George Mason University
College of Education and Human Development
Elementary Education Program (ELED)

ELED 453 Section 001
Science Methods for the Elementary Classroom (3 credits)
Spring 2023 (January 23 – May 1)
Mondays, 10:30am-1:10pm
Face-to-Face
Thompson 2020, Fairfax Campus

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Prerequisites/Corequisites: Admission to the Elementary Education program.

University Catalog Course Description: Develops skills and abilities in science teaching methods, applications of technology, safety practices, and creation of integrated science curricula. Examines science teaching based on contemporary theory, practice, and standards.

Course Overview: The primary goal of this course is support teacher candidates in developing the confidence and capacity to plan and teach engaging and effective elementary science learning experiences through an approach of doing real science together in community. We will begin from the understanding that children come to classrooms full of curiosity and experiential knowledge from their previous explorations of the world in their own local contexts. Our aim is to build on this curiosity and knowledge to hone and develop their scientific skills, content knowledge, and practices in the service of developing a lifelong interest in learning more about how the world works and how they can maintain an active and healthy participation in and with it. In addition to content and methods specific to science, health and technology topics will also be explored.

Course Delivery Method: This course will take place in a face-to-face weekly meeting format with asynchronous tasks to complete between classes via online methods: Blackboard Learning Management system (LMS) housed in the MyMason portal and Google Drive. You will log in to the Blackboard (Bb) course site using your Mason email name (everything before @gmu.edu) and email password. The Bb course site will be available on or before Monday, January 16th. Face-to-face class sessions will include small/large group discussions and tasks, lecture, and student-led activities. A detailed class schedule is included below.

Field Hours: This course requires 15 hours of field observation. Additional details are in the "Assignments" section below.

Technical Requirements

To participate in this course, students will need to satisfy the following technical requirements:

1. High-speed Internet access with standard up-to-date browsers. To get a list of Blackboard's supported browsers see: https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support - supported-browsers
2. To get a list of supported operating systems on different devices see: https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#tested-devices-and-operating-systems
3. Students must maintain consistent and reliable access to their GMU email and Blackboard accounts, as these are the official methods of communication for this course.
4. Students will need a headset microphone for use with Zoom or other required web conferencing tools.
5. Students may be asked to create logins and passwords on supplemental websites and/or to download trial software to their computer or tablet as part of course requirements.
6. The following software plug-ins for PCs and Macs, respectively, are available for free download:
    - Adobe Acrobat Reader: https://get.adobe.com/reader/
    - Windows Media Player: https://support.microsoft.com/en-us/help/14209/get-windows-media-player
    - Apple Quick Time Player: www.apple.com/quicktime/download/

Expectations

1. Course Week: Our course week will begin on the day of our face-to-face meetings (Mondays) as indicated in the Class Schedule.
2. Log-In Frequency: Students must actively check the course Blackboard site and their GMU email for communications from the instructor, class discussions, and/or access to course materials at least 5 times per week.
3. Participation: Students are expected to actively engage in all course activities throughout the semester, which includes reading and viewing all course materials, completing course activities and assignments, and participating in course discussions and group interactions.
4. Technical Competence: Students are expected to demonstrate competence in the use of all course technology. Students who are struggling with technical components of the course are expected to seek assistance from the instructor and/or College or University technical services.
5. Technical Issues: Students should anticipate some technical difficulties during the semester and should, therefore, budget their time accordingly. Late work will not be accepted based on individual technical issues.
6. Workload: Please be aware that this course is **not** self-paced. Students are expected to meet *specific deadlines* and *due dates* listed in the **Class Schedule** section of this syllabus. It is the

student's responsibility to keep track of the weekly course schedule of topics, readings, activities, and assignments due.

7. Instructor Support: Students may schedule a one-on-one meeting to discuss course requirements, content, or other course-related issues. These meetings can take place in person on the Mason Fairfax campus or virtually via videoconference. Students should email the instructor to schedule a one-on-one session, including their preferred meeting method and suggested dates/times.
8. Netiquette: The course environment is a collaborative space. Experience shows that even an innocent remark typed in the online environment can be misconstrued. Students must always re-read their responses carefully before posting them, so as others do not consider them as personal offenses. *Be positive in your approach with others and diplomatic in selecting your words*. Remember that you are not competing with classmates; rather, you are sharing information and learning from others. All faculty are similarly expected to be respectful in all communications.
9. Accommodations: Students who require effective accommodations to ensure accessibility must be registered with George Mason University Disability Services.

LEARNER OUTCOMES:

This course is designed to enable teacher candidates to:

A. Build a pedagogical content knowledge base for science teaching grounded in an overarching understanding of the systems of nature in biology, chemistry, physics, and Earth science.
B. Conceptualize and apply core principles of the nature of science (NOS).
C. Engage in authentic scientific practices as a means of learning about and teaching science.
D. Understand the historical development of scientific concepts and the social, cultural, and economic significance of science.
E. Understand and apply the knowledge, skills, and practices of the four core science disciplines of biology, chemistry, physics, and Earth science to develop lesson plans demonstrating inquiry-based principles in science and health education, including the incorporation of technology.
F. Demonstrate age-appropriate safety standards when designing hands-on classroom experiences.
G. Examine science and health curricula and methods with respect to "Science for All" and standards documents at local, state, and national levels.
H. Develop viable assessment tools for science and health contexts.
I. Understand the relationship of science to math, the design process, and technology.
J. Understand, possess, and integrate the knowledge, skills, dispositions, and processes needed to support learners' achievement in an interdisciplinary manner in Virginia's Foundation Blocks for Early Learning: Comprehensive Standards for Four-Year-Olds and the Virginia Standards of Learning in English, mathematics, history and social science, science, and computer technology.

PROFESSIONAL STANDARDS:
Upon completion of this course, students will have met the following professional standards:

INTASC (The Interstate Teacher Assessment & Support Consortium):

#4. Content Knowledge. The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.
#5. Application of Content. The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.
#6. Assessment. The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making.
#7. Planning for Instruction. The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.
#8. Instructional Strategies. The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.

Technology (ISTE NETS): *International Society for Technology in Education / National Educational Technology Standards*

Standard I. Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.

REQUIRED TEXTS:

1. Brown, P. (2020). *Instructional sequence matters grades 3-5: Explore before explain.* NSTA Press.

   ISBN 9781681406589 (paperback)
   ISBN 9781681406596 (pdf)
   LCCN 2019027258 (ebook)

2. Colburn, A. (2017). *Learning science by doing science: 10 classical investigations reimagined to teach kids how science really works, grades 3-8.* NSTA Press.

   ISBN 9781506344614

**Additional selected readings will be posted on Blackboard.

RECOMMENDED TEXTS:

For a fun and accessible overview of science content knowledge:

Geisen, M. (2016) *Everything you need to ace science in one big fat notebook*. Workman Publishing.

ISBN-10 : 0761160957

ISBN-13 : 978-0761160953

COURSE PERFORMANCE EVALUATION:

Students are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard, Google Drive).

COURSE EVALUATION and ASSINGMENTS AT A GLANCE

Assignment	**Due Date**	**Total Points**
Content and Tech Group Project	Due: 3/6	**10**
Wonder Journal	Ongoing; 10+ total entries turned in for review on 4/3	**10**
Wonder Investigation Presentation	Due 5/1	**15**
Weekly Theory to Practice Fieldnotes	Ongoing; final review: 5/5	**10**
Lesson Series/Mini Unit Project (PBA*)	Draft Due: 4/17 Final Due: 5/10	**30**
Class Participation: • Between-Class Activities (BCA) • During-Class Participation (DCP) • After-Class Reflections (ACRs)	Ongoing: • BCA: by 9:00 am on the day of class. • DCP: during f2f class • ACRs: by 11:59 pm on the day of class.	**25**
	Total	**100**

*Designated performance-based assessment (PBA)

Assignments:

1. **Content and Tech Group Project (10%)**
   DUE: Monday, March 6th

   Although the acquisition of specific science content knowledge is not the main purpose of this course, it is a very important aspect of science teaching and learning, and *you cannot teach well without a solid understanding of the content*.

An additional goal of this course is to become familiar with the ways technology tools might be integrated into the teaching and learning of science.

The purpose of this assignment is to combine these two important areas to create an educational experience for your peers. Working in small groups assigned to the same grade level in your field placements, you will dive deeply into the **science content knowledge** necessarily to teach well at this specific grade level. Together you will also explore the ins and outs of an **educational technology tool** that can do three things related to the "Explain" phase of 5E instruction:

a. support students' active participation in sharing their explanations of the phenomena they have investigated
b. allow the instructor to share terminology, new representations, and supporting content not easily discoverable or accessible from the students' hands-on investigations.
c. Provide students with opportunities for practicing the new terms and concepts

Your group will design and share a presentation for your colleagues that introduces them to the technology tool and incorporates a demonstration of the tool using detailed, specific, and accurate science content knowledge from your grade level.

2. Wonder Journal (10%)

DUE: Ongoing throughout the course; 10+ entries turned in on Monday, April 3

This project is about tracking your engagement with the science of your everyday world. Your task is to pay attention to and notice the world in action and write/draw entries about what you notice and wonder about in a journal. For example, you might: feel the movements and forces while you walk, drive, or ride a bike. You might look up at the sky, feel the sun on your face, watch your pet, communicate with another human, pay attention to the plants and wildlife in your neighborhood. You might listen to birdsong, count crows, or visit with a body of water. You might take note of the smell of rain, of soil, of flowers. You might notice the play of light and shadows. You might pay attention to the wind and/or collect and look closely at rocks. You might consider the physics of a Frisbee game, visit with a mountain, or hang out with a tree. You might track the moon. To work on these entries, you might go for a long walk and just wonder (without your phone!) You might just get lost in your thoughts and/or bodily sensations. What do you notice? What do you wonder? What do you feel?

Over the course of the semester, you will use the use a notebook provided in class to create journal entries about these wonder experiences. The basic idea is to document the various things that catch your attention: what you feel/observe/notice in and about the world. The assignment is to write about, sketch, question, observe, count, and record those things that capture your attention and imagination.

There are not many rules…just two:

1. Complete at least 10 entries in total (more is fine) that include words, sketches, and

(possibly) numbers.

2. You will turn in this journal for review* on April 3rd.

Important note: Your wonders are yours and unique to how you think about and engage with the world, therefore **there is no wrong way to do these journal entries - as long as it is clear you put thought and effort into them.*

3. Wonder Investigation Presentation (15%)
DUE: Monday, May 1st.

As a culmination of your journey with wonder this semester, you will choose a topic from your wonder journal (or a new and different wonder topic), learn more about it, and share what you've learned (and how you learned it) with the rest of us.

This project will take the form of a science-fair type (actual) project OR a digital (virtual) presentation (2-3 slides) that will highlight:

a) the wonder(ing) itself and its relationship to you/your interests/your environment/community
b) the information you identified to make more sense of the topic (diagrams, sketches, experiments, data, observations, notes, photographs, etc.)
c) a diagram/wonder road map – how did your exploration with wonder unfold?
d) identify key scientific concepts related to this topic (definitions, models, connections to other scientific areas, etc.)
e) list further questions you have and any ideas/hypotheses related to this exploration,
f) explain how you might design an experiment or further exploration process from here
g) explain how this project connects with the Nature of Science (NOS) and/or the NGSS science practices and/or Science SOLs
h) how, if at all, you feel this project affected you, your relationship to science, your thoughts/feelings about teaching science
i) any ideas you have for incorporating wonder (not necessarily *this wonder*) into your future teaching.

4. Weekly Theory-to-Practice Fieldnotes (10%)
DUE: These are to be completed each week. A final review of content and quality will take place on May 5th.

Each week, you will be given prompts for observations and/or minor pedagogical experimentations designed to connect theory (course activities and readings) to practice (the real classrooms you are assigned to). The goal is for you use your 15 field hours to have encounters that serve as discussion points for us to consider together.

5. Lesson Series/Mini Unit Project (30%)
Draft Due: April 17th
Final Due: May 10th

This project is your major Performance Based Assessment (PBA) for this course. The goal of this project is to demonstrate your ability to plan a series of science lessons (a mini unit plan) appropriate for the context of your field site. The series of lessons will follow an Explore Before Explain (EBE) theoretical framework for science teaching (Brown, 2020). You will also write two introductory sections summarizing your overall science topic and instructional approach.

Your final submission will include all of the following components and will be assessed via the rubric provided at the end of the syllabus:

Section 1: Overview

Theme/Topic:
Describe the overall topic and provide a summary of your series of lessons including your learning goals for your students.
(1-2 paragraphs)

Teacher Background knowledge:
Describe the detailed and specific content knowledge and scientific concepts that a teacher needs to know well in order to teach this series of lessons. This section should include important terms, concepts, diagrams, graphs, etc. that explain the content. Resources for further exploration of this content knowledge should be included. This section should also include possible misconceptions (or naïve conceptions) to be aware of that children and/or adults my have developed about the topic.
(2-3 paragraphs)

Description of Students:
Provide an overview of what you know about the group of students for which the series of lessons are designed. Predict how this particular group of students might respond to this series of lessons and why.
(1-2 paragraphs)

Section 2: Theoretical Framework for Science Instruction

Describe your approach to teaching your series of lessons, based on modern developmental theory and learning theory using your course text(s) to support your instructional choices.
(1-2 paragraphs)

Section 3: Detailed Lesson Plans

The unit will follow the Explore Before Explain (EBE) approach, and therefore should include a series of 3-5 lessons. *A scaffolded EBE lesson plan template will be provided in class.* The lessons should include:

1. Science SOLs (practices and content) and specific objectives for each lesson.
2. Detailed procedures, including all activities, key teacher statements and questions, and potential student responses/interactions.
3. Formative assessments/checks for understanding and a summative assessment plan aligned with the learning goals (as outlined in class).
4. Lists of all hands-on materials needed, and links and/or copies of all support materials to be used.
5. The ways in which safety is addressed.

Attendance and Participation (25%)

Your success in this course is predicated on being an active and engaged participant in *all course activities*, in the service of your future students. Your full participation includes active engagement in aspects of the course that take place between, during, and immediately following our face to face (f2f) meetings, and include:

1) Between-Class Activities (BCA): Asynchronous activities to be complete between classes. These activities can be found in the "Class Materials" Blackboard folder posted each week, and include readings, watching videos, wonder journaling, meeting with group members to work on projects, completing weekly fieldnote activities, etc. All BCAs are to be completed by 9:00 am on the day of our f2f meeting day (Mondays) unless otherwise indicated.
2) During-Class Participation (DCP): being fully present* (in both senses of the word), attending class from beginning to end, fully engaging with your classmates in the discussions and activities, and contributing to any processes and final products created.
3) After-Class Reflections (ACR): At the end of each class, two items are to be completed (by 11:59 pm):
    a. A reflection on the class activities and/or content in the form of a response to a provided prompt: a written exit ticket (serves as formative assessment for the instructor and an opportunity for you to concretize your learning)
    b. A reflection on your participation (a structured format for this will be provided)

Your final participation grade will be developed based on an accumulation of weekly participation points grounded the above three areas, generally 1 point for each area (BCA, DCP, and ACR).

As outlined in #2 above, it is expected that you will attend every class from beginning to end. If circumstances arise where this expectation is impacted, it is up to you to notify the instructor in advance, and to take full responsibility for what was missed. BCAs and ACRs will still be

expected, and participation points can still be earned in these two areas even if an absence occurs. DCP points cannot be earned or made up in the case of an absence.

**There is a professional expectation that students will not work on other classroom projects, browse the web, or send/check text messages during our class time. This is a vital aspect of being present to one another.*

Work Timeliness & Assignment Expectations

All assignments are to be submitted **by 9:00 AM on the date listed in the syllabus, unless otherwise noted in class. Work will not be accepted after the due date unless prior arrangements have been made with the instructor.** All assignments must be submitted on the due date stated within the syllabus (see below) and should be submitted in the format indicated by the instructor in class. ***Please note that assignments submitted in PDF format will not be accepted.***

Note: I reserve the right to add, alter, or omit any assignment as necessary during the course of the semester. You will always receive advance notice of any modifications.

GRADING POLICIES

The grading for this course is as follows:

Grade	Grading Scale	Interpretation
A+	97-100	Represents mastery of the subject through effort beyond basic requirements
A	93-96	
A-	90-92	
B+	87-89	Reflects an understanding of and the ability to apply theories and principles at a basic level
B	83-86	
B-	80-82	
C+	77-79	
C	73-76	
C-	70-72	Denotes an unacceptable level of understanding and application of the basic elements of the course. Grade does not meet the minimum requirement for licensure courses.
D	60-69	
F	<69	

PROFESSIONAL DISPOSITIONS

Students are expected to exhibit professional behaviors and dispositions at all times (see Elementary Education Program Handbook). See https://cehd.gmu.edu/students/policies-procedures/

Core Values Commitment

The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: http://cehd.gmu.edu/values/.

GMU Policies and Resources for Students

Policies

- Students must adhere to the guidelines of the Mason Honor Code (see https://catalog.gmu.edu/policies/honor-code-system/).
- Students must follow the university policy for Responsible Use of Computing (see https://universitypolicy.gmu.edu/policies/responsible-use-of-computing/).
- Students are responsible for the content of university communications sent to their Mason email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students **solely** through their Mason email account.
- Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see https://ds.gmu.edu/).
- Students must silence all sound emitting devices during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to Tk20 should be directed to tk20help@gmu.edu or https://cehd.gmu.edu/aero/tk20. Questions or concerns regarding use of Blackboard should be directed to https://its.gmu.edu/knowledge-base/blackboard-instructional-technology-support-for-students/.
- For information on student support resources on campus, see https://ctfe.gmu.edu/teaching/student-support-resources-on-campus

Notice of mandatory reporting of sexual assault, sexual harassment, interpersonal violence, and stalking: As a faculty member, I am designated as a "Non-Confidential Employee," and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, and stalking to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-380-1434 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance from Mason's Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

For additional information on the College of Education and Human Development, please visit our website https://cehd.gmu.edu/students/ **.**

Class Schedule*

**Faculty reserves the right to alter the schedule as necessary with notification to students.*

Session	Key Topics	Readings and Assignments (DUE by 9:00 am *BEFORE* CLASS)

Class 1
 	
Monday, January 23
	Overview: Science, Society, and Us
	• Science, society, the world, and you.
	• Who are we as a class?
	• What is science anyway?
	• Introduce course approach:
	  ○ learning by doing
	  ○ sequencing matters
	  ○ the importance of process and emergence
	• Overview of course assignments
	• Introduce wonder journals
		Reading:
		• N/A
		
		Activities:
		• Complete *Science and You* Survey

Class 2
 	
Monday, January 30
	Elementary Science Education Basics
	• Science standards: NGSS and Virginia Science SOLs
	  ○ Practices
	  ○ Concepts
	  ○ Core Ideas
	• The Nature of Science (NOS)
	• The brilliance of children: overview of child development and learning theory and implications for science instruction.
		Reading:
		• Colburn, *Learning Science By Doing Science* (*LSDS*),
		  ○ Preface (pgs. vii-xiii)
		• Brown, *Instructional Sequence Matters* (*ISM*)
		  ○ Introduction: (pgs. xvii-xiv only)
		  ○ Ch. 1: Rethinking Development and Learning (pgs. 2-9)
		
		Activities:
		• Complete first wonder journal entry

Class 3 **Monday, February 6**	**Hands-On/Minds-On Activities** • Establishing a theoretical framework for science teaching • The power of hands-on experiences for developing deep understanding • Inquiry and equity	**Reading:** • Colburn, *LSDS*, Ch. 1: Take us Out Mr. Data (pgs. 1-13) • Brown, *ISM*, Ch. 2: Connecting Hands-On with Minds-On Experience (pgs. 12-17) **Activities:** • Watch *Equity through Inquiry* Video: Zaretta Hammond • Weekly fieldnotes entry • Wonder journaling

Class 4 **Monday, February 13**	**Scientific Thinking and Instructional Models for Science** • Science and ways of knowing • POE and 5E Models • Scientific modeling	**Reading:** ● Colburn, *LSDS*, Ch. 2: Think Different (pgs. 15-29) ● Brown, *ISM*, Ch. 3: Modern Sequences of Instruction (pgs. 20-25) **Activities:** ● Weekly fieldnotes entry ● Wonder journaling
Class 5 **Monday, February 20**	**Interweaving Content & Process** • Three-dimensional learning • Exploring grade level content and process standards	**Reading:** ● Brown, *ISM*, Ch. 4: Content and Process Working Together (pgs. 28-37) **Activities:** ● Weekly fieldnotes entry ● Wonder journaling

Class 6
 	
Monday, February 27
	Planning POE and 5E Lessons
	• Brainstorming EBE lesson ideas
	  ○ Designing from scratch
	  ○ Modifying existing lessons
		Reading:
		● Brown, *ISM*, Ch. 5: Where to Start (pgs. 40-52)
		● Coburn, LSDS, Ch. 9: Learning to Fish (pgs. 147-159)
		
		Activities:
		● Weekly fieldnotes entry
		● Wonder journaling

Class 7 **Monday, March 6**	**Scientific Theory vs. Scientific Law** • Observing vs. Explaining • Hypotheses vs. Predictions **Group Project Presentations**	**Content and Tech Group Project Due** **Reading:** • Colburn, *LSDS*, Ch. 3: I've Got a Theory About That (pgs. 31-46) **Activities:** • Weekly fieldnotes entry • Wonder journaling
Monday, March 13	NO CLASS – SPRING BREAK!	

Class 8 **Monday, March 20**	**The Multiple Methods of Science** • Learning inductively: searching for patterns • Learning deductively: making and testing predictions • Learning abductively?	**Readings:** ● Coburn, *LSDS*, Ch. 4: Elementary, My Dear Watson (pgs. 47-68) **Activities:** ● Weekly fieldnotes entry ● Continue wonder journaling
Class 9 **Monday, March 27**	**Science is a Human Activity** • Indirect evidence and inference • Objectivity and subjectivity • Science and culture	**Readings:** ● Coburn, *LSDS*, Ch. 5: I Must Be a Bit Indirect in the Chapter (pgs. 69-89) **Activities:** ● Weekly fieldnotes entry ● Wonder journaling
Class 10 **Monday, April 3**	**Scientific Investigations: Research Design(s)** • Designing for variable control and investigation fairness • Nonexperimental investigations • Designing wonder investigation projects	**Wonder Journals Due** **Readings:** ● Coburn, *LSDS*, Ch. 6: Scientists Do Experiments… (pgs. 91-107) **Activities:** ● Weekly fieldnotes entry ● Wonder journaling
Class 11 **Monday, April 10**	**Data and Conclusions** • Variability and subjectivity • Obtaining, evaluating, and communicating information	**Readings:** ● Coburn, *LSDS*, Ch. 7: We're Counting on You (pgs. 109-129) **Activities:** ● Weekly fieldnotes entry

Class 12
 	
Monday, April 17
	Projects Workshop
	• Community workshopping:
	  ○ lesson plan series
	  ○ wonder investigations
		Draft Lesson Series Due

Class 13 **Monday, April 24**	**Synthesizing our Learning** • Lessons learned • Extending the model to health topics	**Readings:** • Brown, *ISM*, Ch. 14: Leadership and Lessons Learned (pgs. 142-148) • Coburn, *LSDS*: Appendix B Teacher to Teacher **Activities:** Weekly fieldnotes entry
Class 14 **Monday, May 1**	**Wonder Matters** • Sharing Wonder Investigation Projects	Due: Wonder Investigation Projects

PBA: Lesson Series/Mini Unit Project
Assessment Rubric
50 points available
(30% of total grade)

The goal of this project is to demonstrate your ability to plan a series of science lessons (a mini unit plan) appropriate for the context of your field site. The series of lessons will follow an Explore Before Explain (EBE) theoretical framework for science teaching (Brown, 2020). This project will be submitted in the format of a written paper, with two introductory sections summarizing the overall science topic and instructional approach. For the full assignment description, see "Assignments" sections on our Syllabus, Blackboard, and our shared course folder in Google Drive.

Description and standard addressed	**Exceeds Expectations 4 points**	**Meets Expectations 3 points**	**Does Not Meet Expectations 2 points**	**Does Not Meet Expectations 1 point**
Overview (Summary, content knowedge, and context description) INTASC: #4, 5, 7; (10 pts)	Provides a powerful and engaging overview of the topic, series of lessons, and overall unit goals. Includes very detailed and specific content knowledge needed to teach the topic well, including multiple resources. Excellent description of the specific students the unit is designed for and how it is expected they will respond to the unit.	Gives a good basic overview of the topic, series of lessons, and overall unit goals. Lists the basic content knowledge teachers would need to know to carry out the lesson goals, including resources. Provides a solid description of the students that the unit is designed for.	Does not provide a complete overview of the topic, series of lessons, and overall unit goals. Some information is provided, but much is missing. Some content knowledge is included, but it lacks detail and/or resources. Provides little or no information about a specific group of students for whom the lessons are designed.	Missing or very minimal attempt.
Theoretical Framework for Science Instruction INTASC: #8, 6 (5 pts)	Utilizes inquiry-based lesson model (5Es), clearly describes pedagogical process that embodies inquiry. Uses a myriad of excellent and well-respected sources properly referenced within narrative descriptions. Describes diagnostic, formative and summative approaches throughout the unit.	Utilizes inquiry-based lesson model (5Es), clearly describes pedagogical process that embodies inquiry. Uses dependable sources that are properly referenced within narrative descriptions. Describes diagnostic, formative and summative approaches throughout the unit.	Does not provide complete descriptions and/or theoretical background; and/or is not self-explanatory. Does not utilize reputable sources within narrative descriptions and/or more needed clarity within narrative. Does not include all three types of assessment.	Missing or very minimal attempt.

Detailed Lesson Plans INTASC: #4, 5, 6, 7, 8 (35 pts)	Standards (process *and* content), objectives, detailed procedures for each lesson activity (including teacher statements and questions and anticipated student responses), formative and summative assessments, and all supporting materials are included and seamlessly aligned and interwoven with one another.	All required elements are included with visible efforts to integrate and align them with one another.	Some of the required lesson elements are present, and some are missing. And/or some of the elements are either not well developed and/or not well aligned with one another.	Missing or minimal attempts to address the basic requirements.
	All aspects of the lessons are firmly grounded in an EBE instructional approach, and thus clearly begin with the interests, experiences, and hands-on explorations of students, in support of their development of increasingly sophisticated understanding of science concepts and practices.	A clear attempt to ground all aspects of the lessons in an EBE approach is evident. Children's interests, experiences, and ideas are incorporated. Explanations are provided after students have had adequate time to wonder about and explore with materials and develop their own ideas.	The lessons are not yet grounded in an EBE approach. There is little or no evidence that the interests, experiences, or ideas of the students have been considered. Explanations are provided before students have had an opportunity to have shared experiences exploring phenomena.	
	Everything included is clearly described, highly usable, and includes creative connections and innovative thinking.		Lesson elements are either missing, not clearly described, and/or appear difficult to use.	
	Copies of and/or links to all assessments and support materials are included. Support materials are multiple, varied, creative, and extensive, representing a great deal of research, time, and effort toward providing rich and meaningful opportunities for student learning and engagement.	Copies of and/or links to all assessments and support materials are included.	Few copies and/or links to assessments and support materials are provided.	
	Safety is clearly and adequately addressed.	Safety is clearly and adequately addressed.	Safety is inadequately addressed.	