and Engineering Practices
- ✓ Use of vendor-based programs (Gizmos, Readorium, Discovery)to *facilitate* instruction, not replace it

As Assessments:

- ✓ Summative assessments to *evaluate student learning*
- ✓ Formative assessments to *monitor student learning*
- ✓ Formative assessment to close every lesson
- ✓ Diagnostic assessments to *determine student deficiencies, group students and know where to begin*
- ✓ Performance-Based assessments focusing on

✓ Positively working with students' misconceptions ✓ Disciplinary Core Ideas are clearly stated throughout the lesson, and are tied to previous content learned	content and Science and Engineering practices ✓ Assessments that are aligned in content and rigor to the standards being taught ✓ Meaningful and purposeful feedback ✓ Frequent checks for understanding throughout the lesson and pacing adaptations

IDEAL SCIENCE BLOCK			
	Time	**Teacher Action**	**Student Action**
Whole Group Instruction Initial Lesson	10 min	Instruction • Phenomenon presented • Questions collected • Essential question or… • Anchor task presented	• Student generates questions on phenomenon • Record essential question or… • Anchor task
Whole Group Instruction Subsequent Lessons	45-55 min	• Targeted instruction • Station exploration • Student support • Mini-lecture • Inquiry • Formative assessments (student-centered) • Feedback to writing task	• Student Exploration • Stations/Small Group Work • Lab Activity • Technology component • Literacy component
Closure Discussion Writing Task	5-10 min 10-15 min	• Facilitating • Probing questions • Link outcome to essential question/task	• Participation • Recording Engage in writing response to essential question/anchor task