Foundations of Science Leadership

for Elementary and Middle School Leaders

SPRING 2018

Instructors:

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Time: Wednesdays, 5pm-8pm.

Location: Callaway Elementary

Course objective:

Equip school-based leaders with knowledge, skills, and tools to support Science instruction in a preK-8 setting.

General Overview:

- This 45-hour Professional Learning Community focuses on the content knowledge, pedagogical practices, and leadership knowledge required to support, sustain, and advance science literacy achievement in PreK-5 and PreK-8 schools, as outlined and described by the Common Core and Next Generation Science Standards.
- Classroom activities are based on hands-on explorations from the K-5 SABES units and MS curriculum and enhanced by literacy and mathematics practices outlined by the district as core priorities.
- Course effectiveness is measured by pre/post results of participant survey.

Key Topics:

Essential Questions	Sub-topics
What does it take to run a robust science program at my school?	• How does Science instruction connect to other subjects that we teach? • How should I schedule Science instruction in my building? • Management of instructional materials: what to do if I don't have SABES kits? • What are the effective practices of collaborative planning, and observation of instruction? • What are the roles, responsibilities, and characteristics of my Science Lead? • What about after-school science and STEM programming: do they matter?
What does Science classroom look like?	• What is Science Learning Cycle (5Es)? • What are science misconceptions and why are they important?

	• What's the difference between Science by Inquiry vs Active Learning vs Scientific Method Vs NGSS Practices vs Project-Based Learning? • How does Science support ELA skills? (Close reading, evidence-based argumentation and writing, student discourse, analysis of complex texts, etc.) • How does Science support Math skills? (Developing and using models, computational thinking, etc). • What are Science student habits of mind?
How do I observe science instruction so that I can support my teachers?	• What are the key Science teacher and student actions? • What tools do I use to provide useful science teacher feedback? • What is rigor in a science lesson?
What is the design and structure of NGSS Standards?	• What are NGSS instructional shifts? • NGSS Assessments: how do I prepare my students to do well on the MISA assessment? • Thinking beyond standardized testing: what do students need?
How do I make Science accessible for All?	What supports and differentiation are needed for • Students with Special Needs, • ESOL Learners, • students below grade level, • students above grade level?
What's the difference between Science and STEM?	• How do we integrate science, engineering, and technology? • What is Engineering Design Process (EDP)? • How do I work with families and community to endorse STEM?

Cycle of Development:

a. Learn:
   - interaction with current research on key science education topics,
   - professional reading and group discussions,
   - engaging in hands-on science explorations and engineering challenges,
   - building science content through collaborative discourse,
   - analysis of instructional videos using NGSS Instructional Observation tools

b. Implement:

   School-based assignments:
   - co-develop a lesson with a science teacher or a team
   - co-teach the lesson with a science teacher
   - Science Learning Walks (with pre-brief, protocol, and debrief)
   - conduct a site-based Professional Development session (during a monthly staff meeting or on a systemic PD day)
   - gather implementation data (pre/post Walk-Through with content expert)

c. Reflect:
   - create a PPT presentation or a poster summarizing the key elements of NGSS implementation and supervision
   - create a Science Instructional Observation Tool

d. Share:
   - in-class presentations based on implementation task(s)
   - collect and share instructional videos and/or student artifacts
   - host and/or attend a Science Learning Walk

Leadership Unit, Achievement Unit and CPD Credit Requirements:

1. **Attend all face-to-face classes.**
2. **Attend and/or host a minimum of two Science Learning Walks.**
3. **Complete course readings and/or assignments prior to each class.**
4. **Co-develop and co-teach a lesson with a science teacher.**
5. **Create a PPT presentation or a poster summarizing the key elements of NGSS implementation and supervision.**
6. **Conduct a site-based Professional Development Session.**
7. **Collaboratively create a Science Instructional Feedback Tool.**
8. **Collaborate with the course facilitators around collection, analysis, and reflection on the classroom data.**

Attendance Policy

Participants are expected to arrive on time and to participate in all classes as scheduled. If a participant is absent from a class session, she/he is still responsible for completing the class work and homework assigned for every session. Participants can only miss (and make up) 3 hours of instructional time, the equivalent of one class session. For participants who arrive late, the amount of time missed, rounded up to the nearest half hour, will be included in their missed session time.

Participation

During each class, each participant will be issued a "participation grade" based on his/her engagement in the work. This means that participants should be on task at all times, and all side conversations and use of technology (i.e. cell phones/tablets) should be at a minimum, or not occur at all.

Assignments

All assignments will be graded as satisfactory or unsatisfactory. Participants must earn satisfactory on all assignments to receive course credit. Assignments that are unsatisfactory can be resubmitted once.

READINGS

Books:

Brunsell, E., Kneser, D. & Niemi, K. Introducing Teachers and Administrators to the NGSS: A Professional Development Facilitator's Guide. *Alexandria*, VA: NSTA Press. 2014.

Koch, J. Science Stories: Science Methods for Elementary and Middle School Teachers. 5th edition. Cengage Learning. 2013.

Banko, W., Grant, M. L., Jabot, M. E., McCormack, A. J., & O'Brien, T. Science for the next generation: Preparing for the new standards. NSTA Press. 2013.

Articles:

Blank R. What is the impact of decline in science instructional time in elementary school. Noyce Foundation. 2012.

Sadler P., Sonnert G. Understanding Misconceptions: Teaching and Learning in Middle School Physical Science. American Educator, 2016.

Spring 2018 Course Schedule

Session	Date	Mode	Topic
Session 1	01/17/2018	Face to face	Pre-survey **Nature of Science, Scientific Inquiry, and the 5E Learning Cycle** SABES UNIT: Grade 4 Unit 1 *It's Electric.*
		Homework	Reading 1: Homework reading: Koch, J. Science Stories: Science Methods for Elementary and Middle School Teachers. 5th edition. Cengage Learning. 2013. Pages 9-18.
Session 2	01/24/2018	Face to face	**Strategies for Constructing Scientific Knowledge: Science Misconceptions; Teaching for Conceptual Change** SABES UNIT: Grade 1 Unit 1 *Sunrise, Sunset*.
		Homework	Reading 2: Sadler P., Sonnert G. Understanding Misconceptions: Teaching and Learning in Middle School Physical Science. American Educator, 2016.
Session 3	01/31/2018	Face to face	**NGSS in the classroom: the three dimensional teaching and learning** **NGSS Practices of Science and Engineering** SABES UNIT: Grade 2 Unit 1 *What's the Matter.*
		Homework	Reading 3: Blank R. What is the impact of decline in science instructional time in elementary school. Noyce Foundation. 2012.
Session 4	02/7/2018	Face to face	**Engineering Design Process** UNIT: Grade K Unit 2 Ramps and Pathways
		Homework	Reading 4: Homework reading: Cervetti, Pearson, Greenleaf, Birr Moje, Science? Literacy? Synergy!
Session 5	02/14/2018	Face to face	**Translating NGSS to Classroom Instruction** SABES UNIT: Grade 3 Unit 2 *Music to My Ears.*
		Homework	Observation Tool Design 1
Session 6	The week of February 19	**NO EVENING CLASS**	**Learning Walks 1 and 2 (ES and MS) and debrief**
		Homework	Observation Tool Design 2 (Upload)
Session 7	02/28/2018	Face to face	**NGSS Instructional Shifts** **Sharing Observation tools and Science Lesson Review**
		Homework	**Science Lesson Teaching (record video and/or upload the lesson)**
Session 8	The week of March 5	**NO EVENING CLASS**	**Learning Walk 3 (Science Master Teacher) and debrief**
		Homework	NGSS Visual (flier, poster, PPT, handout) design
Session 9	03/14/2018	Face to face	**Final presentations and reflections** Post-survey