

EDUCATION 325 - Spring 2021
TECHNIQUES FOR TEACHING IN THE ELEMENTARY SCHOOL: SCIENCE

Section 1: Tuesdays & Thursdays, 8:00 - 9:15 Rm CPS 206/208 **Zoom Synchronous**
Section 2: Tuesdays & Thursdays, 9:30 - 10:45 Rm CPS 206/208 **Zoom Synchronous**

Instructor: Perry A. Cook, Ph.D. Office: Room 452 CPS - 346-3263
Office Hours: By appointment

Course Philosophy

Welcome to an exciting semester of learning how to teach science in an elementary education setting! Throughout this semester you will be involved in cooperative and independent activities, both on campus and in an elementary education field experience setting, that will enable you to become a confident, competent, and motivating teacher of science.

Tell me and I forget;
Teach me and I may remember;
Involve me and I learn!

Ben Franklin

Course Materials

Required: Text Rental –

Contant, Bass, Tweed & Carin (2018). **Teaching Science Through Inquiry-Based Instruction, (13th Edition)** Pearson. ISBN – 13:9780134516790

Additional readings on reserve in the LRC or Resource Room – TBA

Major Course Goals & Learner Outcomes

Students will:

1. Develop and increase confidence in teaching science.
2. Develop and demonstrate enthusiasm for teaching science.
3. Investigate basic science concepts that are appropriate for elementary students.
4. Become familiar with and implement DPI guidelines for science instruction.
5. Explore and practice strategies to use in the science classroom including: cooperative learning, conceptual change, problem solving, critical thinking, learning cycles and classroom management.
6. Plan and teach a hands-on science lesson in an elementary classroom.
7. Develop a deeper understanding of the nature of science: it's attitudes, processes, and products.
8. Begin to develop a philosophy of teaching elementary science (learner's role, teacher's role, and learning environment).
9. Design, construct and display an interactive science discovery learning center.
10. Become more knowledgeable about science resources, including technology, to enhance classroom teaching.
11. Gain experience in evaluating student conceptual development and performance in elementary science.
12. Become aware of and learn strategies to provide for equity and safety in the science classroom.
13. Become familiar with national and state standards in science.
14. Become familiar with the Wisconsin Teacher Standards.

15. Value the importance of utilizing learning activities, resources and assessments that are effective/appropriate (best practice) for students with diverse backgrounds (male and female, multi-cultural, socio-economic), needs and learning styles. Although all INTASC and Wisconsin Teacher Standards will be addressed to some degree the following list identifies the WTS that will be the major focus of this course. Please refer to pages 59 and 60 of the following link for comparison of the INTASC and WTS:
<http://www.uwsp.edu/education/Documents/fieldExp/STHandbook.pdf>

InTASC & WISCONSIN TEACHER STANDARDS

This course will focus on the following InTASC and WTS:

InTASC #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.

WTS #4 Instructional Strategies. The teacher understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills.

Knowledge

The teacher can identify multiple approaches of instruction to encourage student learning with respect to a wide variety of content concepts.

The teacher matches appropriate instructional strategies to specific content learning goals.

Skills

The teacher designs lesson plans that reflect their understanding of appropriate instructional strategies. The teacher can model the selection of appropriate instructional strategies to specific content learning goals.

Dispositions

The teacher recognizes there are multiple valid instructional strategies that encourage and foster student learning in science.

The teacher values the creative use of demonstration and laboratory instruction when teaching various science concepts.

InTASC #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. (In this case directly aligned with WTS #6)

WTS #6 Inquiry, Collaboration. The teacher uses knowledge of effective verbal, nonverbal and medial communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom. (part of Black Box, Nature of Science, Unit Plan, Q&A, LAMP lecture)

Knowledge

The teacher applies collaborative learning strategies to problem solve in the Black Box and Three P's (Problem Posing, Problem Solving, Peer Persuasion) activities.

The teacher is able to critically evaluate the advantages and disadvantages of various communication techniques within the context of the classroom setting.

The teacher is able to apply current understandings of inquiry discussion techniques to specific lessons based upon conceptual cognitive demand.

Skills

The teacher is able to demonstrate pedagogical savvy within microteaching and lesson planning contexts by carefully creating discussions that appropriately foster conceptual learning.

The teacher is able to effectively conduct discussions on specific science concepts.
The teacher is able to encourage collaboration within laboratory team settings.

Dispositions

The teacher is able to value and model appropriate science attitudes such as open mindedness, curiosity, tenacity in problem solving and creativity in thinking.

InTASC #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.

WTS #7 Methodology. The teacher plans and delivers instruction based upon knowledge of subject matter, students, the community, and curriculum goals. (Microteaching)

Knowledge

The teacher is able to identify the major components within the body of an effective lesson plan format.
The teacher is able to distinguish between levels of quality within the evaluation of rationales, objectives, procedures and other lesson components.
Teacher is able to construct and evaluate practical lesson plans.

Skills

The teacher is able to effectively instruct using a lesson plan they constructed.
The teacher is able to appraise their knowledge of subject matter, students, the community, and curriculum goals while teaching (planning and instruction).

Dispositions

The teacher values the implementation of multiple instructional strategies based on knowledge of subject matter, students, the community, and curriculum goals.

InTASC #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.

WTS #8 Assessment. The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner. (Unit Plan III)

Knowledge

The teacher recognizes the advantages and disadvantages to using various current assessment tools and strategies in science.
The teacher is able to compare and contrast formal and informal assessment measures.
The teacher is able to judge the validity of types and quality of construction of various assessment questions and instruments.

Skills

The teacher is able to construct valid assessment instruments in both a content rich (lecture material) and performance-based (laboratory) context.
The teacher is able to construct both quiz and test level assessment instruments.
The teacher is able to create and utilize effective informal assessment strategies within the body of their instruction.

Dispositions

The teacher is able to clearly communicate to parents the strengths and weaknesses as well as justify the use of their chosen assessment strategies.

The teacher will value the use of both personally and professionally developed assessment tools.

NOTE:

Education 325 student performance tasks include the Unit Plans as well as any other project/assignment that meets the teacher standards.

Common Core Standards and Rtl

Wisconsin has adopted the common core standards in several subject areas. However, the Department of Public Instruction has not adopted the Next Generation of Science Standards that was recently released. Here is a link to the NGSS: <http://www.nextgenscience.org/next-generation-science-standards>. The NGSS breaks down the science content for each grade level. We will continue to use the Wisconsin Model Academic Standards to guide our curriculum and learning until a change is made at the state level. Here is a link to the WMAS in Science: http://standards.dpi.wi.gov/stn_sciintro. The WMAS is more general in that it only breaks the content into by grades 4, 8 and 12.

Please refer to the link attached if you want to find the common core standards in other curricular areas.

http://standards.dpi.wi.gov/stn_ccss

Wisconsin has a unique vision for the implementation of the framework for Rtl. The attached link provides you that framework as well as additional links to PBIS and SIMS. You are strongly encouraged to use this framework when thinking about instructional design. There is also a wealth of resources for understanding Wisconsin Rtl located at the Wisconsin Rtl Center website that is also included.

<http://rti.dpi.wi.gov/> <http://www.wisconsinrticenter.org/>

UWSP Community Bill of Rights and Responsibilities

UWSP values a safe, honest, respectful and inviting learning environment. In order to ensure that each student has the opportunity to succeed, a set of expectations have been developed for all students and instructors. This set of expectations is known as the Rights and Responsibilities document, and it is intended to help establish a positive living and learning environment at UWSP. For information go to:

<http://www.uwsp.edu/stuaffairs/Pages/rightsandresponsibilities.aspx>

The rights and responsibilities document also includes the policies regarding academic misconduct, which can be found in Chapter 14. A direct link can be found here:

<http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/SSR-2010/rightsChapter14.pdf>

American with Disabilities Act

The American Disabilities Act (ADA) is a federal law requiring educational institutions to provide reasonable accommodations for students with disabilities. For more information about UWSP's policies, check here:

<http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/ADAPolicyinfo.pdf>

If you have a disability and require classroom and/or exam accommodations, please register with the Disability and Assistive Technology Center and then contact me at the beginning of the course. I am happy to help in any way I can. For more information, please visit the Disability and Assistive Technology Center located on the 6th floor of the Learning Resource Center (Library). You can also find more information here:

<http://www.4.uwsp.edu/special/disability/>

Again, any special circumstances that are unique to you as a student learner can be discussed at any time. Please make special arrangements to meet privately during my office hours.

Course Framework and Evaluation

<u>Points</u>	<u>Assignment</u>
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10	<i>Black Box Science</i>
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Students will construct a Black Box (Mystery box) with the help of someone who is good at keeping secrets. Students must Pose a Scientific Question, Apply the Scientific Method, Answer the Question and Present their findings. Presentations may take the form of a short video (3-5 minutes maximum), PPT, PREZI, or Word Doc. Clarity of question/problem/claim, experimental design, evidence that supports claim and strength of argument tying evidence to claim will all be used to assess investigations.

15	<i>Science Discovery Learning Center</i>
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Interactive Inquiry Based Science Discovery Learning Center

Plan, construct and display an interactive science discovery learning center for an appropriate science topic of your choice (**NO EE PLEASE**). You must sign up for a presentation date for this project during the second week of class. Assemble the SDLC to present the morning you signed up for. **(Due to pandemic we will set these up at your home location, take pictures and submit all documentation including the self-assessment to the CANVAS drop box.)** Specific criteria for the SDLC are described in the SDLC Planning sheet and Self-Assessment found at the end of this syllabus. SDLC's should include: **several** inquiry based hands-on activities; questions for students including worksheets where appropriate; support materials, etc. See textbook for more details and examples. Students may work in pairs on this task but please consider how you will divide the center upon completion.

All science discovery learning centers will be presented briefly in class (three to five minutes per SDLC). Each student must submit their own self-assessment along with your SDLC Folder to CANVAS. **(Place support materials in Discussion Folder to share with peers AND self-assessment in Dropbox to be graded by me).**

15	<i>Science Activities Pinterest Account</i>
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Students must create and maintain a Science Activities Pinterest account for organizing web-based resources in science teaching and learning. Please be willing to share with your peers by posting your link without the need of a password in Discussion Folder. Students should try to add 5-10 online resources each week (50 activity minimum) so it does not end up a last minute task. Resources may include different science experiments/demonstrations/activities that illustrate specific elementary science concepts. Science disciplines that may be selected from include Biology/Life Science (plant, animal and EE), Chemistry, Physics, Earth Science (geology, climatology, etc.), Astronomy and General Science. To complete this assignment please conduct at least THREE of the activities or experiments on your own or with a peer. Fill out the self-assessment sheet to document your account and describe the THREE activities you completed.

10	<i>PEER teaching</i>
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Please select a science activity that is **not Environmental Education** focused to develop into a detailed lesson plan then present to class during the PEER TEACHING weeks of class. Students may choose one from their Pinterest account, use lessons from their Ubd Unit Plan or any other resource made into an ORIGINAL lesson plan. NO PLAGIARISM or DOUBLE DIPPING from another class allowed.

Each student must please post their own PEER TEACHING self-assessment in the appropriate CANVAS dropbox to earn their grade.

For examples, visit any appropriate Elementary Science Activities Pinterest account.

30 *Hearts on / Hands On / Heads On Science Unit Plan*

Specific criteria for this assignment will be forthcoming in EMB seminars.

10 *Student Choice – Professional Development*

Students must select **ONE** of the following activities to complete. These must be completed **prior** to the second half practicum experience. When deciding what to do, keep in mind what will truly be of most benefit to you!

A. Field Trip Plan. Develop a plan for a class field trip to the Downtown Central Wisconsin Children's Museum, the UWSP Museum of Natural History or any other appropriate location for teaching and learning science. Think of unique opportunities to learn science concepts while utilizing process skills being learned in class. Include objectives, relevance to classroom work, grade level, logistical considerations, parental permission forms, at least three student activities, and follow-up. Follow general field trip lesson plan (pre/during/post) formats.

B. Interview on Science Ideas. You will interview a child of your choice on his/her ideas about an everyday science experience: rain, plants, stars, magnets, animals, light, electricity, etc. Plan to have props/hands-on materials for your interview so the child has something to touch or look at. Your purpose will be to probe their thinking in a non-threatening way by continuing to ask them what they know and why they think the way they do. Prepare a written summary and analysis of the child's thoughts, your reflections on the child's responses in terms of implications for classroom instruction and a brief presentation of your findings to be given to this class. Your written summary should include a list of materials used in the interview, a list of possible questions prepared prior to the interview, an analysis of the child's scientific understandings and your personal reflections on how this analysis would drive your instruction and curricular decision making.

C. Professional Development. Attend a professional **science** conference or workshop. The WCEE and Science Departments on campus regularly list possible options. Submit a two-page summary of your experience including the title of the conference, sponsoring organization, workshops attended, presenter's name and a rough outline of the presentation. Attach copies of any handouts received in the sessions. Professional journals and newsletters often list scheduled conferences. **PRIOR APPROVAL REQUIRED** for this option. Volunteering to help lead activities at the annual Grandparents and Grandkids day at the Meade Wildlife Center on September 15th, 2019 is a viable option for a limited number of students.

D. Set up and maintain a terrarium or freshwater aquarium in this classroom or set up a chick incubator and hatch chicks in class. You should:

1. Collect information on how to prepare and maintain the center, where and how to collect specimens, as well as safety and ethical concerns related to having plants and animals in the classroom (I'll provide you with sources to use). Plan for what you will do with terrarium, aquarium or chicks when task is completed.
2. Construct at least one activity you would have children participate in (two pages each). Each activity should include learning objectives, science concepts and/or processes being explored, materials list and description of the activity itself. **PARTNERS** are strongly encouraged for this student choice.
3. Empty, clean, rebuild, restock and maintain Room 206 classroom aquarium. Dr. Cook will pay for materials and assist in decision making. This project is open to two students who must work together and write up a practical classroom aquarium manual for teachers. A lesson plan with 2 or 3 activities for fish, water studies, carrying capacity, general ichthyology, etc. must be included.

E. Instructional Technology Project. Using available technology resources, develop a technology based module on an elementary science topic. Possible projects include developing a complete and robust webquest that includes assessment; designing a MOODLE project for elementary students; designing a SMARTBOARD presentation; developing a set of PODCASTS with teacher and student participation; create a VERNIER probe lab for a science class; develop a set of science demo's and video tape using digital camera for classroom use. Each of these technology based projects must start with a written proposal to Dr. Cook. **PRIOR APPROVAL REQUIRED** for this option.

F. If you have other ideas or activities you feel would be more beneficial to your development as a science educator please make an appointment with me to discuss your idea. For example, building a set of smaller Black Boxes for your own class to discover the Nature of Science would give you a practical resource to use when you begin your career!

10 Professionalism and Participation

Your active participation is a crucial aspect of this course. If you do not regularly attend class or visit your elementary school field placement (F2F or Virtually), you will be unable to share in the many activities and experiences that will be undertaken during this semester. Remember that school administrators are seldom understanding of unexcused absences or chronic lateness. Now is the time in your professional development to work on your attendance and promptness. Participation and synchronous class activities **CANNOT** be made up and **NO** extra credit/supplementary work will be provided. In case of an emergency, which will require you to be absent from class, call me at my office or send an email before the absence if possible. Lack of participation may result in multiple **five (5) point reductions** in your participation grade. **No late work will be accepted.**

NOTE: Participation requirements for the practicum experience at a local field site must be met. Students who meet the on campus expectations for this class yet exhibit excessive tardiness, unexcused absences, poor or unsatisfactory performance in their practicum field experience (F2F or Virtually) with respect to the Wisconsin Teacher Standards will receive one of the following:

- A. a **failing grade in this class** with or without the option of repeating the entire experience,
- B. an **incomplete grade earned in this class**, the *disqualification* of student teaching the following semester and the requirement of successfully completing an additional practicum experience prior to student teaching. The Office of Field Experiences coordinates all placements.

Course Format

This course is divided into three distinct sections. The first five weeks include an introduction to elementary science topics such as The Nature of Science, Science Learning, Discovery Centers, Science Resources, Science Safety and Science Instruction. The second three weeks will include student led science activities that provide an overview of a variety of elementary science concepts and instructional approaches. The last seven weeks include the practicum field experience at a local elementary school, either F2F or Virtually.

Grading Scale

Points	Grade
100-93	A
92-90	A-
89-88	B+
87-83	B
82-80	B-
79-78	C+
77-73	C
72-70	C-
69-60	D
Below 60	F

Important Dates for Assignments**InTASC/WTS Applicability**

_2.12.21__ 10	Black Box Science Presentation	1,3,4,6,7,8,9
_2.19.21__ 15	Science Discovery Learning Center	1,3,4,6,7,8,9
_2.19.21__ 15	Science Activities Pinterest Account	1,2,4,7,8
_3.18.21__ 10	PEER Teaching	1,3,4,6,7,8,9
_3.18.21__ 30	Unit Plan	1,3,4,5,6,7,8
_3.18.21__ 10	Student Choice	Variable
_3.18.21__ 10	Professionalism and Participation	All

Education 325 – Dr. Cook Science Discovery Learning Center Planning Sheet

Description

In groups of 2-3 you must plan, construct and display an interactive Science Discovery Learning Center that depicts a specific scientific topic (**NO EE PLEASE**). The scientific topic may be as narrow as a single concept or as broad as a bridging theme (i.e. primary colors to the visible spectrum of energy). Keep in mind these are different from bulletin boards - they involve manipulatives beyond a visually, aesthetically pleasing bulletin board. The purpose of a Science Discovery Learning Center is to engage students in active, inquiry based learning about a topic. They should be informative and interactive in nature and include a literacy component of some form. An opportunity to present your SDLC's in a professional setting will be provided in the spring semester.

Evaluation Criteria

Your Science Discovery Learning Center will be evaluated on several criteria. Please take several pictures of your SDLC. Submit those pictures, a two page narrative (that describes the level, concepts explored, learning activities and learning assessments), a list of materials, activity directions and data sheets; an annotated APA/MLA bibliography of trade books and other sources of information as a SINGLE DOCUMENT (Science Discovery Learning Center Document) to CANVAS on the completion date. Please complete and submit the SDLC *Student Self-Assessment* form to CANVAS, as well. No more than \$40 should be spent on the entire project. SDLC's must be portable. Preprinted, professional posters and materials will not be accepted. Each of the submitting students will receive the same point grade for this project so please work together and assign the work equitably. Grades for the Science Discovery Learning Center project will be based on the following:

Folder information

Informative, Accurate Content and Concept Development

Fun

Visually stimulating

Interactivity

Creativity/Originality/Neatness/Format

Appropriate level

Literacy Component

Each Science Discovery Learning Center Project will be carefully assessed. Dr. Cook will look at your group self-assessment and determine the overall grade you will earn.

Education 325 - Science Discovery Learning Center Student Self-Assessment

SDLC Title: _____

Names: _____

<u>Issue/item</u>	<u>Points</u>
Included all SDLC Document Components (2)	_____
Informative, Accurate Concept Development (3)	_____
At least 4 Inquiry Based HO ³ Activities (4)	_____
Visually stimulating / Fun (2)	_____
Creativity / Originality/Neatness /Format (2)	_____
Literacy Component (2)	_____

Total: _____

Any additional comments (please write about your SDLC strengths and weaknesses):

Dr. Cook's assessment:

Final Point Total: _____