Teaching Elementary Science
Education 528 Winter 2015

Course Information
Instructor: Sylvie Kademian
Office: 3111 SEB
Phone: 608.215.0968 (cell)
Email: smkademi@umich.edu
Class time: M 1-4pm, T 8:30am-11:30am, F 8:30am-11:30am
Office hours: By appointment (Tuesday after class is the best time for me, but I am happy to work with you if we need to talk at a different time)

If you have special needs for which accommodations may be needed, please inform your instructor as soon as possible. If you will be missing class due to a religious holiday, please let your instructor know during the first week of class.

Course Objectives and Organization
In Elementary Science Methods, we will build on current research and best practice to prepare you to foster science learning in elementary school students. Our main goals are for you to:

• describe the three dimensions of the Next Generation Science Standards – Disciplinary Core Ideas, Science Practices, and Crosscutting Concepts.
• incorporate the three dimensions of the Next Generation Science Standards into effective elementary science teaching to support students as they engage, experience, and explain with evidence through science investigations. Specifically, you will work on science teaching practices such as:
  o appraising and modifying science lesson plans and activities to address a specific learning goal
  o setting up and managing small-group investigative work
  o establishing norms and routines for classroom discourse and work that are central to science (such as asking children for evidence to support their claims)
  o choosing and using representations, examples, and models of science content
  o explaining core content and supporting students in constructing scientific explanations
  o enacting science lessons or portions thereof to support a specific learning goal
• identify and enact instructional practices that make science accessible to all students. Some practices that may facilitate equitable instruction include:
  o selecting and enacting the activities with care, including through connecting science to students’ lives
  o using scientific language in accessible and accurate ways, and helping children to do so
  o using multiple representations of the ideas and making connections between representations
  o considering a broad conception of scientific expertise
  o being explicit about what might have been invisible to some learners (e.g., providing rationales for instructional decisions, unpacking terminology, having clear rules, being clear about what’s invisible or otherwise inaccessible about the scientific phenomenon)
• learn how to prepare, teach, and analytically reflect on elementary school science investigation lessons

Throughout the semester, we will work on the goals listed above. We’ll read relevant chapters and articles that can help us unpack the ideas related to these, and we'll also use other records of practice (video, student work, etc.) to help bring some of the ideas to life. Each week, we'll be working on some key teaching practices, and you'll be practicing those practices in our EDU528 class, in the field, or both.
By the end of the course, you should feel better prepared to put the pieces together to teach science effectively as a beginning teacher.

We've structured the class to allow for a focus on elements of science teaching. Many science lessons can be broken down into three basic elements: engage, experience, and explain with evidence. Sometimes, these elements will span across a unit, rather than a lesson. We'll work through different teaching strategies associated with each element, focusing on using investigations to help students learn science content and scientific practices.

What are possible ways to engage, experience, and explain with evidence in science lessons? Watch for these elements when you observe science teaching. For example, you might see a teacher use journal writing to engage students by eliciting their ideas at the beginning of a lesson, and/or the teacher might review previous lessons. For the experience element, a teacher might provide students multiple opportunities to interact with scientific phenomena and concepts. For example, the teacher could have students conduct a first-hand investigation, supporting them in collecting and recording data systematically. S/he might also have students read a text, watch a video, conduct research using the Web, or use data that had already been connected, and we'll explore in class how these kinds of experiences can complement first-hand experiences with the phenomenon. In the explain with evidence element of a lesson, the teacher might have students look for patterns in data, make claims based on evidence, construct a consensus model, or all of the above. Some of these approaches might, in turn, serve as formal or informal assessments.

Course Reading Materials

Required Readings and Other Course Expenditures


What’s Your Evidence?: Engaging K-5 Students in Constructing Explanations in Science provides a framework for you to help your students develop their ability to construct scientific explanations. The book focuses on how you can have students use explanations to enhance conceptual understandings and communicate effectively in the science classroom. The book also includes a DVD with videos of practitioners carrying out many of the strategies discussed by the authors. In addition to reading assignments, you also will be expected to view videos from the DVD in preparation for class. You can purchase What’s Your Evidence?: Engaging K-5 Students in Constructing Explanations in Science at Ulrich’s. (If you buy a used copy, be sure that it includes the DVD.)

Michigan Department of Education. Michigan Grade Level Content Expectations.

The Michigan Department of Education has a set of standards for teaching science in Michigan. These science standards can be found in the Michigan Grade Level Content Expectations (GLCEs), available at www.michigan.gov/documents/mde/Item_C_194161_7.pdf.

Next Generation Science Standards

The Next Generation Science Standards is a new set of standards for teaching science (released in 2013) that integrate the disciplinary core ideas in science, science practice, and cross-cutting concepts. The Next Generation Science Standards are available at http://www.nextgenscience.org. While the state of Michigan has not yet adopted the Next Generation Science Standards, Michigan was a lead state in their development.

The other required readings are provided on CTools under "Resources" and within the "Weekly Resources" folder, by week.
In addition to the required readings, you should expect to need to spend no more than $25 to cover expenses associated with your science teaching in your elementary classroom.

Additional Resources

You may find some of the following books to be useful, as well. At least portions of these books are available online. Each is linked from the CTools site.


The *Framework*, as this document is called, is the foundation for the Next Generation Science Standards. The Framework is available at http://www7.nationalacademies.org/bose/Standards_Framework_homepage.html.


Common Core State Standards Initiative (2010). *Common Core State Standards for English Language Arts.*

The Common Core will guide your math and language arts instruction, but you should also use these documents in making connections to science. For example, the ELA Common Core emphasizes content-area literacy and science is a key discipline for being able to make such connections.


The *Atlas* provides a concept map view of the Benchmarks described above, demonstrating how the different concepts are interconnected. Some of the Atlas' maps are available on-line at http://www.project2061.org/tools/atlas/sample/toc.htm. You may want to purchase this book if you are a science major; the URL is http://www.project2061.org/tools/atlas/default.htm

** Additional resources are available for your use on the CTools course website.

Course Requirements and Grading

The percentages listed here are approximate, but will give you a sense of the relative weight of each assignment. Expectations for these assignments will be discussed in more detail in class, and detailed assignment sheets will be provided. All written work should be uploaded to the corresponding assignment folder in the ED528 CTools site by the specified due date.

*Class Attendance, Participation and Additional Written Assignments (15%)*

Attendance and participation are expectations in this class as a form of professionalism. I expect you to attend every class, to arrive on time for a prompt start, to stay till the end, and to participate in and contribute to class. It is vital that you attend every class session if at all possible. If you cannot be present for a class session, let me know by e-mail by 8:00AM the day of class. Acceptable absences include absences due to religious holidays; please let me know at the start of the semester if you will miss class for this reason. While it will not be possible to recreate a missed class, please make arrangements with me to complete alternative work that will support the learning you missed. I will specify the due date for this alternative assignment. More than two absences from the class will make successful learning of the material in the course challenging and put you in danger of not being able to complete the course successfully. The Office of Teacher Education will be notified if there is more than one absence. As always, participation points will be deducted for absences and late arrivals. Three absences—excused or unexcused—is grounds for failing this course. As always, participation points will be deducted for absences and late arrivals.
"Participation" means that you need to be in the habit of speaking up and being engaged in whole class and small group discussions and activities. Appropriate use of electronic devices is also a part of your professional participation in our class. Using laptops or cell phones as tools for your learning is acceptable, as long as it is not distracting to your colleagues or your instructor. Examples of acceptable use of electronic devices include making records of your practice and consulting resources for work in class. Texting, phone calls, social networking, shopping, and other non-instructional use of these devices are not acceptable in this class at any time, and will result in a reduction in your participation grade. If you are concerned about your ability to meet this professional expectation, please discuss your concern with your instructor. Please let your instructor know if there is an emergency that affects your need for a phone in class. Additionally, you will have one or more small written assignments in class.

Science Ideas Conversation (10%)
You will plan for and conduct a conversation with another person about their science ideas around two content areas. Then, you will complete the short interpretation and reflection for the assignment. This assignment will allow us to consider how children’s prior ideas and experiences may be involved in science learning.

Peer Teaching in ED528 (three times) (30% total)
Each peer teacher will have a chance to lead their peer “students” through each of the following three elements of a science lesson: engage with an investigation question, experience the scientific phenomenon associated with the investigation, and explain the phenomenon with evidence to his/her peer teaching team. We refer to these three elements of science teaching as the "EEE framework for science teaching".

Exploring Science Teaching in the Field Assignment (15%)
You will have the opportunity to choose from three possible assignments to explore what science teaching might look like in your field placement. These options include (1) observing a science lesson taught either by your mentor teacher or by another teacher in your field placement (2) finding and analyzing science curriculum materials being used in your field placement or (3) eliciting students’ ideas about a scientific phenomenon using text and the engage element of the EEE framework for science teaching.

Reflective Teaching Assignment (30%)
You will teach a full science lesson in your practicum classroom. For the reflective teaching (RT) assignment, you will analyze a science lesson plan using the lesson design considerations framework, develop your version of the science lesson plan using the instructional planning template, teach the lesson to children, reflect on your teaching using your video record, and analyze student work.

Class Policies and Additional Information

Contacting
Email is the best way to reach me. You can also call, text, or come to see me in person in my office.

Grading and Late Work
If you cannot complete an assignment on time, please contact your instructor by email in advance of the due date and request an extension. Typically I will give an extension of two days after that, the work will be counted as late and your grade will be affected. You may request a re-grade on any assignment. The request must be made via email and you must turn in the revision within one week of the assignment being handed back.

Readings and Videos
You are expected to do all the reading and video viewing in advance of class. Our work in class depends on it. Readings and videos other than those from the Zembal-Saul book are posted on Ctools.
Written and Video Assignments

For turning in your written assignments, you will use the assignment area on the CTools site. For turning in videos that accompany written assignments, you will use Edthena. Always allow "Admin Download" when uploading videos.

Participating in Program Evaluation and Research

You received information about teacher education program evaluation and research. If you have any questions, please ask us or your field instructor. You or your mentor teachers have also received a letter to the parents or guardians of the children in your classroom. Please make sure you follow the instructions you receive about signing, copying, and distributing these letters.

Class start time and procedures

Mondays: Class will begin promptly at 1:00 pm, and will release at 4:00 pm. Tuesdays and Fridays: Class will begin promptly at 8:30 am, and will release at 11:30 am. We will also take a ten-minute break during the three-hour period. Please sign in and pick up materials for the class period when you arrive.

Accommodations for Students with Disabilities

If you think you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way the course is usually taught may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities (SSD) to help us determine appropriate academic accommodations. SSD (734-763-3000; http://ssd.umich.edu) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. Any information you provide is private and confidential and will be treated as such.

Questions, Comments, or Concerns

If you have any questions, comments, or concerns about the class, please do not hesitate to contact me! I am looking forward to working with you this semester!