Science Instructional Model

Purpose:

- To establish equitable instructional practices that connects the resources, standards, and assessments to accelerate student learning.
- APS Instructional Models provide content instruction that is differentiated by language proficiency levels in order to teach students the academic language necessary to engage in grade level standards.

Equitable science instruction is grounded in the 3 principles of How People Learn

Elements of Instruction	**Drawing out Prior Understandings** New understandings are constructed on a foundation of existing understanding and experiences.	**Building a Conceptual Framework** Facts must be placed in a conceptual framework to be well understood.	**Self- Monitoring** Helping students become effective learners, (i.e. – know themselves as learners and monitor current understanding).
Best Practices	**Whole-Part-Whole** - problem based, high cognitive demand tasks **Active Investigation precedes explanation**- the 5 E Instructional Cycle **Math and Literacy Application** - tools to determine patterns and a source of evidences to support claims **Discourse** – highly productive science discourse **Content** - Core Ideas, Science and Engineering Practices and Cross Cutting Concepts		
Core Resources	**Elementary** FOSS – Full Option Science System	**Middle School** PBIS - Problem Based Inquiry Science	**High School** 9th – Active Physics 10th – Active Chemistry 11th – Biology Pilot (2015)
Supplemental resources	FOSS Web Engineering is Elementary APS Elementary Science Website - Literacy Book lists (elem.) Page Keeley Formative Assessment Probes	PHeT simulations Net Logo Page Keeley Formative Assessment Probes	PHeT simulations POGIL
Assessment	• FOSS I-checks • Grade specific and district Common Formative Assessments • CMAS 5th Grade	• PBIS Unit Project • Grade specific and district Common Formative Assessments • CMAS 8th grade	• Active Chapter Challenges • Grade specific and district Common Formative Assessment • CMAS 12th grade

Implementation Phases

The best practices implemented by teachers at each phase are foundational and build on each other to produce rigorous and relevant instruction at each phase.

Phase 1 →	Phase 2 →	Phase 3
Whole Part Whole: • Instructional time is **split** 50/50 between **teacher** and **students**.	**Whole Part Whole :** • Instructional **time** is **structured** as a **Whole part whole** (opener, mini-lesson, student work time, and debrief)	**Whole Part Whole :** • Instruction time of **whole part whole** is **reflective** of **student data** i.e. – student discourse or written response
Discourse: • **1 out 4** categories of highly productive science discourse is evident throughout block **Science and Engineering Practices:** • **Using** the **practices** to **learn** content	**Discourse:** • **2 or more** categories of highly productive science discourse is evident throughout the whole part whole cycle **Science and Engineering Practices:** • **Using 6 of the 8 practices** in order to refine their **claims**.	**Discourse:** • **All** categories of highly productive science discourse is evident throughout the whole part whole cycle **Science and engineering Practices:** • Using **6 of the 8 practices multiple times** to **construct scientific explanations, design solutions and communicate information.**
Content: • CAS and Core Resource **Literacy:** • Reading, writing, listening and speaking as a way to learn content (CAS) **Math:** • Notice patterns in data **Active Investigation:** • Investigations are present in the classroom	**Content:** • CAS ,Core Resource and Science and Engineering Practices **Literacy:** • Reading, writing, listening and speaking used as pieces of evidence to explain and support arguments **Math:** • Conceptual understanding proceeds procedural discussion. **Active investigation:** • Investigation cycles follow the 5 E Instructional Cycle (Engage, Explore, Explain, Evaluate, Elaborate)	**Content:** • CAS , Core Resource , Science and Engineering Practices and Cross-Cutting Concepts **Literacy:** • Building, evaluating, synthesizing and reporting scientific findings clearly and effectively in order to create a scientific explanation. **Math:** • Mathematical models to explain scientific phenomena, justify thinking and predict future results. **Active investigations:** • Investigation 5 E cycle is driven by formative assessments of student discourse and written response