Independence School District Comprehensive Science Plan:

Birth to Grade 12

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Introduction

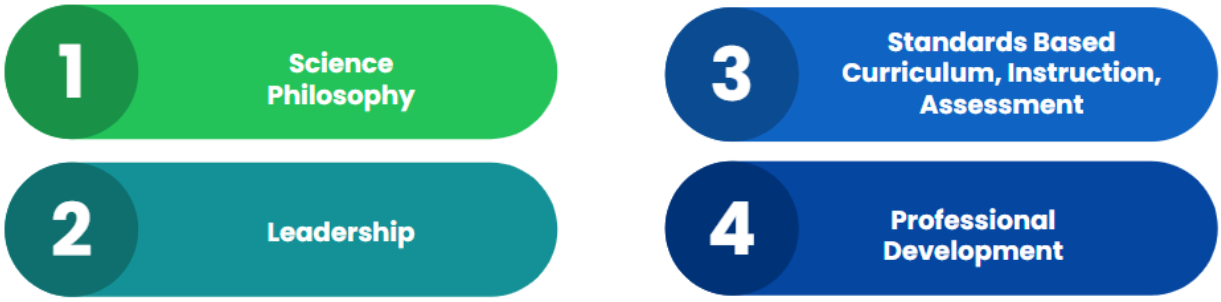
The Independence School District (ISD) Comprehensive Science Plan (CSP) is a resource for parents, caregivers, teachers, and administrators throughout the infant to college and career continuum. The CSP supports teachers and administrators with information and resources to guide instruction, coordination of staff support, and alignment of goals. The CSP guides the components of the ISD Science Instructional Model.

Pillars of ISD

The Independence School District has four pillars that are the district's focus. These include Literacy, Math Computation and Problem Solving, College and Career Readiness, and Increasing Student Attendance. The pillars are built upon the foundation of the Student and Family Experience.

Plan Organization

The ISD Comprehensive Science Plan is organized into four main components.



Each area works in concert to provide science development and academic achievement for all ISD students. The components are critical to providing each student with a comprehensive science education.

Overview of the ISD Science Plan Components:

1. **Science Philosophy:** The ISD has outlined beliefs and practices that ensure all students have equitable access to high-quality science instruction.

2. **Leadership:** Leaders at the district, building, and classroom levels collaborate to build shared ownership and direction toward literacy success.

3. **Standards-based Curriculum, Instruction, and Assessment:** The ISD has clear expectations for what all students will know and be able to do. The curriculum is aligned with the Missouri Learning Standards. Educators bring the ISD curriculum to life by designing high-quality instruction for the students served. The Backward Design model by Wiggins and McTighe (2005) helps ensure that the curriculum, instruction, and assessments are aligned.

4. **Professional Development:** The ISD provides ongoing, job-embedded professional development, including research-based practices. Instructional coaches provide ongoing support to meet the needs of each educator.

Independence School District Science Philosophy

Learning Beliefs

The Independence School District has the following learning beliefs to guide our work.

- Learning is our core purpose.
- Trusting relationships and commitment to our core values will foster learning at all levels.
- Effective teaching is the most essential factor in student learning.
- ISD is committed to ensuring that every student learns and succeeds, regardless of race, ethnicity, gender, socioeconomic status, language proficiency, or disability.

Guiding Principles

Accessibility for All

In the ISD, excellence in science education requires accessibility for all. All children have access to high quality, grade level appropriate science curriculum and instruction, with high expectations for all learners. Accommodations are made for learning differences, and all classrooms and students are given the resources and support to be successful. Academic safety is at the core of classroom culture with opportunities for all students to see themselves as a scientist.

Curriculum

In the ISD, teachers develop a focused curriculum that aligns with the Missouri Learning Standards with an emphasis on the ISD Priority Standards. The curriculum is well articulated and includes a coherent progression from birth to grade 12.

Teaching and Learning

In the ISD, teaching and learning promotes scientific reasoning that engages students in critical thinking through problem solving, experimentation, collecting and analyzing data, communicating results, and collaborating with peers. Through the 5E instructional model, students engage in real world phenomena to explore concepts, explain their observations, and gain the understanding of scientific concepts and skills.

Assessment and Feedback

In the ISD, assessment supports the learning of essential science concepts and provides feedback for student and teacher improvement.

Professional Development

In the ISD, teachers participate in ongoing, purposeful, and job-embedded professional development.

Leadership

The Independence School District Comprehensive Science aims to foster a community-wide approach to supporting and enhancing science outcomes. Leadership within the ISD community includes district leaders, building leaders, teachers, and families. The following outlines how each leader contributes to helping students become skilled scientists.

District and Building Leaders

District and building leaders are instrumental in developing a successful science environment. The approach requires a common vision and coordination at all levels of the Independence School District. Areas of focus for district and building leaders include:

- **Goals and Vision:** A common understanding and shared commitment to the desired future vision and the milestones towards the goals.
- **Policies & Procedures:** Ensure compliance with federal and state mandates and policies about science.
- **Funding & Resources:** Commit guidance, support, and resources to ensure a cohesive curriculum is delivered to all students from birth through college and career readiness.
- **Assessment and Data:** Foster a culture of continuous improvement by providing constructive feedback on teacher effectiveness and identifying students' strengths and weaknesses.
- **Professional Development & Instructional Practices:** Provide continuous science professional development for all staff and ample time and resources for ongoing professional learning in research-based strategies.
- **Tier One Core Curriculum & Supplemental Materials:** Understand the importance of science instruction and the processes, plans, and support necessary for student success. The Tier One core curriculum is accessible to all students. Students needing intervention or enrichment will be provided supplemental materials, instruction, and opportunities within and outside the school day.

Teachers

Improving science for all is heavily reliant on the pivotal role of teachers. The Independence School District Comprehensive Science Plan is crafted to provide support to educators across all tiers, enabling them to enhance student learning systematically. Emphasizing science across content areas underscores its significance as a collective vision. Areas of focus for teachers include:

- **Goals and Vision:** A common understanding and shared commitment to the desired future vision and the milestones towards building and student goals.
- **Policies & Procedures:** Comply with federal and state mandates and policies about science.
- **Assessment and Data:** Foster a culture of continuous improvement by providing specific and effective feedback on identifying students' strengths and areas for growth through assessment and data analysis.

- **Professional Development & Instructional Practices:** Engage in continuous science professional development and utilize research-based practices to support ongoing learning.
- **Tier One Core Curriculum & Supplemental Materials:** Understand the importance of science instruction and the processes, plans, and supports necessary for student success. The Tier One core curriculum is accessible to all students. Students needing intervention or enrichment will be provided supplemental materials, instruction, and opportunities within and outside the school day.

Family Partnership

The family plays a paramount role as the primary partnership in their students' education. As stated in the Comprehensive School Improvement Plan (CSIP), posted on the ISD website, the ISD takes steps to ensure families are involved and have access to schools in the following ways:

- **Strategy 4.1.1**: Improve and streamline communication with parents and the community through teachers, buildings, and the district.
    - Increase social media presence.
    - Survey families' preferred communication methods and streamline based on the results
    - District and Building Leaders review professional development in proactive communication.
    - Provide education on where to access school district communication/information.
- **Strategy 4.1.2**: Increase parental and patron involvement in the schools and district.
    - Track and grow parent involvement at the building level.
    - Actively recruit and retain parent and community partnerships.
    - Offer information/resources to families to improve their knowledge of district initiatives.
- **Strategy 4.2.1: Deepen customer service at all levels.**
    - Provide resources annually to frontline staff.
    - Provide Building Leaders training on communication methods for customer service.
- **Strategy 4.2.2:** Improve the transition of new students and families and those transitioning between ISD schools.
    - Welcome and engage new and transitioning students and families and a follow-up.
    - New students and families are welcomed and acclimated to the ISD through the admissions office and a follow-up.
- **Strategy 4.3.1:** Deepen community engagement through ISD Academies, AVID, and Leader in Me.
    - Increase partnerships with the ISD academies.
    - Increase service learning opportunities and contact available with community partners to support Leader in Me.
    - Increase college and community partnerships to support AVID.
    - Communicate volunteer opportunities and celebrate volunteer participation through the ISD Foundation.
    - Highlight social media, media, e-newsletter, and other communication channels.

Standards-Based Curriculum, Instruction, and Assessment

Curriculum

The ISD science curriculum is aligned with the Missouri Learning Standards. Clear standards help improve teaching, inform planning, and maintain accountability. Curriculum development is ongoing, organized by the instructional coach learning team, and designed by teachers. The curriculum is research-driven and continually evaluated through the lens of data analysis as well as a continuous cycle of feedback from all stakeholders. Using district and state priority standards, item specifications, performance level descriptors, and feedback from stakeholders, teacher leaders work together with the instruction leadership team to revise and edit the curriculum annually.

The curriculum is available to all staff through the employee portal. In addition, curriculum overviews are available to parents through the district website.

Instruction

The ISD science instruction is based on two components. The first component is the 5e instructional model, which is grounded in active learning (Bybee, 2016). The second component is the three dimensional learning framework, which includes science and engineering practices, disciplinary core ideas, and cross cutting concepts (National Research Council, 2012).

5E Model

The 5E model includes phases 1) engage, 2) explore, 3) explain, 4) elaborate, and 5) evaluate. The 5E model provides a scientific phenomena that peaks student interest and inquiry that guides their learning for the unit. Throughout the learning process, students engage, explore, explain, and elaborate on their understanding of a scientific phenomena or engineering problem. "Phenomena are observable events that occur in the universe and that we can use our science knowledge to explain or predict." (*Using Phenomena in NGSS-Designed Lessons and Units*, 2016). By using phenomena the teacher becomes the facilitator, guiding the students through different questions, investigations, and research. Teacher and student evaluation is embedded throughout each component of the inquiry. Students develop a deep understanding of scientific topics at the end of their investigations.

Figure 1

5E Instructional Model

Engage. In the Engage phase of the 5E model, the teacher introduces a scientific phenomena or engineering problem that builds student interest and activates prior knowledge. This phenomena or problem may be represented as a specific picture, video clip, or demonstration. The phenomena represented in the engage phase is aligned to a standard or big idea in which concepts are tied together in order for students to build on their foundational knowledge.

In planning for the Engage phase, the following should be considered:

- What is the main purpose of the lesson?
- How does it connect to the students' prior knowledge?
- What do students need to understand to create a solution to the problem?
- What difficulties might the students have?
- How can I keep from giving the students too much of the solution?

The following can be used during the Engage phase:

Poll or survey	Short video clip
Graph	Picture
KWL activity	Graphic organizer
Lab demonstration	Classroom objects (rocks, plants, etc.)

Explore. After engagement, students need time to explore a scientific phenomena or engineering problem. Students investigate objects, events, and simulations to observe patterns, test variables, and establish relationships between items. These collaborative exploration activities are designed to ensure that all students have a common experience in order to discuss scientific concepts within the classroom. Students will use their curiosity to investigate, realize misconceptions, and connect prior learning to new experiences.

In planning for the Explore phase, the following should be considered:

- How will the students be organized to best involve all students (individuals, pairs, groups, etc.)?
- What materials will the students need?
- In what directions might students' investigations go?
- What are the parameters of the investigations?
- How do I prevent new misconceptions from influencing the students?

The following can be used during the Explore phase:

Laboratory investigations	Online simulations
Creating models	Solving a real world problem
Reading articles	

Explain. During the explain phase students share their initial explanations and models from their observations during the engage and explore phases. The teacher guides the students through questioning, conversations, and introduces resources and knowledge to support student learning. Students use this learning to revise their evidence-based models, describe their observations, and formulate conclusions based on collected data.

In planning for the Explain phase, the following should be considered:

- How can I facilitate a student-led discussion so that the students can share their observations and data?
- How can I clarify what the students might present?
- What vocabulary might the students need to be introduced to?
- What misconceptions might the students be holding on to?

The following can be used during the Explain phase:

Analyzing the findings of experiments	Laboratory reports
Teacher presentations	Reading Informational text
Concept map	

Elaborate. Once students have developed their explanations, models, or solutions, the teacher provides students with additional experiences that deepen student learning. These additional experiences take place during Elaborate.

In planning for the Elaborate phase, the following should be considered:

- How does this activity tie into the Explore phase?
- How will students communicate their learning?
- What are the boundaries of the standard or topic I am covering?
- What conclusions should the students make?

The following can be used during the Elaborate phase:

Classify objects or situations	Conduct an investigation
Creating solutions to real world problems	Presentations

Evaluate. Evaluation is embedded throughout the scientific process. Students receive timely feedback throughout each learning phase. This feedback allows the student and teacher to monitor learning progress and revise and adjust scientific understandings if necessary.

In planning for the Evaluate phase, the following should be considered:

- What is the standard or topic that I am assessing?
- What are the key ideas that the students need to grasp throughout the lesson?
- What method of evaluation would be the most effective?

The following can be used during the Evaluate phase:

Performance assessment	Graphic organizers
Quizzes	Classroom presentations
Discussions	Formal assessments

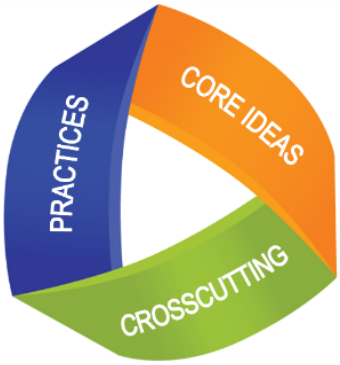
Three Dimensional Learning

When planning lessons, it is not only important to focus on the content contained in the standards but also use the Missouri Learning Standards for Science Expanded Expectations (Department of Elementary and Secondary Education. 2016) to fully understand the intent of grade-level standards and how disciplinary core ideas, crosscutting concepts, and science and engineering practices connect and progress across grade levels (Missouri Department of Education, 2021). These standards are essential to fostering a greater understanding of science and its impacts on students. Without teaching science through this three dimensional view a students ability to incorporate the science material into their lives may diminish.

Figure 2

Three Dimensional Learning

"Three Dimensional Learning." Three Dimensional Learning | Next Generation Science Standards, www.nextgenscience.org/three-dimensional-learning.



Practices. The practices are defined as the skill and knowledge one would use to engage with while conducting a scientific investigation.

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Crosscutting Concepts. Crosscutting concepts are the application of scientific knowledge across the different domains of science.

1. Patterns
2. Cause and effect: Mechanism and explanation
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter: Flows, cycles, and conservation
6. Structure and function
7. Stability and change

Disciplinary Core Ideas. There are four areas considered to be part of the disciplinary core ideas. These are the priority scientific topics that are essential for a student to learn.

Physical Sciences

- PS1: Matter and its interactions
- PS2: Motion and stability: Forces and interactions
- PS3: Energy
- PS4: Waves and their applications in technologies for information transfer

Life Sciences

- LS1: From molecules to organisms: Structures and processes
- LS2: Ecosystems: Interactions, energy, and dynamics
- LS3: Heredity: Inheritance and variation of traits
- LS4: Biological evolution: Unity and diversity

Earth and Space Sciences

- ESS1: Earth's place in the universe
- ESS2: Earth's systems
- ESS3: Earth and human activity

Engineering, Technology, and Applications of Science

- ETS1: Engineering design
- ETS2: Links among engineering, technology, science, and society

Early Science: Birth to Five Years of Age
https://dese.mo.gov/media/pdf/missouri-early-learning-standards

1. Cause and Effect
2. Inquiry Through Observation and Investigation
3. Documentation and Communication of Inquiry
4. Knowledge of the Natural World: Living and Non-living Things

DRDP (2015): A Developmental Continuum from Early Infancy to Kindergarten Entry – Preschool View – August 1, 2015 © 2013-2015 California Department of Education – All rights reserved.

Science is a process of inquiry. The child's natural curiosity provides a springboard for investigations that promotes scientific thinking. Children use their senses to explore their environments. Experiences that encourage the child to investigate a variety of objects and materials helps them develop an understanding of the world around them, such as the difference between living and non-living things.

Creative Curriculum. All Early Education classrooms, birth to five years of age, use Creative Curriculum, in which the teacher acts as a facilitator, asking meaningful, critical thinking questions as students observe and explore materials that meet their interests.

Project Approach. These classrooms also use Project Approach, in which qualitative and quantitative data are collected in order to develop a project for the class to complete over a

period of several weeks. The projects end with a culminating event in which others are invited to attend so that the children, now the "experts" on the chosen topic, can share their work and their findings.

Elementary Science: Kindergarten to Fifth Grade Students

Generation Genius. The elementary science curriculum utilizes two anchor curriculum resources. The first curriculum resource is Generation Genius. This resource is produced in partnership with the National Science Teaching Association (NSTA). Generation Genius offers educators 5E lessons, reading material, engaging student videos, activities, quizzes, and teacher guides.

Missouri Department of Conservation: Discover Nature Schools (DNS). The second resource includes the Missouri Department of Conservation (MDC) education programs. Curriculum resources provided by MDC are listed below.

- K- Bears Through the Seasons (DNS)
- 1- Exploring Missouri (DNS)
- 2- Pollinator pilot in three schools
- 3-Nature Unleashed (DNS)
- 4-Discover Nature Fishing
- 5-Nature Unleashed (DNS)

All elementary schools are classified as DNS and benefit from resources, training and materials.

> This no-cost program emphasizes hands-on learning, teaches problem-solving, and provides authentic and local contexts for learning. DNS teaches students from pre-K through high school about Missouri's native plants, animals, and habitats and connects them with nature. (Discover Nature Schools, n.d. para. 2)

Key elements of Discover Nature Schools include: a full-color, illustrated student book, a student science notebook, comprehensive teacher guides with outdoor activities and lesson plans, a student-centered, collaborative, and experiential learning approach, free professional development and support from MDC conservation educators, grants for field trips and exploration equipment.

Project Lead the Way. Project Lead the Way (PLTW) is offered at two elementary schools; Cassell Park Elementary, Spring Branch Elementary, and Three Trails Elementary. Buildings have developed site based plans to implement the PLTW model.

Spring Branch Plan

- Kindergarten: Sunlight and Weather
- 1st Grade: Light and Sound
- 2nd Grade: The Changing Earth
- 3 Grade: :Life Cycles and Survival
- 4th Grade: Organisms-Structure and Function

Three Trails Plan

- 3rd Grade: Stability and Motion: Science of Flight and Stability and Motion: Forces and Interactions
- 4th Grade: Energy Explorations and Computer programming
- 5th Grade: Robotics and Computer programming

Students are immersed in hands-on activities, projects, and problems that build upon each other and relate to the real world. They experience integrated learning that blends computer science, engineering, biomedical science, and more. Throughout the modules, even the youngest learners apply their math and English Language Arts (ELA) skills, learn science to standards, and adopt skills that are foundational across disciplines. (Project Lead the Way, n.d., para. 2)

Grades K-5 Curriculum Units

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Kindergarten	Physical Science Energy	Life/Earth/Space From Molecules to Organisms	Physical Science Motion & Stability	Earth & Space Reducing Impact
1st Grade	Kickstart: Earth Systems Light & Energy	Earth & Space	Sound & Energy	Structures & Behaviors in Organisms
2nd Grade	Kickstart Science Earth Systems	Earth Systems	Matter & Its Interactions	The Needs of Plants
3rd Grade	Kickstart Science Matter & Heat Organism Traits	Advantages in Survival	Environmental Changes Over Time	Forces & Interactions
4th Grade	Structures & Functions of Organisms	Patterns in Earth's Changing Surface & Reducing Impacts	Energy & Motion	Energy Transfer & Information Transmission
5th Grade	What is Science? Earth's Major Systems	Matter & Energy in Ecosystems	Matter & Its Interactions Stars in the Solar System	Stars in the Solar System Review all science concepts

Secondary Science: 6th to 12th Grade Students

Kesler Science. The middle school (6-8) science curriculum utilizes Kesler Science as their science resource. Kesler Science is aligned with the NGSS standards, which mirror the Missouri Learning Standards. This resource offers teachers 5E lessons, reading materials, and inquiry-based laboratories.

High School. The high school curriculum (9-12) has been created by the teachers through open sourced materials. It is reviewed yearly based on teacher feedback, data, and student performance on state and local assessments.

PLTW. Project Lead the Way courses are offered at three middle schools; Clifford H. Nowlin Middle School, George Caleb Bingham Middle School, and Pioneer Ridge Middle School, along with all three high schools; Truman High School, Van Horn High School, and William Chrisman High School. Throughout these courses, students are required to participate in hands-on activities, problem-solve, and develop solutions to real-world problems (PLTW).

Grades 6-8 Curriculum Units.

	Semester 1	Semester 2
6th Grade	Engineering Design Structure and Properties of Matter Chemical Reactions	Energy Wave Properties Force and Motion Types of Interactions
7th Grade	Engineering Practices Seasons Lunar Phases Gravity Scale of the Solar System Earth's History	Evidence of Continental Drift Geologic Processes Water Cycle Weather and Climate Human Impact on the Environment
8th Grade	Cell Structure and Function Photosynthesis and Cellular Respiration Body Systems	Reproduction and Genetics Ecology Natural Selection

Grades 6-8 PLTW Curriculum Units.

	Semester 1
Medical Detectives	Disease Detectives Mysteries of the Human Body Outbreak

Grades 9-12 Curriculum Units.

	Semester 1	Semester 2
Biology/ Honors Biology	Macromolecules Cells and Homeostasis Mitosis, Meiosis, and Reproduction DNA, RNA, and Protein Synthesis Genetics	Photosynthesis and Cellular Respiration Ecology Natural Selection and Evolution
Chemistry/ Honors Chemistry	Matter and Change Atomic Structure Elections in Atoms The Periodic Table Ionic Bonding Covalent Bonding	Scientific Measurement Chemical Equations and Reactions Stoichiometry
Earth Science	Astronomy Geologic Time	Plate Tectonics Rocks and Minerals Weather and Climate
Environmental Science	The Living World Populations Land and Water Use	Energy Resources and Consumption Pollution Global Change
Forensic Science	Evidence Fingerprints Shoe Prints Documents Fiber and Hair Forensics Blood and DNA	Blood Spatter Ballistics Impressions (Tools and Tires) Skeletal Evidence Post Mortem
Physics	Intro to Mathematical Concepts Linear Motion Projectile Motion Forces and Newton's Laws	Momentum Energy Waves

Grades 9-12 PLTW Courses.

Grades 9-12 College Credit Courses.

- College Biology - Missouri Western University
- College Chemistry - Missouri Western University
- AP Environmental Science - credit is determined by individual universities admissions based on AP test scores.

Assessment

In the ISD, teachers use a variety of formative and summative assessments that factor into a child's grade. Students who are not meeting proficiency on the intended standard or learning goal will have the opportunity to relearn and reassess until they gain a solid understanding of the grade level standard.

Families receive quarterly progress reports to monitor student growth. Proficiency scores are not and cannot be related to a traditional grade. When reviewing a child's proficiency scores on a report, the primary goal is to provide insight into how well a child meets specific content standards. At the elementary level, students proficiency is shared based on the following grading scale:

- M = Meets
  - Consistently meets the requirement of proficient work
  - Independently demonstrates an acceptable level of knowledge and understanding
- A= Approaching
  - Meets some requirements for proficient work
  - Demonstrates some knowledge and understanding
- E= Emerging
  - With support, beginning to meet some of the requirements for proficient work
  - Demonstrates little knowledge of understanding
- B= Below Expectation
  - Unable to meet requirements for proficient work, even with support
  - Demonstrates little or no knowledge and understanding

District-wide, common unit assessments are built and administered to align with the Missouri Learning Standards, State Item Specifications, and the Performance Level Descriptors.

The ISD Comprehensive Assessment Plan outlines all assessments and the purpose for each.

Family Partnership

Families are welcome to engage and partner with curriculum, assessment, and instruction. The ISD posts a curriculum website for families on each school webpage. This website includes curriculum resources, sample progress reports, and pacing guides. Elementary offers monthly Family Choice Boards that align home support with district grade-level curriculum.

Families are invited to student conferences in the fall and spring to discuss science progress. Title I family nights provide educators and families a setting to build excitement, encouragement, and tools to increase the science partnership.

Schools and families are also encouraged to communicate through Seesaw in the elementary schools. School social media accounts are utilized to share the day-to-day learning and events for parents who are not able to physically frequent the school building.

Professional Development

In the ISD, each educator has access to high-quality professional learning in order to cultivate their strengths and address the needs of each student they serve. Additionally, every new teacher entering the district receives training on current effective teaching practices.

Professional development (PD) in math instruction, spanning from birth through grade twelve, includes the following components:

- Annual science-focused professional development is offered throughout the school year during cross-district professional development days led by district instructional coaches.
- Weekly collaboration with grade-level colleagues allows teachers to review science data and adjust instruction accordingly. The building principal and coaches provide ongoing support, including regular assistance through planning, co-teaching, modeling lessons, and small group instruction as needed.
- Summer math-focused professional development is required of all new elementary teachers joining the Independence School District.
- Feedback is collected each year to support curriculum updates and additional professional development needed.
    - **Classroom Self-Assessment:** Teachers provide feedback on Tier One curriculum and resources. The feedback provided is used to guide curriculum adjustments needed for the upcoming school year.
    - **Building Self-Assessment:** Buildings collect and use feedback to help guide professional development needs for the upcoming school year.
    - **District Self-Assessment:** District leaders collect and use classroom and building feedback to guide professional development needs for the upcoming school year. The annual Professional Development Survey given to all staff is also used to make professional development decisions.

Timeline and Goals

Goals 2019-2020

- ISD priority standards identification and vertical alignment at the secondary level (grades 6-12)..

Goals 2020-2021

- Professional development on using evidence to support a scientific argument.

Goals 2021-2022

- Professional development on strategies to increase student's vocabulary.
- Professional development on using scientific reasoning through oral and written language in the science classroom.

Goals:2022-2023

- Continue training and focus on Tier 1 Instruction
    - Review the ISD Science Model
    - Review the implementation of Tier 1
- Professional development covering the use of models in the scientific classroom.
- Review of potential K-8 science resources for adoption in 23-24.

Goals:2023-2024

- Adoption and professional development K-5 for Generation Genius science resource.
- Adoption and professional development K-5 for Missouri Department of Conservation Education and grant funding from MDC
    - K-Discover Nature Schools (DNS) Bears Through the Seasons
    - 1- Exploring Missouri 9DNS)
    - 2- Pollinator pilot in three schools
    - 3-Nature Unleashed (DNS)
    - 4-Discover Nature Fishing
    - 5-Nature Unleashed (DNS)
- Adoption and professional development 6-8 for Kesler Science.
- PD on utilizing evidence to explain scientific phenomena.

Goals:2024-2026

- Science and Engineering Practices in Next Generation Science Standards - DESE Implementation Matrix *Practice number four: Analyzing and interpreting data*
    - K-2 Condensed Practices: Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.
        - Record information (observations, thoughts, and ideas).
        - Use and share pictures, drawings, and/or writings of observations.
        - Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.
        - Compare predictions (based on prior experiences) to what occurred (observable events).
    - Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.
        - Represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships.
        - Analyze and interpret data to make sense of phenomena using logical reasoning, mathematics, and/or computation.
        - Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.
        - Analyze data to refine a problem statement or the design of a proposed object, tool, or process. Use data to evaluate and refine design solutions.
    - Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.
        - Construct, analyze, and/or interpret graphical displays of data and/or large data sets to identify linear and nonlinear relationships.
        - Use graphical displays (e.g., maps, charts, graphs, and/or tables) of large data sets to identify temporal and spatial relationships.
        - Distinguish between causal and correlational relationships in data.
        - Analyze and interpret data to provide evidence for phenomena.

        - Apply concepts of statistics and probability (including mean, median, mode, and variability) to analyze and characterize data using digital tools when feasible.
        - Consider limitations of data analysis (e.g., measurement error) and/or seek to improve the precision and accuracy of data with better technological tools and methods (e.g., multiple trials).
        - Analyze and interpret data to determine similarities and differences in findings.
        - Analyze data to define an optimal operational range for a proposed object, tool, process or system that best meets criteria for success.
    - Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.
        - Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.
        - Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.
        - Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data
        - Compare and contrast various types of data sets (e.g., self-generated, archival) to examine the consistency of measurements and observations.
        - Evaluate the impact of new data on a working explanation and/or model of a proposed process or system. Analyze data to identify design features or characteristics of the components of a proposed process or system to optimize it relative to criteria for success.

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