EDCI 365

Teaching Science in the Elementary School

Syllabus Packet
Fall 2014
EDCI 365
Teaching Science in the Elementary School

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Introduction
How do children come to understand ideas and practices in science? What classroom conditions and instructional methods facilitate children’s understanding of science? What do teachers need to know and do to create such conditions? These broad questions will serve as the foundation for this science methods course. You will explore these questions through reading, writing about, practicing, and discussing ideas about science teaching and learning.

Block V Teaching and Learning Framework
As one of three courses in Block V (including EDCI 36400 and 37000), EDCI 365 is designed to help you think about and practice teaching and learning in the principal context of elementary science while keeping in mind that science teaching and learning are rarely devoid of mathematics and the language arts. A teaching and learning cycle framework with components of assessment, evaluation, planning, and teaching is used across the three courses in Block V to facilitate your understanding of the connectedness of teaching and ongoing assessment/evaluation across all content areas represented. The assessment component consists of data gathering through a variety of sources including, but not limited to, classroom observations, interviews, and children’s oral and written products. The evaluation component is targeted toward interpreting these data – looking for patterns in children’s behaviors and thinking related to science. The planning component of the framework involves planning instruction based on this evaluation. Planning will create opportunities to enhance, clarify, and build on children’s current scientific knowledge. The final part of the framework, teaching, presents opportunities for the teacher to support children’s progress towards deeper scientific understandings (ideas and practices).

Expected Outcomes
EDCI 365 is designed to help you continue to develop the knowledge, dispositions, and performances that address the College of Education Guiding Principles in Practice: 1) Attention to Learners; 2) Understanding Curriculum in Context; and 3) Commitment to Professional Growth. In particular, by the end of EDCI 365, we expect that you will have:
• Clarified and refined your beliefs about teaching and learning science;
• Presented and defended your beliefs about elementary science teaching and learning;
• Increased your awareness of children’s ideas in science and how they influence learning;
• Used and continue to use questions to uncover student thinking and understanding;
• Gained skill in assessing, evaluating, and responding to the needs of diverse learners (developmental level, ability, ethnicity, gender) in science;
• Increased your understanding of ways to assess student learning in science;
• Learned, practiced, and reflected upon teaching strategies commensurate with your beliefs and knowledge about how children learn science;
• Planned science instruction based on inquiry and teaching for understanding for all learners;
• Become aware of a variety of resources for teaching science: informal science education, the World Wide Web, science education software, published curriculum projects, and local resources;
• Reflected and will continue to reflect on your teaching, noting areas of strength and need.

**Course Format**

EDCI 365 has both a campus-based and a field-based component. The campus-based component combines 2 hours of lecture-discussion and 2 hours of hands-on, inquiry-based activities per week. In addition to the on-campus meetings of EDCI 365, students will be scheduled into a field placement during the week. The Theory Into Practice (TIP) field component is shared by the three courses in Block V (EDCI 364, 365, and 370). Each cohort section of the block is partnered with its own local school. Each team of Purdue students will be matched with one classroom throughout the semester and carry out literacy, mathematics, and science activities in conjunction with the 3 block courses during this time.

**Theory-into-Practice (TIP) School Delays and Closings**

When severe weather occurs, area K-12 school districts and individual schools that host students in the TIP component of this course may announce a delay of 1-2 hours in beginning their school day. In very severe conditions, schools may close for an entire day. When a delay in opening our TIP school occurs, and the delay reduces the amount of time that Purdue students can participate in the TIP school on that day, then TIP will be cancelled that day and rescheduled on a later day. Purdue students should then report to class on-campus at the normal class time. If the TIP school remains closed for the entire day, students should report to class at the normal time. An exception to this policy involves Purdue University also closing classes for the day. If Purdue should close, then Purdue students should not report to class on-campus.

**Course Readings**

EDCI 365 Teaching Science in the Elementary School Reading Packet
EDCI 365 Teaching Science in the Elementary School Syllabus Packet
Documents distributed in class by your instructor
Indiana Academic Standards Science, Mathematics, and Reading/Language Arts located at: https://learningconnection.doe.in.gov/Standards/About.aspx?art=11
Attendance, Tardiness, Absences, and Participation and Engagement in Class

1. **Attendance:** Purdue University policy states that all students are expected to be present for every meeting of classes in which they are enrolled. Given the interactive and field-based nature of this course, regular attendance and engagement in class activities, discussions, and lectures are expected. All matters relative to attendance, including the make-up of missed work, are to be arranged between you and the instructor. Only the instructor can excuse you from classes or course responsibilities. In the case of an illness, accident, or an emergency, the office of the Dean of Students (765-494-7663) should be notified as soon as possible. You should make direct contact with your instructor as soon as possible, preferably before the class. If the instructor cannot be reached directly, a message should be left in the instructor’s email, department mailbox, or with the instructor’s secretary. If you will be absent for more than five days, have not been able to reach your instructor in person, by email, by telephone, or through leaving notification of your circumstances with the instructor’s secretary, you or your representative should notify the Office of the Dean of Students (765-494-1254) as soon as possible after becoming aware that the absence is necessary. Be advised, you or your representative may be asked to provide documentation from an authorized professional or agency which supports an explanation for your absence.

2. **Tardiness:** You are expected to attend each class meeting and arrive on time. Chronic tardiness may result in a lower grade. More specifically, arriving to class tardy on two or more occasions may result in a lower grade.

3. **Absences:** You are allotted up to two excused/unexcused absences over the course of the semester. Excessive absences, excused or unexcused, will result in points being deducted from your grade and a lowering of your final grade. Specifically, all absences (excused or unexcused) beyond a second absence will result in points being deducted from your grade and a lowering of your final grade.

4. **Participation in Class:** Learning to teach is, in part, a function of being a member of a community of learners that interacts to build knowledge about teaching and learning. I expect you to be a consistent and high quality contributor to class activities, discussions, and group projects. I may give quizzes to assess your learning.

5. **Engagement in Class:** In recent years, students’ monitoring and in-class use of cell phones, iPhones, laptop computers, and other communication technologies have become a distraction from and a hindrance to student engagement and a constructive classroom climate. Being engaged is more than just being present. Being engaged means that you are focused on instruction, actively listening and participating in class activities and
discussions. All communication technologies should be turned off during class unless your instructor gives specific permission for their use as part of instruction.

**Assignments**

Assignments other than the major assignments listed below may be given in order to create a complete learning experience. All assignments are crucial to your growth as an educator and will be evaluated.

1. **Project-based Assignments**: Project assignments are group or team-based assignments. These assignments are briefly described below:

   **Planning and Developing Classroom Assessments in Science**: This assignment will provide you with the experience in planning and developing assessments for use in elementary classrooms.

   **Science Learner Profile**: This activity provides the opportunity to use an important tool for determining student science understandings and abilities, the interview. You will interview students about their science understandings, reasoning, and abilities, and construct a profile of a science learner. You will create a paper and a PowerPoint presentation.

   **Experimental Test of an Advertisement Claim**: Students will work in teams to scientifically test a claim about an advertised product. Each team will design and carry out an experimental test of the advertisement claim, submit a written report, and present an oral report in class using PowerPoint.

   **Inquiry-based Science Lesson Plans (3)**: Students are expected to design and implement a total of three (3) inquiry based science lesson plans. Each lesson plan will exemplify the 5-E Model (Engage, Explore, Explain, Elaborate, Evaluate). Students will be required to consult with their TIP teacher to identify appropriate Indiana science standards and scientific concepts as the focus for each lesson. Beyond the lesson plan itself, lesson plan grades will also depend on the instructor's professional judgment of your teaching and your reflections on the lessons you taught.

2. **Other Assignments**: These are individual assignments and are listed below and described in detail elsewhere in the syllabus.

   **Autobiographical Reflection**:

   **Science Safety Plan**:

   **Case Study in Inquiry Science**:

   **Classroom Observation Write-up**:
Assessment Plan:

Reflection on Inquiry Lesson (3):

3. **Science Portfolio TaskStream Assignment**: In lieu of a final examination, you will create a portfolio to help you synthesize your ideas about elementary science teaching and learning. The portfolio will include class assignments and other artifacts that demonstrate your growth as a science educator. The portfolio serves as your e-portfolio. When you submit your Science TaskStream Portfolio, you should submit it to the new TaskStream Program, which is titled "Elementary Education (Blocks III – VI) Fall 2013+"

**Theory-into-Practice (TIP) School Delays and Closings**

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**Nondiscrimination**

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, Purdue seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.

Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Executive Memorandum No. D-1, which provides specific contractual rights and remedies. Any student who believes that he or she has discriminated against may visit [www.purdue.edu/report-hate](http://www.purdue.edu/report-hate) to submit a complaint to the Office of Institutional Equity. Information may be reported anonymously.
Adaptive Programs Statement/Students with Disabilities

Purdue University is required to respond to the needs of the students with disabilities as outlined in both the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 through the provision of auxiliary aids and services that allow a student with a disability to fully access and participate in the programs, services, and activities at Purdue University.

Students with disabilities must be registered with Adaptive Programs in the Office of the Dean of Students before classroom accommodations can be provided. If you are eligible for academic accommodations because you have a documented disability that will impact your work in this class, please schedule an appointment with your instructor within the first three (3) weeks of the semester in order to discuss any adjustments. It is important that the student and instructor talk about this at the beginning of the semester. It is the student’s responsibility to notify the Disability Resource Center (http://www.purdue.edu/drc) of an impairment/condition that may require accommodations and/or classroom modifications.

Grief Absence Policy for Students

Purdue University recognizes that a time of bereavement is very difficult for a student. The University therefore provides the following rights to students facing the loss of a family member through the Grief Absence Policy for Students (GAPS). GAPS Policy: Students will be excused for funeral leave and given the opportunity to earn equivalent credit and to demonstrate evidence of meeting the learning outcomes for misses assignments or assessments in the event of the death of a member of the student’s family.

Grading and Late Work

Given the interactive nature of this course, regular attendance is expected (see above). Absences, excused or unexcused, could result in the lowering of your final grade. Because this class involves reflective inquiry and field-based experiences, assignments are project based. Detailed explanations and evaluation criteria will be provided as each assignment is to be completed. Assignments will be graded from criterion-referenced and norm-referenced viewpoints. Scholarly work is expected and rewarded. Scholarly work goes beyond opinion and a simple description of readings. Scholarly work involves reflection and inquiry, citing readings and the literature as evidence to support your position(s). Scholarly writing exhibits correct spelling, word use, sentence structure, paragraph structure, coherence of thought, expression and argument. From a future perspective, treat each written assignment as if you are submitting a report to your school superintendent. Late work (e.g., assignments) receive a 10% reduction in grade per day and will not be accepted one week after the due date. Final grades will be based on percentages: A=90% and above, B= 89-80%, C=79-70%, D=69-60%, F=59% and below. Grades are not given; they are earned. Your instructor may use the +/- system of Purdue University.
**Elementary Education Course Completion Policy**

Elementary Education majors have two opportunities to enroll in and pass required EDCI, EDPS, and EDST courses with a minimum grade of C-. Withdrawal from a course (W or WF) constitutes one of the two opportunities. Failure to successfully meet this requirement will result in dismissal from the Elementary Education program. Courses repeated to improve a grade must be taken at the West Lafayette campus. *(Approved by the Elementary Teacher Education Committee, April 20, 2007)*

**Professional Development**

We recommend that you join one or more of the following science teacher organizations:

- Hoosier Association of Science Teachers, Inc. (HASTI). See: http://www.hastio.org
- National Science Teachers Association (NSTA). See: http://www.nsta.org

Student memberships range from $10 to $20 and include year long subscriptions to journals such as *The Hoosier Science Teacher, Science and Children*, and *CESI Science*. HASTI hosts an annual conference in Indianapolis, IN during the month of February.

**Student Evaluation of Course and Instructor**

During the last two weeks of the semester, you will be provided with an opportunity to evaluate this course and your instructor(s). Purdue now uses an online course evaluation system. Near the end of classes, you will receive an official e-mail from evaluation administrators with a link to the online evaluation site. You will have up to two weeks to complete this evaluation. Your participation is an integral part of this course, and your feedback is vital to improving education at Purdue University. As your instructor, I strongly urge you to participate in the evaluation system.

**Dispositions**

Students are expected to demonstrate appropriate dispositions that reflect: 1) A willingness to work with others fairly and equitably; 2) take responsibility for establishing a positive climate in the classroom; 3) exhibit a commitment to planning, reflection, assessment, and learning as on-going processes; 4) maintain responsible and ethical behavior; and 5) demonstrates enthusiasm for science at the elementary school level, and makes connections to everyday life. Violation of these dispositions will constitute grounds for reduction in course grade and/or failure of the course.

**Academic Dishonesty Statement**

Purdue prohibits “dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty” *(University Regulations, Part 5, Section III, B, 2, a).* Furthermore, the University Senate has stipulated that “the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of ghost-written papers, the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself
dishonest" (University Senate Document 72-18, December, 15, 1972). Violation of academic dishonesty will result in one or more of the following actions: 1) receiving a lower or failing grade on the assignment; or 2) receiving a lower or failing grade for the course. (Purdue University, Responding to Academic Dishonesty: A Guide for Faculty, 2002).

**Violent Behavior Policy**

Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, violent behavior is prohibited in or on any Purdue facility or while participating in any university activity.

**Emergencies**

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Relevant changes to this course will be or can be obtained by contacting the instructor via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

Students are required to visit [http://www.education.purdue.edu/ODFD/resources.html](http://www.education.purdue.edu/ODFD/resources.html) and review the response procedures for emergencies in Beering Hall. It is necessary that you review these directions within the first week of your Beering Hall classes. If you have any questions, see you instructor.

**Note:** All entries in the syllabus and calendar are tentative and subject to modification by the instructor. Any changes will be provided in class.
<table>
<thead>
<tr>
<th>Week/Date</th>
<th>Topic</th>
<th>Readings</th>
<th>Assignments and TIP</th>
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</table>
| Week 1, Aug. 25 Mon/Tue | Introductions, Syllabus, Information Cards, Pictures, Name Tents, Journals, Discussion; Why Teach Science in K-6? Goals for K-6 Science Teaching?  
**ACTIVITY: ELECTRICAL CIRCUITS #1**  
**ASSIGNMENT: AUTOBIOGRAPHICAL REFLECTION**                                                                 | Syllabus                                                                 |                                        |
| Wed/Thur       | 5-E Instructional Model, Syllabus, Teacher Centered <-> Student Centered  
What is Science? Nature of Science?  
**ACTIVITY: ELECTRICAL CIRCUITS #2**  
**INTRODUCE: 5-E LESSON PLAN MODEL**  
**ASSIGNMENT: SCIENCE SAFETY LESSON PLAN**                                                                 | Harlen Chs 1 & 2  
NSRC (Inquiry in science)                                                                 |                                        |
| Week 2, Sept. 1 Mon/Tue | NO CLASS – LABOR DAY                                                                                                                                                                                                 | Ash (process skills)  
Foster & Heiting  
Harlen Ch 7                                                                 |                                        |
| Wed/Thur       | The Science Processes and Inquiry Skills  
Scientific Attitudes  
**ACTIVITY: BALANCE/MOTION**  
**ASSIGNMENT: SCIENCE LEARNER PROFILE (SLP)**                                                                 | Ash (process skills)  
Foster & Heiting  
Harlen Ch 7                                                                 | Autobiographical Reflection Due |
| Week 3, Sept. 8 Mon/Tue | InquirY Teaching: Developing children's conceptual understandings  
Discuss – TIP Classroom Observation and Science Learner Profile  
**ACTIVITY: BLACK BOXES**  
**ACTIVITY: DICE**                                                                 | NSRC (value of sci)  
Colburn  
Ash & Kluger-Bell  
Moscovici & Nelson                                                                 |                                        |
| Wed/Thur       | InquirY Teaching: Developing standards- and inquiry-based instruction  
Discussion – 5-E LESSON PLAN MODEL  
**ACTIVITY: MEASUREMENT #1 – MATHEMATICS CONNECTION**                                                                 | Irwin-Devitts, Modlo,  
& Bromley  
NRC (inst. analysis)                                                                 | Science Safety Plan Due |
| Week 4, Sept. 15 Mon/Tue | How Children Learn Science: The Role of Prior Ideas and Experience and the Implication to Science Teaching and Learning (Constructivism)  
**ACTIVITY: MEASUREMENT #2 – MATHEMATICS CONNECTION**                                                                 | Review Science Learner Profile  
Assignment (see syllabus packet)  
Harlen Ch 5  
Eaton, Anderson, & Smith                                                                 |                                        |
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<tr>
<th>Date</th>
<th>Activity/Assignment</th>
<th>Details</th>
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<tbody>
<tr>
<td>Wed/Thur</td>
<td>How Children Learn Science: A Piagetian Perspective and the Implication to Science</td>
<td>Stephans, Beiswenger, &amp; Dyche</td>
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<td>Teaching and Learning&lt;br&gt;&lt;br&gt;&lt;i&gt;ACTIVITY: PENDULUMS&lt;br&gt;ASSIGNMENT: TESTING AN</td>
<td>Barman, Barman, Cox, Newhouse, &amp; Goldston</td>
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<td>ADVERTISEMENT CLAIM&lt;/i&gt;</td>
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<td>Week 5, Sept. 22</td>
<td>Conduct Classroom Observation&lt;br&gt;Begin Learner Profile assignment&lt;br&gt;</td>
<td>Work on classroom observation write-up</td>
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<td>Mon/Tue</td>
<td>&lt;i&gt;ACTIVITY: FORCE&lt;/i&gt;</td>
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<td>Wed/Thur</td>
<td>TIP Day #1&lt;br&gt;Settle in. Start Science Learner Profile?&lt;br&gt;Conduct interviews? Assist</td>
<td>Work on interview transcriptions and analysis questions</td>
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<td>coop-teacher&lt;br&gt;&lt;br&gt;&lt;i&gt;ACTIVITY: SOUND OFF&lt;/i&gt;</td>
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<td>Week 6, Sept. 29</td>
<td>Discuss TIP day 1, 2, 3 experiences&lt;br&gt;&lt;br&gt;&lt;i&gt;ACTIVITY: TOOTHPICKS&lt;/i&gt;</td>
<td>Work on interview transcriptions and analysis questions</td>
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<td>Mon/Tue</td>
<td>TIP Day #2&lt;br&gt;Science Learner Profile&lt;br&gt;Conduct interviews, assist coop-teacher</td>
<td>Barman&lt;br&gt;Fort &amp; Varney&lt;br&gt;Bodzin &amp; Gehringer</td>
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<tr>
<td>Wed/Thur</td>
<td>Planning and Developing Assessments in Science&lt;br&gt;Assessing Children’s Science</td>
<td>Harlen Ch 9 NSRC (assessment strategies)</td>
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<td>Learning and Process/Inquiry Abilities&lt;br&gt;&lt;br&gt;&lt;i&gt;ACTIVITY: TOOTHPICKS&lt;/i&gt;</td>
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<td>Week 7, Oct. 6</td>
<td>TIP Day #3&lt;br&gt;Science Learner Profile&lt;br&gt;Conduct interviews, assist coop-teacher</td>
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<td>Mon/Tue</td>
<td>NO CLASS – OCTOBER BREAK</td>
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<td>Wed/Thur</td>
<td>TIP Day #4&lt;br&gt;Teach Inquiry Lesson 1?&lt;br&gt;Plan and Design Assessments in Science</td>
<td>Jones&lt;br&gt;Tippins &amp; Dana&lt;br&gt;Stearns &amp; Courtney&lt;br&gt;Main&lt;br&gt;Harlen (Reading Packet)</td>
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<td>Assessing Children’s Science Journals</td>
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<td>Week 8, Oct. 13</td>
<td>Science Learner Profile Due</td>
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<td>Mon/Tue</td>
<td>Small Groups for Effective Science Teaching&lt;br&gt;&lt;br&gt;&lt;i&gt;ACTIVITY: ROCK OBSERVATIONS&lt;/i&gt;</td>
<td>Martens&lt;br&gt;Johnson &amp; Johnson</td>
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<td>Week 9, Oct. 20</td>
<td>TIP Day #5&lt;br&gt;Teach Inquiry Lesson 1?&lt;br&gt;Assist cooperating teacher with students</td>
<td>Harlen Ch 3, 4&lt;br&gt;Rowe&lt;br&gt;Shepardson &amp; Britsch (analyzing children’s journals)</td>
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<td>Week 10, Oct. 27 Mon/Tue</td>
<td>PowerPoint Presentations of Tests of Advertisement Claims Discuss TIP experiences</td>
<td>Cain Harlen Ch 8 Capobianco &amp; Thiel</td>
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<td>Wed/Thur</td>
<td>TIP Day #6 Teach Inquiry Lesson #2? Assist cooperating teacher with students</td>
<td>Shepardson &amp; Britsch (children’s science)</td>
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<td>Week 11, Nov. 3 Mon/Tue</td>
<td>Discuss TIP experiences <em>ACTIVITY: DIRECTOR/DIRECTEE</em></td>
<td>Harlen Ch 6 Iwasyk Barman &amp; Kotar</td>
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<td>Wed/Thur</td>
<td>TIP Day #7 Teach Inquiry Lesson 2? Assist cooperating teacher with students</td>
<td>Ballou Blake Simons &amp; Hepner</td>
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<td>Week 12, Nov. 10 Mon/Tue</td>
<td>Discuss TIP experiences Addressing Gender/Multicultural Issues Science for all Children <em>ACTIVITY: DROP CHAMBERS</em></td>
<td>Review Portfolio Assignment in course syllabus</td>
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<td>Wed/Thur</td>
<td>TIP Day #8 Teach Inquiry Lesson 3? Assist cooperating teacher with students</td>
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<td>Week 13, Nov. 17 Mon/Tue</td>
<td><em>ACTIVITY: FINGER PRINTS</em> Discuss TIP experiences</td>
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<tr>
<td>Wed/Thur</td>
<td>TIP Day #9 Teach Inquiry Lesson 3? Assist cooperating teacher with students</td>
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<td>Week 14, Nov. 24 Mon/Tue</td>
<td>Discuss TIP experiences</td>
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<td>Wed/Thur</td>
<td>NO CLASS – THANKSGIVING BREAK</td>
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<td>Week 15, Dec. 1 Mon/Tue</td>
<td>Discuss TIP experiences <em>ACTIVITY: HUMDINGERS</em></td>
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<td>Wed/Thur</td>
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<td>Week 16, Dec. 8 Mon/Tue</td>
<td>Preparing Your TaskStream Science Portfolio Work on Science Portfolio Discuss TIP experiences</td>
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<tr>
<td>Wed/Thur</td>
<td>Work on TaskStream Science Portfolio</td>
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University Regulations
Part 2, Section VI, A
Attendance

Students are expected to be present for every meeting of classes in which they are enrolled. At the beginning of each semester, instructors are responsible for clarifying their policy for handling class absences and the impact absences will have in the determination of course grades. All matters relative to attendance, including the make-up of missed work, are to be arranged between the student and the instructor involved.

Only the instructor can excuse a student from classes or course responsibilities. In the event of an illness, accident, or emergency, when circumstances permit, the student should make direct contact with his/her instructor(s) preferably before a class or an exam takes place. If the instructor cannot be reached in person or by telephone, the student should leave a message in the instructor's department mailbox or with the instructor's secretary.

When a student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, the student or the student's representative should contact the Office of the Dean of Students if the reported absence is expected to be for an extended period of time (normally more than five days). A member of the Dean of Students staff will notify the student's instructor(s) of the circumstances. The student should be aware that this intervention does not change in any way the outcome of the instructor's decision regarding the student's academic work and performance in any given course. The student must make personal contact with the instructor(s) as soon as it is possible to do so. The student may discuss the circumstances of the absence with a member of the Office of the Dean of Students for advice on how to proceed.

If a student becomes seriously delinquent in attendance, he/she may be dropped from the course by the Committee on Scholastic Delinquencies and Readmissions in accordance with procedures stated in Section V-E-2.

If you have questions concerning this revision, please do not hesitate to contact the Office of the Dean of Students at 49-41747.
Purdue University
Teacher Education Council
Candidate Disposition Assessment Process

Introduction:

All teacher education students, faculty, and academic counselors will be provided with a copy of the Dispositions To Be Assessed (Form D-1) and the Dispositional Assessment Form (Form D-2) via the Office of Professional Preparation and Licensure (OPPL). Students will be made aware that repeated violations of these dispositions will constitute grounds for a decision regarding separation from the Purdue University Teacher Education Program. This information will also be published in appropriate teacher education documents and reinforced throughout the program.

Procedure:

The Dispositional Assessment Form (Form D-2) may be utilized by all faculty, staff, and classroom teachers to bring a deficiency with regard to professional conduct to the attention of the Teacher Education Council Special Cases Committee. At the conclusion of each semester, course instructors will be asked to submit a Form D-2 for any student who has exhibited a deficiency with respect to the INTASC dispositions listed in Form D-1. The completed form will be distributed to the student, the student’s academic advisor, OPPL, and the Office of Field Experiences (OFE). The student’s academic advisor will monitor each student’s folder to ascertain if more than one D-2 form has been issued to the student.

If a student receives two D-2 forms, the academic counselor will notify the appropriate department head or program chair within 14 days of the filing of the second form. The department head or program chair will schedule a meeting with the student, the academic counselor, the course instructor/coordinator of the course in which a deficiency was observed, and with the individuals submitting the Form D-2s within 14 days to discuss the specific concerns that need to be addressed. (If notification of the second form D-2 falls at the end of a term, the department head or program chair will schedule the meeting within 14 days after the beginning of the next full term in which the student is enrolled.) If the meeting determines that a dispositional issue does exist, a list of actions that the student agrees to follow will be prepared in memo form, and both the student and department head or program chair will sign the agreed course of action to be taken. A copy of the actions to be taken will be placed in the student’s file and sent to OPPL and OFE. The student may also submit any additional information that s/he wishes to include in the record.

If a student receives a third D-2 form, the academic counselor will notify the appropriate department head or program chair within 14 days of the filing of the form. The department head will notify the student and the Director of Teacher Education (Dean of the SOE) within 7 days of the third D-2 form. The Director of Teacher Education will
convene the TEC Special Cases Committee within 14 days of notification and will provide documentation regarding the three D-2 forms and the Course of Action Memo. (If notification of the third form D-2 falls at the end of a term, the department head or program chair will schedule the meeting within 14 days after the beginning of the next full term in which the student is enrolled.) The student will be asked to provide any information s/he wishes regarding the three D-2 forms in writing to the TEC Special Cases Committee. The Special Cases Committee shall meet to review the documentation provided and also meet with the student and his or her academic counselor. The Special Cases Committee shall provide one of three recommendations to the Director of Teacher Education within the 14-day period. The recommendations can be: continue in the program, removal from the program, or not enough evidence was provided to make a decision in which case the student continues in the program. Within 14 days of receiving the recommendation from the TEC Special Cases Committee, the Director of Teacher Education shall make a decision on the case and notify all parties involved including the student, academic counselor, department head, OPPL, OFE, and TEC. The student may appeal further to the Office of the Provost within 14 days of receiving the decision of the Director of Teacher Education.
Purdue University
Teacher Education Council Form D-1
Dispositions to be Assessed

Note: Specific dispositions for each licensing area that are tied to the dispositions on Form D-1 may be found at the following website:
http://www.state.in.us/psb/

Numbers in parentheses refer to the Interstate New Teacher Assessment and Support Consortium (INTASC) principles addressed.

1. Is sensitive to community and cultural norms, and engages in and supports appropriate professional practices for self and colleagues. (3) (9)

2. Demonstrates a willingness to work with other professionals to improve the overall learning environment for students. (7) (9) (10)

3. Takes responsibility for establishing a positive classroom climate and recognizes the importance of peer relationships in establishing a climate of learning. (3) (5)

4. Respects students as individuals and respects students' privacy and confidentiality of information. (3) (10)

5. Treats all students fairly and equitably; valuing individual differences and experiences. (2) (3) (5) (6) (8) (9)

6. Demonstrates an awareness of all aspects of a child’s well being (cognitive, emotional, social, and physical). (3) (6) (10)

7. Shows commitment to adapting instruction to students’ responses, ideas, and needs in order to facilitate the development of students’ critical thinking, independent problem solving, and performance capabilities. (1) (4) (5) (9)

8. Demonstrates flexibility and is open to adjustment and revision based on needs and changing circumstances. (1) (4) (7)

9. Exhibits behaviors that show a commitment to planning, reflection, assessment, and learning as on-going processes. (1) (5) (7) (8) (9)

10. Demonstrates thoughtful, effective verbal and nonverbal communication and responsive listening. (6)

11. Demonstrates enthusiasm for the discipline(s) taught, keeps abreast of new ideas and developments in the field, and sees connections to everyday life. (1)
Purdue University
Teacher Education Council Form D-1, cont'd.
Assessment Categories and Examples of Deficiencies

The following categories of dispositions will be assessed. Examples of behaviors that might be consistent with dispositional deficiencies are given. This list is meant to be illustrative of possible dispositional deficiencies but is neither intended to be exhaustive nor prescriptive. (Numbers in parentheses refer to the eleven dispositions identified above.)

Legal/Ethical Conduct
  • Engages in illegal or unethical conduct involving minor children or which would be grounds for dismissal from a teaching position. (1)
  • Fails to maintain privacy and confidentiality of student information. (4)
  • Violates the Purdue University Code of Student Conduct. (1)

Attendance/Punctuality
  • Is frequently late or absent except when excused in advance. (1)

Professional Appearance and Demeanor
  • Fails to act or dress according to the standards of the school where the candidate is placed. (1)
  • Fails to maintain composure in the classroom. (1) (3)

Reliability/Dependability
  • Frequently fails to complete assignments, duties, or tasks on time. (1) (9)

Interactions with Others
  • Fails to interact in a positive and professional manner with students, peers, teachers, university personnel, and others. (2) (4) (5)

Fairness/Lack of Bias
  • Shows overt bias, prejudice, or lack of fairness toward certain students or groups of people. (3) (4) (5)

Safety/Responsible Conduct
  • Acts in a dangerous or irresponsible manner that might put students at risk. (1) (6)

Flexibility/Adaptability/Openness to Feedback
  • Is unable to adapt teaching to changing classroom circumstances. (7) (8)
  • Reacts defensively or antagonistically to feedback about performance. (1) (8)

Communicative Effectiveness
  • Makes frequent errors in oral and/or written communications with students, peers, teachers, university personnel, and others. (10)

Commitment to Student Learning
  • Makes negative comments about students' abilities to learn. (6) (7) (9)
  • Unable to adapt instruction to meet varying needs and abilities. (7) (8)

Commitment to Improving Teaching Performance
  • Makes no effort to improve instructional practices and teaching activities. (7) (8) (9) (10)

Commitment to Profession
  • Exhibits poor attitude toward the discipline and/or teaching profession. (1) (11)
Purdue University
Teacher Education Council Form D-2
Dispositional Assessment Form

This form is to be used by faculty, staff or classroom teachers who observe a teacher education candidate's dispositional deficiency as related to their teacher education program of study. For a list of dispositions and possible deficiencies, please refer to Form D-1.

Please complete the entire form and submit it to the department or program area in which the candidate is majoring (e.g., elementary education-Department of Curriculum and Instruction) after you have discussed it with the student.

Candidate Name_________________________ Student ID No.__________Date ________

Form Completed By______________________ Phone Number ______________

Check any category for which a dispositional deficiency has been observed.

☐ Legal/Ethical Conduct ☐ Attendance/Punctuality ☐ Professional Appearance and Demeanor
☐ Reliability/Dependability ☐ Interactions with Others ☐ Fairness/Lack of Bias
☐ Safety/Responsible Conduct ☐ Flexibility/Adaptability/ Openness to Feedback ☐ Communicative Effectiveness
☐ Commitment to Improving Teaching Performance ☐ Commitment to Student Learning ☐ Commitment to Profession
☐ Other, please specify

For any dispositional area identified as deficient above, please describe the context of this assessment in specific, observable terms (e.g., course number and name, where situation occurred, specifically what transpired, date) and relate it to the deficiency area(s) addressed. Use the reverse side of the page and/or attach additional sheets if necessary.
Teaching Science in the Elementary School
Science Safety Plan

Teachers of science need to be concerned about safety, even at the elementary level.

Visit and review the FLINN web site: http://www.flinsci.com/. Using this site, and resources from at least one other website, develop a science safety plan for your elementary science classroom. Include specific steps and/or actions you will take to establish a safe environment for children. **Attach a copy of the home pages from the FLINN website and at least one other website, to your plan.** You may also use other science safety resources to develop your safety plan, if so include a reference page.

Include the following items in your plan:

- Identify the grade the plan designed for
- Any artifacts you want to share with children (i.e. lab safety contract)**
- A clear explanation as to how exactly you will educate children of lab safety. This means going beyond just listing steps or actions you will take.
- A discussion of what the value of exercising lab safety is in the elementary science classroom

** Be sure your plan is suitable and appropriate for elementary school children. For example, do not download the same "lab safety contract" on the FLINN website. Create one on your own that is grade appropriate.

<table>
<thead>
<tr>
<th>Elements of Science Safety Plan for the Elementary Science Classroom</th>
<th>Level of Performance</th>
<th>Earned Points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unsatisfactory (0)</td>
<td>Satisfactory (3)</td>
</tr>
<tr>
<td>Appropriate grade level is identified</td>
<td>Grade level is not identified</td>
<td>Grade level is identified but not appropriate</td>
</tr>
<tr>
<td>Examples of artifacts</td>
<td>Does not have existing artifacts</td>
<td>Contains 2 artifacts</td>
</tr>
</tbody>
</table>
| Explanation of exactly how you will educate children of safety procedures | Explanation is not given | Explanation is given
Lacks clarity
Appears as a list of steps with little elaboration | A clear explanation is given that demonstrates understanding of how children learn science |
| Discussion of the value of exercising lab safety in the elementary science classroom | Discussion is not given | Discussion appears vague and does not communicate the importance or significance of lab safety | A clear and valid discussion is given that illustrates the importance of exercising lab safety |
Teaching Science in the Elementary School

Autobiographical Reflection

To come to a better understanding of how young children experience school science and how their identities as young scientists are shaped by various factors, it is important to reflect on our own lived experiences in/with science, specifically school science. This assignment is designed to encourage students to recount their own school and personal experiences with science. The importance of this assignment is to note, if not discover, similarities and differences that emerge among our own personal accounts with learning science and to reflect on ways our lived experiences relate to those of our current and future students.

For this assignment, you are encouraged to write an autobiographical reflection (3 to 5 pages) that describes your earliest to most recent experiences with school science. You may include stories or examples of pivotal role models, classroom experiences, field trips, and other events/people that may have influence your current interest (or lack of) in science.

<table>
<thead>
<tr>
<th>Elements of Science Autobiographical Reflection</th>
<th>Level of Performance</th>
<th>Earned Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examples of key experiences that facilitated and/or impeded science interest/participation</td>
<td>Does not describe experiences</td>
<td>Unsatisfactory</td>
</tr>
<tr>
<td>Ability to identify the strengths and weakness of experiences</td>
<td>Does not provide insight into experiences nor connects experience with other events</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Ability to identify patterns among experiences</td>
<td>Does not compare nor contrast experiences</td>
<td>Excellent</td>
</tr>
<tr>
<td>Overall quality of reflection</td>
<td>Reflection shows little to no thoughtfulness. Reflection is incomplete</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reflection shows some thoughtfulness. The reflection is partially complete.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reflection shows thorough thoughtfulness. Reflection is complete and well written</td>
<td></td>
</tr>
</tbody>
</table>
Science Textbook Analysis for Equity

Science textbooks teach not only the science concepts and process skills to be studied, but provide lessons and activities through which students can develop positive values, attitudes, and behaviors toward science. Gender bias in books is often portrayed through narrow and unrealistic images of men and women and often times can contribute to the underrepresentation of young women from engaging in and with science. Persons of color and/or with disabilities are additional groups of individuals often misrepresented and/or invisible in science textbooks. Two classifications of bias to illustrate gender and other inequities in books are invisibility and stereotyping. Research indicates girls/women (or people of color or with disabilities) are included less often in science textbooks than boys/men (invisibility), and are portrayed as passive and dependent individuals (stereotyping). Although deliberate attempts to address gender and other forms of bias have been made by various science textbook publishing companies, the question still remains: Do these inequities still exist in our science textbooks?

Task: To examine systematically the depiction of bias (i.e. gender, race, disability, and other) roles in the illustrations of males and females in science textbooks. Use the tables below to calculate the frequency of appearances and activities carried out by male and female students portrayed in each science textbook.

Directions: Choose any one science textbook. Select one unit that has at least three chapters. Review each chapter and complete the tables below. Repeat the process with another textbook.

Title of Textbook #1:

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Quantitative Analysis</th>
<th>Qualitative Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of females</td>
<td>Numbers of males</td>
</tr>
<tr>
<td>Chapter _____</td>
<td>Title: _______________</td>
<td>Pages _____ to _____</td>
</tr>
<tr>
<td>Chapter _____</td>
<td>Title: _______________</td>
<td>Pages _____ to _____</td>
</tr>
<tr>
<td>Total number =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage =</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Quantitative Analysis

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Number of females</th>
<th>Numbers of males</th>
<th>Representation</th>
<th>Qualitative Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter _____</td>
<td></td>
<td></td>
<td>Description of Activity</td>
<td>Females Key word(s) describing activity</td>
</tr>
<tr>
<td>Title: _______</td>
<td></td>
<td></td>
<td></td>
<td>Males Key word(s) describing activity</td>
</tr>
<tr>
<td>Pages _____ to _____</td>
<td></td>
<td></td>
<td>Level of Activity (passive role or an active role)</td>
<td></td>
</tr>
<tr>
<td>Chapter _____</td>
<td></td>
<td></td>
<td></td>
<td>Personal characteristics Portrayed as problem solver, main character, and/or lab partner</td>
</tr>
<tr>
<td>Title: _______</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pages _____ to _____</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Discussion questions:

1. Based on your review of each textbook, what can conclude?

2. What kinds of biases appear to be present in each textbook?

3. What kinds of gender roles does our culture consider and/or perpetuate as appropriate for females and males in the sciences?

4. What kinds of gender roles do different school cultures consider and/or tend to perpetuate as appropriate for female and male students in the science classroom?

5. How is race represented? How is race misrepresented in each textbook?

6. How are persons with disabilities represented? What attempts do each textbook make to meet the needs of persons with disabilities?
EDCI 365:
Planning and Developing Classroom Assessment in Science

Purpose of Assignment

Although assessment is a component of classroom activity, it is often not planned as an aspect of the classroom. The NRC teaching standards note that “Assessment tasks are not afterthoughts to instructional planning, but are built into the design of teaching” (NRC, 1996, p. 38). Therefore, the purpose of this assignment is to engage you in planning and developing classroom assessments that align with curriculum and instruction.

 Procedures

For this assignment you will be planning and developing classroom assessments based on one unit of study derived from an approved elementary school science textbook, program, or module. The objective for this assignment is to develop two different assessment tasks and clearly indicate where the tasks would be implemented in the curricular/instructional context of the elementary science textbook, program, or module.

The following outlines the assignment:

1. Select one unit of study from an assigned/approved elementary science textbook/program/module. This unit provides the curricular and instructional context for this assignment.

2. Develop a unit outline that includes:
   - Grade level
   - Theme of unit of study
   - Science topics covered in the unit (i.e. lesson ideas)
     - Your lesson explanations should be brief descriptions (i.e. you are not writing full lessons), that include all the information necessary for your instructor to determine if the lesson aligns with the objectives and standards you have chosen.
   - Indiana Academic Science Standards that will be assessed
     - You will have one set of standards that correspond to the entire unit
   - Instructional goals and objectives that will be assessed
     - You will have one set of objectives that correspond to the entire unit
   - Purpose for assessment
     - This should include the rational behind the design and implementation of your two assessment tasks. It should specify what you are trying to assess, how the assessment informs you about student learning, and how the assessment aligns with the objectives and standards you have chosen for the lesson.
   - Mix of assessments that will be used (the format and method of assessment)
     - Develop two assessments that demonstrate student performance standards and scoring criteria. These two must include a practical task and an open response task. These assessments should align with the curricular and instructional context.
   - Points within the curricular/instructional units when the assessments will be administered
     - This can be documented as a paragraph that describes when during the unit each of the assessment tasks will be administered, or it can be included in the appropriate location in the unit outline. These assessments may be implemented at any point in the assessment plan.
   - Rubrics that will be used to evaluate student performance on each task

3. For each assessment task answer the following questions:
   - What would you know about the student who responded correctly?
   - What would you know about the student who responded incorrectly?
## Assessment Plan Rubric

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Beginning (1-2)</th>
<th>Developing (3-4)</th>
<th>Proficient (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timing</td>
<td>The assessment plan does not include where in the curricular/ instructional unit the assessments will be administered.</td>
<td>The assessment plan does not clearly articulate where in the curricular/ instructional unit the assessments will be administered.</td>
<td>The assessment plan clearly articulates where in the curricular/ instructional unit the assessments will be administered.</td>
</tr>
<tr>
<td>Overall description</td>
<td>Three elements are missing or incomplete.</td>
<td>One or two elements are missing or incomplete.</td>
<td>The assessment plan clearly articulates the purpose(s) for the assessments, the instructional goals and objectives that will be assessed. Includes a clear, detailed description of the unit of study.</td>
</tr>
<tr>
<td>Indiana Standards alignment</td>
<td>Few of the instructional goals align with the Indiana State Standards.</td>
<td>Some of the instructional goals align with the Indiana State Standards.</td>
<td>The plan clearly states the Indiana State Standards being assessed. The instructional goals were determined based on the Indiana State Standards and are in complete alignment with the chosen standards.</td>
</tr>
<tr>
<td>Open-response task</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>directions</td>
<td>The task includes vague student and/or teacher directions, OR scoring criteria are not given; OR the task is not an open-response task.</td>
<td>The task includes complete student OR teacher directions, but not both. Scoring criteria given in the rubric are ambiguous.</td>
<td>The task includes complete student and teacher directions. Students are directed to respond to the task using a variety of paper/pencil methods which can include explaining, drawing and describing a model or investigation. Specific scoring criteria are given in the rubric.</td>
</tr>
<tr>
<td>Scoring criteria</td>
<td>More than one element of the scoring criteria chosen is not appropriate, reasonable and/or practical. (e.g., the assessment is not age-appropriate; the criteria don’t align with the instructional goals of the unit).</td>
<td>One element of the scoring criteria chosen is not appropriate, reasonable and/or practical. (e.g., the criteria don’t align with the instructional goals of the unit).</td>
<td>Scoring criteria chosen are appropriate, reasonable and practical for assessing the given grade level, instructional goals and conceptual understandings of the unit.</td>
</tr>
<tr>
<td>Standards alignment</td>
<td>Few of the assessment criteria align with the Indiana State Standards.</td>
<td>Some of the assessment criteria align with the Indiana State Standards.</td>
<td>The assessment criteria were determined based on the Indiana State Standards and are in complete alignment with the chosen standards.</td>
</tr>
<tr>
<td>Responses</td>
<td>The responses to the questions (what would you know about the student who responded correctly/incorrectly?) are not clearly explained or only make superficial statements.</td>
<td>The responses to the questions (what would you know about the student who responded correctly/incorrectly?) are clearly explained but lack complete details.</td>
<td>The responses to the questions (what would you know about the student who responded correctly/incorrectly?) are clearly explained and describe more than simply “I would know they understand/learned or don’t understand/didn’t learn the material”.</td>
</tr>
<tr>
<td>Practical task</td>
<td>Directions</td>
<td>Scoring criteria</td>
<td>Standards alignment</td>
</tr>
<tr>
<td>----------------</td>
<td>------------</td>
<td>------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>directions</td>
<td>The task includes vague student and/or teacher directions, OR scoring criteria are not given; OR the task is not a practical task.</td>
<td>The task includes complete student OR teacher directions, but not both. Scoring criteria are given in the rubric are ambiguous.</td>
<td>The task includes complete student and teacher directions. Students are directed to respond to the task by designing AND conducting an investigation or experiment. Specific scoring criteria are given in the rubric.</td>
</tr>
<tr>
<td>Scoring criteria</td>
<td>More than one element of the scoring criteria chosen is not appropriate, reasonable and/or practical. (e.g., the assessment is not age-appropriate; the criteria don't align with the instructional goals of the unit).</td>
<td>One element of the scoring criteria chosen is not appropriate, reasonable and/or practical. (e.g., the criteria don’t align with the instructional goals of the unit).</td>
<td>Scoring criteria chosen are appropriate, reasonable and practical for assessing the given grade level, instructional goals and conceptual understandings of the unit.</td>
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<tr>
<td>Standards alignment</td>
<td>Few of the assessment criteria align with the Indiana State Standards.</td>
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</tr>
<tr>
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<td>The responses to the questions (what would you know about the student who responded correctly/incorrectly?) are clearly explained and describe more than simply “I would know they understand/learned or don’t understand/didn’t learn the material”.</td>
</tr>
</tbody>
</table>
EDCI 365
Confidential Peer/Self Assessment Form

Name: ________________________ Assignment: ________________________

Directions: You are to rate yourself and your peers ability to work as a group on a scale of 1 to 3; 1 (less work), 2 (same), 3 (more work). Base your rating on the following three criteria: contribution (significance of ideas and level of participation), responsiveness (flexibility/ability to work with others), and collaboration (willingness to take responsibility for tasks). You must provide a written rationale for each rating that is based on the criteria. In the ideal group, all individuals would be contributing equally (the same) and would receive a rating of “2”. At the bottom indicate your specific responsibilities.

<table>
<thead>
<tr>
<th>Group Members (Names)</th>
<th>Rating</th>
<th>Rationale for rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 (less)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (same)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 (more)</td>
<td></td>
</tr>
<tr>
<td>Self</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

My responsibilities:
Case Studies on Science Teaching

Mr. Jewell

Mr. Jewell uses hand-on activities to develop his fourth grade classroom science experience. He structures his classroom in such a way that hands-on activities should yield the necessary content but not the teacher. He expects students to use the well-set formulas as tools to come up with results that make sense.

In groups, students take the responsibility of planning their projects and making meaning out of the hands-on activities that involve a considerable amount of ambiguity with minimal teacher intervention. In fact, he takes a back seat and patiently awaits his students struggle on their own. He assures them of the frustration ahead and the need to modify their projects time and again. These projects last for weeks. Mr. Jewell realizes the students struggle and eventually intervenes and provides a few clues.

Mrs. Sorenson

Mrs. Sorenson set expectations quite differently than Mr. Jewell when it comes to exploring science in her fourth grade classroom. She is concerned that her fourth graders “do it right.” “Reading and following directions...that is part of their job”, she emphasizes. Sorenson assumes initially that classroom investigations will speak for themselves. Unlike Jewell; Sorenson expects the experiences and observations her students make in her “hands on” labs to lead to certain premises. Students’ commonsense reasoning then should lead from these premises to accepted theory.

However, Sorenson does intervene to reinforce “necessary” conclusions that her students may not have drawn based on results from their own inquiries. She wants her students to provide evidence to her that they have adopted the correct scientific explanations and conclusions during their labs. But when students’ responses do not fulfill Sorenson’s expectations, she provides the students with step-by-step instructions that will guarantee success.

Mr. Dodgson

Mr. Dodgson, like Mr. Jewell, builds his fourth grade classroom’s science experience around hands on activities. But unlike Jewell, he is more actively involved in his students’ group work. While students perform activities, Dodgson visits each group and asks questions to find out where students might have misconceptions, and works to help the groups fix problems in their experimental design.

Students in Dodgson’s classes are free to inquire and explore topics with a great deal of freedom, but are expected to share with what they find in discussions with the class. This discussion often includes students describing in detail their procedures to the class, and reporting on their conclusions. Dodgson strives to have students understand the concepts in the curriculum as well as the process of science.
The Case of Ms. Lopez

"How do seeds live? Can seeds grow way, way deep in the ocean and make seaweed?" "How do seeds get inside of watermelons?" "Hey! How do they make watermelons without seeds in them? How do seeds grow plants?" These are some of the many questions asked by Ms. Lopez's second graders.

Today, seeds are the topic. As the students are thinking about the origin of seeds, Ms. Lopez writes down their questions on a piece of oak-tag titled: "Question: We Have About Seeds." Another chart titled "What We Know About Seeds" contains such statements as "Seeds grow in gardens," "You can eat sunflower seeds," and "Carrots don't have seeds." Ms. Lopez refers to these charts constantly. She encourages the children to ask questions, and she guides the children as they form their concepts and change their beliefs. She uses their questions and comments to decide whether the children are ready for a "seed walk."

The next morning all the students go to a nearby field and collect seeds. Each student, besides carrying a collection bag, wears a large wool sock, used for collecting seeds, over one shoe and pulled up to the knee. After returning from the walk, each student selects one seed to study carefully with a hand lens. They observe what the seed looks, feels, and smells like, and guessing how it might travel. Then each child makes a presentation to the class, which is gathered in a meeting circle. By taping the seed specimens onto a chart, the teacher keeps track of the different seeds the class discusses. After the students tally how many of each seed they found, they graph their results.

That evening, after the seed walk, Ms. Lopez reflects on the differences in the children's understandings of the structure and function of seeds. She notes which children easily made observations and which ones had difficulty, which children made more obvious or more creative responses, and which children seemed comfortable or uncomfortable using the lens for examining their seeds. While planning the next day's activities, Ms. Lopez consults her notes and places the children in groups that will prompt and challenge each student.

The next day, some groups choose to count the seeds that came back on their socks and then plant the seeds in large, self-sealing plastic bags and water; the groups then set the plastic bags and seeds near the windows. In the days that follow, the groups will observe the germination process carefully and compare the total number of seeds with the number that sprouted by making "ratio" graphs and by writing corresponding sentences. Ms. Lopez invites other children to compare sizes of seeds; she asks them to outline the seeds on graph paper and then count the number of graph squares that each seed covers. The students discover that there is a great diversity of sizes and
shapes in different seeds and that the same kind of seed varies in size and shape.

Still other groups choose to continue working on their "seed journals," which Ms. Lopez requires all the students to keep. The children either paste in or draw the specimen and then write about three seeds of their choice, including observations shared earlier in the meeting circle. Because students of this age have a range of writing capabilities, Ms. Lopez meets with each child and discusses that individual's observations and writing. She uses both the journal entries and group presentations to monitor their understanding of diversity, cycles, and other major scientific concepts.

Ms. Lopez's class spends most of the day working on the concepts of diversity and cycles. She incorporates writing, math, and inquiry-based science activities into the program. The children will also have to write a story about how a Native American girl uses seeds and plants, compose a garden song, and complete additional writing and mathematical assignments.

In successive lessons, Ms. Lopez will call groups together and ask several activity-related questions, the answers to which should be based on the students' explorations. As she records the students' responses, Ms. Lopez will ask the children to clarify their answers. Eventually, she will introduce new vocabulary words and information that will help the students develop scientific concepts. A few of the children may be unsure about the new information; they will need more time for discussion and additional testing of their ideas before the new information becomes a part of their personal understanding of seeds. For instance, last year when they were taught this unit, several youngsters insisted that the lima bean embryos they had discovered inside the seeds would grow into lima bean plants without the seed halves attached. They were convinced that the embryos could "eat" the soil and water and grow into adult lima bean plants. Through careful questioning, Ms. Lopez was able to guide these children to design a test of their beliefs. She found that these children changed their point of view after they conducted the investigation and that they now had additional questions.

After her students have studied seeds for several weeks, Ms. Lopez recognizes that they have learned a great deal about diversity, life cycles, structure, and function. The children become adept observers; they have learned to ask each other and Ms. Lopez about these developing concepts. Ms. Lopez knows they will soon be ready to apply their new knowledge and skills to other science areas. With her class, she will return to the original questions and the children's answers for them. She will point out how much they have learned. The children will, as a group, write and produce a booklet on how to plant seeds and care for the seedlings. Ms. Lopez will keep notes on the progress of each child and the class as a whole. Her notes will then become the source material that will enable her to make more formal assessments for report cards, in conferences with parents, and -- for the class as a whole to Mr. Sandowski, the third grade teacher.
<table>
<thead>
<tr>
<th>Inquiry/Process Skill</th>
<th>How Demonstrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Observing</td>
<td></td>
</tr>
<tr>
<td>2. Classifying</td>
<td></td>
</tr>
<tr>
<td>3. Communicating</td>
<td></td>
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<tr>
<td>4. Measuring</td>
<td></td>
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<tr>
<td>5. Inferring</td>
<td></td>
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<tr>
<td>6. Predicting</td>
<td></td>
</tr>
<tr>
<td>7. Relating Objects/Events</td>
<td></td>
</tr>
<tr>
<td>8. Defining Operationally</td>
<td></td>
</tr>
<tr>
<td>9. Formulating Hypotheses</td>
<td></td>
</tr>
<tr>
<td>10. Interpreting Data</td>
<td></td>
</tr>
<tr>
<td>11. Controlling Variables</td>
<td></td>
</tr>
<tr>
<td>12. Investigating</td>
<td></td>
</tr>
<tr>
<td>Teaching Standard and Element</td>
<td>Evidence, Description of Practice Observed</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td><strong>Standard A. Teachers plan an inquiry-based science program</strong></td>
<td></td>
</tr>
<tr>
<td>• Adapts content and curricula to interest and experiences of students.</td>
<td></td>
</tr>
<tr>
<td>• Teaching and assessment nurtures a community of science learners.</td>
<td></td>
</tr>
<tr>
<td><strong>Standard B. Teachers guide and facilitate learning</strong></td>
<td></td>
</tr>
<tr>
<td>• Orchestrates discourse among students about scientific ideas.</td>
<td></td>
</tr>
<tr>
<td>• Encourages all students to participate</td>
<td></td>
</tr>
<tr>
<td>• Models the skills of scientific inquiry, curiosity and skepticism.</td>
<td></td>
</tr>
<tr>
<td><strong>Standard C. Teachers engage in ongoing assessment of teaching and learning</strong></td>
<td></td>
</tr>
<tr>
<td>• Uses multiple methods to gather data about student understanding and ability.</td>
<td></td>
</tr>
<tr>
<td>• Guides students in self-assessment.</td>
<td></td>
</tr>
<tr>
<td><strong>Standard D. Teachers design and manage learning environments</strong></td>
<td></td>
</tr>
<tr>
<td>• Structures time so that students engage in extended investigations.</td>
<td></td>
</tr>
<tr>
<td>• Makes available the necessary science tools, materials, technology.</td>
<td></td>
</tr>
<tr>
<td>• Creates setting for student work that is flexible and supportive of science inquiry.</td>
<td></td>
</tr>
<tr>
<td><strong>Standard E. Teachers develop communities of science learners</strong></td>
<td></td>
</tr>
<tr>
<td>• Enables students to have a significant voice in decisions about content, work, requiring students to take responsibility.</td>
<td></td>
</tr>
<tr>
<td>• Nurture collaboration among students.</td>
<td></td>
</tr>
<tr>
<td>• Facilitates discussion based on a shared understanding of rules of discourse.</td>
<td></td>
</tr>
<tr>
<td>• Models the skills, attitudes, and values of scientific inquiry.</td>
<td></td>
</tr>
</tbody>
</table>
Purpose

Teachers need to be aware of and understand children's ideas and ways of thinking about science phenomena, abilities to "do" science, and attitudes toward science and school science in order to plan and implement more effective science teaching. Further, children's science abilities vary within and across grade levels, thus this assignment allows for an opportunity to look at differences in children's science capabilities and developmental levels. The actions of teachers of science are deeply influenced by their understanding of children's abilities to learn science, the science content to be taught, and the methods used to teach science. All teachers of science have implicit and explicit beliefs about science learning and teaching that influence how they teach children science. The National Science Education Standards (NRC, 1996) indicate that teachers of science should: "Select science content and adapt and design curricula to meet the interests, knowledge, understanding, abilities, and experiences of students (p. 30)." Thus, the aim of this assignment is to assist you in better understanding children's science ideas, abilities, and attitudes. The assignment is designed to help you better understand the children you will be teaching and the implication to planning science instruction.

Procedure

To complete this project you will conduct a series of interviews with a child from your assigned TIP classroom. The interviews are designed to assist you in constructing a profile of a science learner. Because the interviews are extensive you will need to conduct the interviews over four 20 min. time periods. Your team will prepare a written report and PowerPoint presentation about science learners based on your teams interviews. The interviews focus on three aspects of the science learner: (1) what is science and attitude towards science, (2) abilities to do science using the science process skills, and (3) the importance of children's prior ideas in learning science. Each of these is described in more detail below.

You will need to tape record your interview and transcribe (by hand or typewritten) the interview verbatim. The transcript should be attached to your team report as an appendix. Be sure to indicate the child's age (years & month) in your report, but do not identify the child—use a pseudonym.

Interview about science and school science, scientists, and attitudes toward science and school science

This portion of the interview should take about 20 min. The following questions should be included as a part of your interview. You will need to ask additional questions in order to probe children for their ideas and understandings.

<table>
<thead>
<tr>
<th>Equipment/Materials needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tape recorder</td>
</tr>
<tr>
<td>Blank tapes</td>
</tr>
<tr>
<td>Plain sheets of paper</td>
</tr>
<tr>
<td>Pencils/crayons/markers</td>
</tr>
</tbody>
</table>

Interview Example

I would like to find out about your meaning for the words, "science," and "a scientist." Is it okay with you if I tape record your answers so I can remember what you said later?
Interview Questions about Science

What do you think science is? (Possible Probe questions: Can you tell me more? Can you explain more?)
What do you like about science?
What do you dislike about science?
Do you find science to be hard or easy? Why do you feel that way?

Interview Questions about School Science

Have you ever done science at school?
What did you do?
Did you like doing that? Why did you like doing that?
What do you like about doing science in school? Why?
What do you dislike about doing science in school? Why?
Does your teacher ever do science?
Do you ever do science at home? If so, what did you do? Did you like doing that?

Note: If the child does not respond adequately you can return to some of the questions above after “Draw a Scientist” task.

Draw-a-Scientist

Now provide the child with a blank sheet of paper and ask them to draw a picture of a scientist and explain their drawing.
Sample probing questions:

Tell me about your drawing. Why did you draw your scientist like this? What is your scientist doing?

Complete the interview with the following questions about scientists:

What does a scientist do?
Do you know any scientists? What do they do?
Are you a scientist? Why or why not?
Do you want to be a scientist when you grow up? Why or why not?
If you were a scientist, what would you do?

Concluding the Interview

Thank the child for doing the interview.

Analyzing Your Interview

As you analyze and compare your child to the children of your teammates consider the following questions:

a. What are children’s views about science?
b. What are children’s views about school science?
c. What are children’s views about scientists?
d. What is the basis for children’s views about science? Scientists? School science?
e. What kinds of science activities do children do in school?
f. Is there a difference between girls’ and boys’ responses?

Readings to use and cite in your paper and presentation:
- Harlen Chapters 1 and 2
Interview about the science processes

The purpose of this portion of the interview is to investigate children's abilities to "do science" using the science process skills. It is through the science process skills that children interact with and gather information about the environment and phenomena and construct scientific knowledge. Tape record your interview so that you have a record of the interview and can review the interview for children's ideas. The following tasks will address different science process skills, however, not all of the process skills will be investigated. This portion of the interview is time intensive and should be divided into two 20 min. sessions.

Equipment/Materials needed
- Tape recorder
- Blank tapes
- Plain sheets of paper
- Pencils/crayons
- 2 objects that float
- 2 objects that sink
- 1 object that sinks half way (optional)
- Water trough
- Paper towels for cleaning up work place

Interview Example

I would like to find out about your ability to do some of the common activities that scientists do. Is it okay with you if I tape record your answers so I can remember what you said later?

Process Skill 1: Observation and Communication

Sinking and Floating Task

For younger children you will need to record children's responses, for older children have them write (record) their observations on a blank sheet of paper.

Using 5 different objects, 2 that float, 2 that sink to the bottom, and 1 that sinks half way* (optional), place the objects in a tub of water one at a time, and ask the child to: 1) draw what they observe and 2) describe/record their observations about the event, sinking and floating.

Possible Questions:
What do you observe/what happens/what do you see?
Can you tell me about your drawing/describe your drawing for me?

Note: *Using an object that sinks half way is optional.

Analyzing Your Interview

As you analyze and compare your child to the children of your teammates consider the following questions:
a. What details do the children observe/draw about the objects? How detailed are the children’s observations/drawings?
b. Do the children observe/draw similarities or differences in the objects?
c. Do the children observe/draw patterns or sequences in the objects?
d. Do the children observe/draw the scale or relationship of the objects?
e. How are children’s ideas reflected in their observations/drawings? Do the children observe properties of the objects or are they making inferences/interpretations/explanations about the objects?
f. What language/words (oral and written) do the children use to communicate and represent their observations?

Readings to cite in your group’s report and presentation:
- Harlen Chapters 7 and 8

**Process Skill 2: Cause-and-Effect Reasoning**

*Sinking and Floating and Plant Growth Tasks*

The purpose of this task is to investigate children’s abilities to observe actions among and between objects, cause-and-effect.

After the children have completed the sink-and-float activity ask them to explain why they think some objects sink and why some objects float.

Then show students the pictures of the two plants and explain that one plant was given fertilizer (the one that has grown the best), ask the children to explain why they think the one plant has grown better than the other plant.

Possible question: Can you give me a reason why you think one plant has grown more than the other?

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**Equipment/Materials needed**
- Tape recorder
- Blank tapes
- Plain sheets of paper
- Pencils/crayons
- Diagrams of the two plants (see diags. below)
Analyzing Your Interview

As you analyze and compare your child to the children of your teammates consider the following:

a. Describe the child’s (children’s) abilities to use cause-and-effect reasoning about why objects sink or float.

b. Describe the child’s (children’s) abilities to use cause-and-effect reasoning about why fertilizer helps plants grow.

c. How does the child’s cause-and-effect reasoning compare between the sink and float task (real objects) and the fertilizer task (abstract objects)?

Process Skill 3: Predicting

Sun, Whales, and Magnets Task

The purpose of this task is to investigate children’s ability to make predictions based on past experiences, to indicate what would happen in the future.

First ask the child “What do you think would happen if the Sun did not come up tomorrow morning?” Why do you think that? Be sure and ask for the child’s reasoning?

Next ask the child if they know what whales are and if they know that whales eat tiny plants called plankton. Ask the child “How many plankton does a whale have to eat every day to stay alive?”

Now present the child with a magnet and three or four objects that are attracted to the magnet. Have the child pick up the objects with the magnet. Now show the child six new objects (3 that are not attracted to the magnet and three that are attracted to the magnet)

Ask the child: “Which objects do you think will be attracted to the magnet and why? (NOTE: DO NOT LET THE CHILD USE THE MAGNET UNTIL AFTER MAKING THE PREDICTION)

<table>
<thead>
<tr>
<th>Equipment/Materials needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tape recorder</td>
</tr>
<tr>
<td>• Blank tapes</td>
</tr>
<tr>
<td>• Plain sheets of paper</td>
</tr>
<tr>
<td>• Pencils/crayons</td>
</tr>
<tr>
<td>• 1 magnet</td>
</tr>
<tr>
<td>• 3 objects that are attracted to the magnet</td>
</tr>
<tr>
<td>• 3 objects that are not attracted to the magnet</td>
</tr>
</tbody>
</table>

Analyzing Your Interview

As you analyze and compare your child to the children of your teammates consider the following questions:

a. How does the use of real objects affect the child’s (children’s) ability to make a prediction?

b. How does the child’s experience affect their ability to make a prediction?

c. Does the child use data (evidence) in making a prediction?
Process Skill 4: Constructing Tables and Graphs

Candies Task

The purpose of this task is to investigate children's ability to make and interpret data tables and graphs.

Equipment/Materials needed
- Tape recorder
- Blank tapes
- Plain sheets of paper
- Pencils/crayons
- A small bag of candy (jelly beans/M&Ms/gumdrops)
- A ruler, some children might need for drawing their graphs (optional)

Using a small bag of candy (e.g., M & Ms, jellybeans, gumdrops) have the child randomly take out 10 pieces of candy and ask them to create a data table on a sheet of paper (REMEMBER NOT TO HELP THE CHILD IN MAKING THE DATA TABLE).

Possible Questions: After the child has made the data table ask them to:
1) Describe their data table and 2) Explain why they made their data table the way they did.

Next remove the candies (so that students cannot see the candies) and have the child interpret their data table by asking the following questions:

Which color was chosen the most times? How do you know?
Which color was chosen the fewest times? How do you know?
Where there any colors chosen the same number of times? How do you know?

Provide the child with another sheet of paper and ask them to make a graph based on their data table. If the child has difficulties show them the selected candy and ask them to make a graph based on the candies.

After the child has made their graph ask them to:
1) Describe their graph, and
2) Explain why they made their graph the way they did. Next have the child interpret their graph by asking the following questions:

Which color was chosen the most times? How do you know?
Which color was chosen the fewest times? How do you know?
Where there any colors chosen the same number of times? How do you know?
If we were to take another candy from the bag, what color do you think that candy would be and why do you think that?

Next show the child the following data and ask them to make a graph/chart (on a new sheet of paper):
<table>
<thead>
<tr>
<th>Amount of Fertilizer (oz.)</th>
<th>Average Height of Plants (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>28</td>
</tr>
<tr>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>?</td>
</tr>
</tbody>
</table>

After the child has made their graph ask them to: 1) Describe their graph and 2) Explain why they made their graph the way they did. Next have the child interpret their graph by asking the following questions:

Which plant grew the least? How do you know?
Which plant grew the most? How do you know?
How does fertilizer affect plant growth? How do you know?
What do you think will happen to the height of the plant if 10 ounces of fertilizer is used? How do you know that?

Analyzing Your Interview

As you analyze and compare your child to the children of your teammates consider the following questions:

a. What abilities do the children have in making a data table? A graph? Do children label their graph in appropriate ways?
b. What difficulties do the children have in making a data table? A graph?
c. Does the candy data table show the relationship between the color of the candies and the number of candies?
d. Is the candy graph a bar graph, picture graph, or line graph?
e. What abilities do the children have in reading their candy data table? Graph?
f. What type of graph do the children make for the fertilizer and plant growth data?
g. Is there a difference in the children’s abilities to make a graph based on real objects (candies) as compared to abstract objects (plant growth)?
h. Is the child able to make a prediction based on their graph (candies and plant growth)?

Children’s Ideas

The purpose of this portion of the assignment is to provide you with experience using two techniques for assessing children in science—draw and explain and the interview about instances—as well as become familiar with children’s ideas. In this activity you will administer and analyze an interview with elementary children about the science concept of animal. You will also compare children’s ideas to the ideas of scientists and discuss the implications to teaching. This portion of the interview should take about 20 min. Place each of the pictures below on a 3x5 card to make eight instance cards. Use the following protocol to conduct your interview. Be sure you tape record your interview.

**Equipment/Materials needed**
- Tape recorder
- Blank tapes
- Plain sheets of paper
- Pencils/crayons
- Instance cards pasted on index cards
Interview Example

I would like to find out about your meaning for the word, “animal.” Is it okay with you if I tape record your answers so I can remember what you said later?

Drawings

Will you please draw me a picture of what you think an animal is?

Can you explain (tell me about) your drawing to me?

Why do you think your drawing is a picture of an animal?

Can you tell me another reason why your drawing is a picture of an animal?

I would like you to draw me another picture of what you think an animal is. Can you explain (tell me about) your drawing to me?

Why do you think your drawing is a picture of an animal?

Can you tell me another reason why your drawing is a picture of an animal?

Instance Cards

Okay, now I am going to show you some cards with drawings of different objects and I would like you to tell me if you think the drawings are pictures of animals. I am going to show you one card at a time.

In your description of the word animal, is a __________ an animal?

Why do you think that?

Is there any other way you know that a __________ is an animal? Or compare with earlier responses.

Conclusion

These are the pictures you said were animals, and these are the ones you said were not animals. Are there any cards you would like to move? Why did you move this card?

Analyzing Your Interview

As you analyze and compare your child to the children of your teammates consider the following questions:

a. What ideas do the children hold about animals? Misconceptions and conceptions these children seem to have about the concept.

b. How do the children’s ideas compare to that of scientists? What constitutes a scientifically appropriate response; that is, what is the scientifically accepted view of the concept. Be sure you are complete and accurate.

c. Do the children use ordinary, everyday words or do they use scientific sounding words?

d. How do children’s experiences with animals influence their ideas/responses?

e. How does children’s schooling influence their ideas/responses?
f. Are your children's ideas/responses based on perceptions, focused on one feature of an animal, or based on a specific context?

g. As a teacher what might you do to better help these children learn about animals? The potential implication of children's ideas to the teaching and learning of the concept. What activities would you do to facilitate children's science learning and why?

Hints for writing up this portion of the profile: (1) Be sure to use quotes/examples from your interview to support your analysis and conclusions, (2) Remember, children's reasons for their ideas are more important than their ability to identify examples of the concept, and (3) Use the literature to support your interpretations.

Readings to cite in your report and presentation:
- Harlem Chapter 5
- Worth (1999), The power of children's thinking
- Eaton, Anderson, & Smith (1983), When students don't know
- Stephens, Beiswenger, & Dyche (1986) Misconception die hard
- Barman, Barman, Cox, Newhouse, & Goldston (2000), Student's ideas about animals
The learner profile will be assessed for thoroughness and accuracy. The following scoring matrix will be used to assess the group's learner profile:

<table>
<thead>
<tr>
<th>Category</th>
<th>Beginning (Not addressed)</th>
<th>Developing (Poorly developed)</th>
<th>Proficient (Acceptable)</th>
<th>Mastery (Well-developed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding</td>
<td>The profile demonstrates minimal or irrelevant knowledge and/or application of concepts, theories, and process skills related to how children think about science, concepts, and scientists</td>
<td>The profile demonstrates general knowledge and/or application of concepts, theories, and process skills relate to children's thinking of science, concepts, and scientists</td>
<td>The profile demonstrates general knowledge and some specific knowledge and/or application of concepts, theories, and process skills relate to children's thinking of science, concepts, and scientists</td>
<td>The profile demonstrates specific, relevant, and detailed knowledge and application of concepts, theories, and process skills relate to children's thinking of science, concepts, and scientists</td>
</tr>
<tr>
<td>Interpretation &amp; Analysis</td>
<td>The interpretation and analysis of children's ideas is incomplete and limited. No evidence or references to children's responses are provided.</td>
<td>The interpretation and analysis of children's ideas is partially complete. Limited evidence or reference to children's responses.</td>
<td>The interpretation and analysis of children's ideas is grounded in discrete references to children's responses and demonstrates an understanding of how children learn science.</td>
<td>The interpretation and analysis of children's ideas are comprehensive. Extensive use of children's responses to demonstrate an understanding in how children learn science.</td>
</tr>
<tr>
<td>Comparisons</td>
<td>The comparison of children's ideas and science understanding is incomplete, limited, and illogical.</td>
<td>The comparison of children's ideas and science understanding is partially complete.</td>
<td>The comparison of children's ideas and science understanding is complete, appropriate, and logical.</td>
<td>The comparison of children's ideas and science understanding is comprehensive.</td>
</tr>
<tr>
<td>Misconceptions</td>
<td>Reference to children's misconceptions is missing or limited.</td>
<td>Reference to children's misconceptions is partially complete and/or no explanation provided.</td>
<td>Reference to children's misconceptions is provided and supported with an explanation for why children harbor these misconceptions.</td>
<td>Reference to children's misconceptions is comprehensive and supported with an explanation using course readings.</td>
</tr>
<tr>
<td>Use of literature</td>
<td>No reference to course readings to support analysis and interpretation.</td>
<td>Partial reference to course readings to support analysis and interpretation.</td>
<td>Discrete reference to course readings to support analysis and interpretation.</td>
<td>Purposeful and comprehensive reference to course readings to support and strengthen analysis.</td>
</tr>
<tr>
<td>Implications</td>
<td>Implications are not stated.</td>
<td>Implications are partially stated.</td>
<td>A complete list of implications are stated and explained.</td>
<td>A comprehensive list of implications are stated, explained, and connected to how to use children's ideas to drive instruction.</td>
</tr>
<tr>
<td>Reflection</td>
<td>Reflection is not provided.</td>
<td>Reflection is partially complete (i.e. few examples).</td>
<td>Reflection includes specific examples.</td>
<td>Reflection is thoughtful and insightful. Includes links to learning through interviewing.</td>
</tr>
<tr>
<td>Appropriate use of grammar, spelling, APA</td>
<td>Poor use of proper grammar, spelling, etc.</td>
<td>Fair use of proper grammar, spelling, etc.</td>
<td>Good use of proper grammar, spelling, etc.</td>
<td>Excellent use of proper grammar, spelling, etc.</td>
</tr>
<tr>
<td>Overall organization and presentation</td>
<td>Disorganized, difficult to follow</td>
<td>Poorly organized</td>
<td>Organized</td>
<td>Highly organized and well-developed</td>
</tr>
</tbody>
</table>
EDCI 365
Confidential Peer/Self Assessment Form

Name: ___________________________    Assignment: _______________________

Directions: You are to rate yourself and your peers ability to work as a group on a scale of 1 to 3; 1 (less work), 2 (same), 3 (more work). Base your rating on the following three criteria: contribution (significance of ideas and level of participation), responsiveness (flexibility/ability to work with others), and collaboration (willingness to take responsibility for tasks). You must provide a written rationale for each rating that is based on the criteria. In the ideal group, all individuals would be contributing equally (the same) and would receive a rating of “2”. At the bottom indicate your specific responsibilities.

<table>
<thead>
<tr>
<th>Group Members</th>
<th>Rating</th>
<th>Rationale for rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Names)</td>
<td>1 (less)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (same)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 (more)</td>
<td></td>
</tr>
</tbody>
</table>

Self

My responsibilities:
5E Lesson Plan and Lesson Reflection Descriptions

• Inquiry Lesson Using Productive Questions

• Inquiry Lesson Through a Fair Test Investigation Using Productive Questions

• Description of Lesson Plan Reflection Assignment
EDCI 365
5E INQUIRY LESSON USING PRODUCTIVE QUESTIONS

Purpose
As an elementary school science teacher you will encounter situations where it is more appropriate to use productive questions to guide children’s investigation of scientific phenomena. Through the use of appropriately planned and sequenced productive questions, teachers can guide children toward acquiring physical knowledge and facilitate their conceptual understanding. This activity is designed to provide you with an opportunity to develop a pedagogical method using productive questions (see Harlen, 2001, p. 27-30), and interpret children’s science understandings through the analysis of their written (graphic) and oral language.

Procedures
You and your teammates are to develop a productive question inquiry lesson on a science concept. You will teach this lesson to children and analyze their science understandings based on their graphic products. The following procedures are provided to assist you in completing the assignment:

- Identify and select an existing activity for developing the lesson. You do not need to re-invent the wheel, but modify existing resources to fit the framework of this assignment. Be aware, however, that published activities may be used to teach more than one concept or may not really teach the stated concept.
- Identify the science concepts and describe the conceptual understandings children will construct.
- Operationally define the science processes skills that children will use and learn during the lesson.
- Include a list of materials that you and/or children will provide
- Develop a series of productive questions appropriate for engaging children and challenging their conceptual understanding. You are to incorporate at least two questions of each type of productive question, including reasoning. In parentheses identify the type of productive question. You should sequence your questions in an appropriate manner that builds from attention focusing questions to problem posing and reasoning questions.
- Develop a set of productive question task cards that could be distributed to children as an optional activity. The task cards would require children to manipulate the materials in order to complete the task. The task cards would allow you to individualize the activity.
- The lesson needs to incorporate children’s journaling (writing and drawing) at least three different times: prior to starting the lesson, during the lesson, and at the end of the lesson.
- Develop an assessment strategy that identifies the specific criteria to be used to assess children’s performance. The assessment technique must at least incorporate the use of children’s graphic products (journal writing and drawing) and assess children’s conceptual understandings.
- Identify and operationally define the Indiana Academic Standards addressed.
- Identify the potential conception/misconceptions children have about your topic and describe how your lesson is designed to address the children’s conceptions/misconceptions.
- You will need to collect and prepare materials for teaching the lesson and provide a copy of your lesson to your TIP teacher.
- The lesson plan needs to be specific and detailed such that others could teach from the lesson. The success of your lesson will depend on how well you have thought through the productive questions that you will ask children and the materials you have children manipulate to answer the productive questions. As you plan your lesson, consider the instructional phases outlined below:
### 5E INQUIRY LESSON FRAMEWORK

<table>
<thead>
<tr>
<th>Model Phase</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Engage**  | • Set purpose of lesson, introduce materials.  
              • Elicit children’s prior understandings.  
              • Provide time for children to explore the materials.  
              • Encourage children to write and draw pictures of their observations and understandings. |
| **Explore** | • Use productive questions (Attention-Focusing, Measuring, Counting, & Comparison) to focus children’s manipulation and observation of materials.  
              • Encourage children to write and draw pictures of their observations and understandings. |
| **Explain** | • Use productive questions (Reasoning) to promote children’s thinking about the phenomenon, the interpretation of their observations. Children’s observations become the evidence for answering the reasoning questions.  
              • Introduce the scientific concept, linking it to the children’s experiences and observations, when appropriate.  
              • Encourage children to write and draw pictures of their observations and understandings. |
| **Elaborate** | • Apply or extend students’ developing concepts in new contexts.  
                • Provide opportunities for students to develop deeper and broader understanding. |
| **Evaluate** | • Encourage students to assess their understanding as they apply what they know to solve problems. |

**Reflection on Lesson:** (see rubric)

You will collect two children’s writing/drawing samples and analyze the writing/drawing in terms of their use of the science processes and conceptual understandings, as well as other performance categories you deem appropriate and important. Each student individually will prepare an analysis (2 to 4 pages) of the children’s work that will be turned in at the next class period. Your analysis needs to incorporate (cite) course readings to support your interpretations and ideas.

**Assessment:** (see rubric)
### Productive Questions

<table>
<thead>
<tr>
<th>Type of Question</th>
<th>Question Starters</th>
<th>Common placement</th>
</tr>
</thead>
</table>
| Attention-focusing | Have you seen . . .?                          
|                   | Did you notice . . .?                                                               |                  |
|                   | What are they doing . . .?                                                        |                  |
|                   | How does it feel/sound/look?                                                      |                  |
| Measuring and counting | How many . . .?                                                                      |                  |
|                   | How often . . .?                                                                  |                  |
|                   | How long . . .?                                                                   |                  |
|                   | How much . . .?                                                                   |                  |
| Comparison       | How are they alike . . .?                                                        |                  |
|                   | How are they different . . .?                                                    |                  |
|                   | How do these go together . . .?                                                  |                  |
| Action           | What if . . .?                                                                    |                  |
|                   | What will happen when . . .?                                                     |                  |
| Problem-posing   | Can you find a way to . . .?                                                      |                  |
|                   | Can you make this happen?                                                         |                  |
| Reasoning        | Why do you think . . .?                                                           |                  |
|                   | How would you explain . . .?                                                     |                  |
EDCI 365
5E INQUIRY LESSON THROUGH A FAIR TEST INVESTIGATION

Purpose

The National Science Education Standards call for a change in the way science is taught, promoting inquiry-based science teaching. The Indiana Science Academic Standards also identify inquiry abilities and skills children are to obtain. Further, inquiry-based science instruction provides students with a more meaningful and lasting learning experience. Inquiry-based instruction capitalizes on children's natural curiosity and interest in science and promotes children's problem solving and decision-making. Thus, it is important that you have an opportunity to develop an inquiry-based science lesson and to teach children using such a lesson. There are many types or levels of inquiry-based teaching, for this assignment you will be developing a fair test-inquiry lesson that engages children in designing their own investigation (experiment) and conducting their investigation, using scientific knowledge to explain their results.

Procedures

You and your teammates are to develop a productive question inquiry lesson on a science concept. You will teach this lesson to children and analyze their science understandings based on their graphic products. The following procedures are provided to assist you in completing the assignment:

- Identify and select an existing activity for developing the lesson. You do not need to re-invent the wheel, but modify existing resources to fit the framework of this assignment. Be aware, however, that published activities may be used to teach more than one concept or may not really teach the stated concept.
- Identify the science concepts and describe the conceptual understandings children will construct.
- Operationally define the science processes skills that children will use and learn during the lesson.
- Include a list of materials that you and/or children will provide.
- State any safety precautions.
- Develop a series of productive questions appropriate for engaging children and challenging their conceptual understanding. You are to incorporate at least two questions of each type of productive question, including reasoning. In parentheses identify the type of productive question. You should sequence your questions in an appropriate manner that builds from attention focusing questions to problem posing and reasoning questions.
- Indicate how cooperative learning will be used to manage each small group.
- Develop an assessment strategy that identifies the specific criteria to be used to assess children's performance. The assessment technique must at least incorporate the use of children's graphic products (journal writing and drawing) and assess children's conceptual understandings.
- Identify and operationally define the Indiana Academic Standards addressed.
- Identify the potential conception/misconceptions children have about your topic and describe how your lesson is designed to address the children's conceptions/misconceptions.
- You will need to collect and prepare materials for teaching the lesson and provide a copy of your lesson to your TIP teacher.
- Develop an investigation planning sheet and an investigation sheet (a technique for helping children organize their thinking) as part of this assignment (See class examples).
- The lesson plan needs to be specific and detailed such that others could teach from the lesson. The success of your lesson will depend on how well you have thought through the productive questions that you will ask children and the materials you have children manipulate to answer the productive questions. As you plan your lesson, consider the instructional phases outlined below.
<table>
<thead>
<tr>
<th>Model Phase</th>
<th>Description</th>
<th>Fair Test Investigation Instructional Phase</th>
</tr>
</thead>
</table>
| **Engage**  | • Set purpose of lesson, introduce materials.  
              • Elicit children's prior understandings.  
              • Provide time for children to explore the materials.  
              • Encourage children to write and draw pictures of their observations and understandings. | • *Setting the stage* frames the lesson by posing a question or defining a problem or issue that children will be investigating. It sets the purpose of the lesson. |
| **Explore** | • Use productive questions (Attention-Focusing, Measuring, Counting, & Comparison) to focus children's manipulation and observation of materials.  
              • Encourage children to write and draw pictures of their observations and understandings. | • *Planning and conducting the investigation* involves children stating the researchable question, identifying the variables, and developing the procedures; setting up and carrying out the investigation; recording and transforming the data. |
| **Explain** | • Use productive questions (Reasoning) to promote children's thinking about the phenomenon, the interpretation of their observations. Children's observations become the evidence for answering the reasoning questions.  
              • Introduce the scientific concept, linking it to the children's experiences and observations, when appropriate.  
              • Encourage children to write and draw pictures of their observations and understandings. | • *Interpreting and explaining the investigation* requires children to interpret the data and to use scientific ideas (knowledge) to explain their results. |
| **Elaborate** | • Apply or extend students' developing concepts in new contexts.  
                • Provide opportunities for students to develop deeper and broader understanding. | • *Communicating the findings* involves the preparation of written and/or oral reports for sharing the investigation with others. |
| **Evaluate** | • Encourage students to assess their understanding as they apply what they know to solve problems. | • *Assessing* children's learning and process skill development through a real world application. |

**Reflection on Lesson:** (see rubric)

You will collect two children's writing/drawing samples and analyze the writing/drawing in terms of their use of the science processes and conceptual understandings, as well as other performance categories you deem appropriate and important. Each student individually will prepare an analysis (2 to 4 pages) of the children's work that will be turned in at the next class period. Your analysis needs to incorporate (cite) course readings to support your interpretations and ideas.

**Assessment of Lesson Plan:** (see rubric)

47
<table>
<thead>
<tr>
<th>Students:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What is the problem:</strong></td>
</tr>
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<td></td>
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<tr>
<td><strong>Investigation question:</strong></td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>What we think will happen (prediction) and why we think it will happen (explanation):</strong></td>
</tr>
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<td></td>
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<tr>
<td><strong>What variable(s) should be changed (Independent variable):</strong></td>
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<tr>
<td><strong>What variables should not be changed (Controlled variables):</strong></td>
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<tr>
<td><strong>What responding variable(s) will be observed or measured (Dependent variables):</strong></td>
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<td></td>
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<tr>
<td><strong>How the results will be used to answer the question:</strong></td>
</tr>
<tr>
<td>Investigation Sheet</td>
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<tr>
<td>---------------------</td>
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<tr>
<td>Students:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data collected:</th>
<th>Data transformation:</th>
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<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Interpretation of data:</th>
</tr>
</thead>
<tbody>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Explanation of data (using scientific ideas to explain results)</th>
</tr>
</thead>
<tbody>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Reflection on initial prediction and explanation:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>How I would change my investigation to improve it:</th>
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<tbody>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>What new research questions do I have:</th>
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<tbody>
<tr>
<td></td>
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</tbody>
</table>
EDCI 365
Lesson Plan Reflection

Purpose: Reflection is an important aspect of becoming an effective teacher. For each lesson plan you implement, you will complete a reflective analysis based on the following criteria:

Knowledge of Student Learning Needs and Interests:
You should be describing the learners; make sure you address whatever you know about the things listed in this section of the rubric: their prior knowledge, needs and interests, their skills, abilities/disabilities, and culture. With this section you are demonstrating how well you know the student population with whom you are working.
Questions to think about: Who are they? What do they already know? What are they interested in? On what level are they working?
Incorporate course readings where appropriate. Possible articles or chapters to consider:

Opportunities to Engage in Inquiry:
The second section is to describe in what ways the students engaged in inquiry during your lesson; you don’t need to describe everything that you and the students did during the lesson, focus on what aspects of the lesson were inquiry-based.
Questions to think about: Which process and inquiry skills were they able to demonstrate? How did the inquiry help the students begin to develop the conceptual understandings?
Incorporate course readings where appropriate. Possible articles or chapters to consider:

Knowledge of Student Learning:
The third section is where to make sure you are making specific ties between the conceptual understandings, the objectives and what the students have produced as their work. You will be assessing at least two students’ work; you will need to keep copies of these students’ work. It is important to address each conceptual understanding for each student, and discuss how their work exemplifies what they learned from the lesson. You will use examples directly from their work and tie them to the conceptual understandings and objectives to show what the students learned and explain how you know that is what they learned. If you are working with students who have limited writing abilities (e.g. Kindergarten) and plan to use anecdotal evidence in your evaluation, make sure you have your notes from that lesson with that evidence. (i.e., during or immediately following the teaching of the lesson, you should jot down what students said/ did in case you will be able to use it in these reflections).
Questions to think about: Did they learn what you wanted them to? How do you know? What is missing from their understanding? Why don't they understand?
Incorporate course readings where appropriate. Possible articles or chapters to consider:
5E Lesson Plan
Forms and Rubrics

• 5E Lesson Plan Template
• 5E Lesson Plan Rubric
• Lesson Plan Reflection Rubric
• Peer/Self Assessment Form
• Field Experience Observation Form
5E Lesson Plan Template

Name of Lesson:

Grade Level:

Science Concepts and Conceptual Understanding: [Define term and concepts in detail. Explain the relationships between the concepts.]

Possible Misconceptions:

Science Process/Inquiry Skills:

List of Materials:

Safety Precautions:

Instructional Objectives:
Students will be able to:

Indiana Academic Standards: [1 to 3 appropriate standards]

Lesson Procedures [Describe in detail what the teacher is doing, what the students are doing, and the list of productive questions during each phase. Please classify each productive question.]

Engage Phase:

Explore Phase:

Explain Phase:

Elaborate Phase:

Evaluate Phase: [Include copies of rubrics and student handouts.]

Evidence of Journaling:

Evidence of group work:

Lesson Modifications for Diverse Learners:
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Beginning</th>
<th>Developing</th>
<th>Proficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>General information about context</td>
<td>Three or more elements are missing or incorrect/ inaccurate.</td>
<td>One or two elements are missing or incorrect/ inaccurate.</td>
<td>Grade level is specified. Indiana State Standards are noted, lesson objectives are performance-based, and are aligned with the Standards.</td>
</tr>
<tr>
<td>Concepts and resource related information</td>
<td>Three or more elements are missing or incorrect/ inaccurate.</td>
<td>One or two elements are missing or incorrect/ inaccurate.</td>
<td>Conceptual understandings are detailed and accurate, lesson plan lists and addresses common student misconceptions about topic covered, all lesson activities are clearly aligned with student understanding of concepts, necessary resources and materials are noted in detail, and lab safety guidelines are addressed.</td>
</tr>
<tr>
<td>Engage Phase</td>
<td>The description is not detailed enough for someone to determine what is to be done by the teacher or the students. Productive questions are missing.</td>
<td>The activity is not an inquiry activity (e.g. specific procedures are given by the teacher or the students are not investigating using materials). Productive questions are not the correct type.</td>
<td>Detailed explanation that guides teacher through the students' experience which describes a short inquiry activity meant to capture students' interest that taps into students' prior knowledge, and poses at least two attention-focusing productive questions.</td>
</tr>
<tr>
<td>Explore Phase</td>
<td>The description is not detailed enough for someone else to determine what is to be done by the teacher or the students. Productive questions are missing.</td>
<td>The activity is not an inquiry activity (e.g. specific procedures are given by the teacher or the students are not investigating using materials). Productive questions are not the correct type.</td>
<td>Detailed explanation that guides teacher through the students' experience which describes what inquiry (hands-on &amp; minds-on) activity/ activities the students will do prior to technical explanations. The focus is on student observation and interaction with materials and each other. The activity should be open- i.e. specific procedures are NOT given by the teacher. Poses at least two different types of productive questions from measuring and counting, comparison, action or problem-posing categories.</td>
</tr>
<tr>
<td>Explain Phase</td>
<td>The description is not detailed enough for someone else to determine what is to be done by the teacher or the students. Productive questions are missing.</td>
<td>The lesson plan has the teacher doing the explaining of the science concepts rather than working with the students to develop their own accurate explanations. Productive questions are not the correct type.</td>
<td>Detailed explanation that guides teacher through the students' experience which describes how the teacher encourages students to explain observations in their own words before connecting experiences to appropriate scientific content. The emphasis is on student rather than teacher explanation, and the students connect explanations to evidence. Includes at least two reasoning productive questions.</td>
</tr>
<tr>
<td>Elaborate Phase</td>
<td>The description is not detailed enough for someone else to determine what is to be done by the teacher or the students. Productive questions are missing.</td>
<td>Students are not applying the new concept in a new context. Productive questions are not the correct type.</td>
<td>Detailed explanation that guides teacher through the students' experience which describes multiple or varied opportunities for students to apply newly learned concept. Students utilize newly learned terms and definitions in a new context. Includes at least two productive questions that encourage students to develop deeper, broader understanding. (From measuring and counting, comparison, action, problem-posing, or reasoning categories).</td>
</tr>
<tr>
<td>Evaluate Phase</td>
<td>Two or more elements are missing or incorrect/ inaccurate. OR the description is not detailed enough for someone else to determine what is to be done by the teacher or the students.</td>
<td>One element is missing or incorrect/ inaccurate.</td>
<td>Detailed explanation that describes the assessment approaches used to assist the teacher in diagnosing what the student's know as well as what they do not know. The lesson plan illustrates how children demonstrate an understanding of cited Indiana Standards and performance objectives. Methods for assessing student progress are evident throughout the lesson.</td>
</tr>
<tr>
<td>Assessment</td>
<td>The lesson includes fewer than three journal-writing opportunities, AND the scoring criteria are not detailed, clear and appropriate.</td>
<td>The lesson includes fewer than three journal-writing opportunities, OR the scoring criteria are not detailed, clear and appropriate.</td>
<td>Children's writing/ drawing is effectively integrated into the lesson. Children complete at least three journal entries: before, during and at the conclusion of the lesson. A rubric is included with clear, detailed and appropriate scoring criteria.</td>
</tr>
</tbody>
</table>
Reflection Paper Assessment Matrix

Lesson Plan Analysis: This instrument will be used to assess the following artifacts from the implementation of your lesson: 1) a minimum of two examples of student work gathered from the lesson; and 2) your reflection of the impact of the lesson on students' science learning and your science teaching (~ 2 to 3 pages).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>1: Beginning (little or no evidence)</th>
<th>2: Developing (limited evidence)</th>
<th>3: Proficient (sufficient evidence)</th>
<th>4: Expert (clear, consistent, and convincing evidence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of Students' Learning Needs and Interests</td>
<td>The reflection demonstrates minimal, stereotypical, or irrelevant knowledge of student needs and interests, skills, culture, abilities/disabilities, and prior learning in science.</td>
<td>The reflection demonstrates general knowledge of student needs and interests, skills, culture, abilities/disabilities, and prior learning in science.</td>
<td>The reflection demonstrates general and some specific knowledge of student needs and interests, skills, culture, abilities/disabilities, and prior learning in science.</td>
<td>The reflection demonstrates specific and relevant understanding of student needs and interests, skills, culture, abilities/disabilities, and prior learning in science.</td>
</tr>
<tr>
<td>Opportunities to engage in scientific inquiry</td>
<td>The nature and sequence of the lesson activities provided students with limited opportunities to engage in scientific inquiry.</td>
<td>The nature and sequence of the lesson activities provided students with opportunities to apply basic science process skills.</td>
<td>The nature and sequence of the lesson activities provided students with opportunities to apply science inquiry skills.</td>
<td>The nature and sequence of the lesson activities provided students with opportunities to apply science inquiry skills and develop understanding of the nature of science.</td>
</tr>
<tr>
<td>Knowledge of Students' Learning</td>
<td>The reflection demonstrates minimal knowledge about how students learned science concepts or inquiry skills during the course of instruction. No reference to student work.</td>
<td>The reflection demonstrates general knowledge about how students learned science concepts or inquiry skills during the course of instruction. No reference to student work.</td>
<td>The reflection demonstrates general and some specific knowledge about how students learned science concepts or inquiry skills during the course of instruction. The reflection includes general references to student work as evidence of how students performed.</td>
<td>The reflection demonstrates specific knowledge about how students learned science concepts or inquiry skills during the course of instruction. The reflection includes discrete references to student work as evidence of how students performed.</td>
</tr>
</tbody>
</table>
EDCI 365
Confidential Peer/Self Assessment Form

Name:_________________________ Assignment:_________________________

Directions: You are to rate yourself and your peers ability to work as a group on a scale of 1 to 3; 1 (less work), 2 (same), 3 (more work). Base your rating on the following three criteria: contribution (significance of ideas and level of participation), responsiveness (flexibility/ability to work with others), and collaboration (willingness to take responsibility for tasks). You must provide a written rationale for each rating that is based on the criteria. In the ideal group, all individuals would be contributing equally (the same) and would receive a rating of “2”. At the bottom indicate your specific responsibilities.

<table>
<thead>
<tr>
<th>Group Members</th>
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<th>Rationale for rating</th>
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<tr>
<td>(Names)</td>
<td>1 (less)</td>
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<td>2 (same)</td>
<td></td>
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<tr>
<td></td>
<td>3 (more)</td>
<td></td>
</tr>
</tbody>
</table>

Self

My responsibilities:
Science Methods Field Experience
Observation Form

This form is designed to give you feedback on your preparation, classroom management, and teaching experience. Your cooperating teacher is invited to complete this form after each lesson then share his/her feedback with you. Once you have completed your lesson and this form, please return it to your methods instructor.

Date: ____________________________

Cooperating Teacher: ____________________________ Grade: _________

School: ____________________________

Type of science lesson (circle one):

   Productive Questions   Fair Test Investigation

I. Comments of preparation and classroom management

II. Comments on appropriateness of science activities/ science content

III. Comments on teaching, behaviors (e.g. questioning, responding, wait time)

Thank you for your feedback
EDCI 365
Teaching Science in the Elementary School
Purdue Electronic Portfolio

Purpose: The portfolio you develop for science methods is similar to the state requirement and is to demonstrate your understanding of science teaching, learning and assessment.

Building your portfolio: You will be required to include specific artifacts from your class assignments and your TIP experience that demonstrate your learning and understanding of science teaching, learning and assessment. The required artifacts are as follows:

- Lesson Plan- you will choose one of the three lesson plans implemented during your TIP experience.
- Student Work- a minimum of two examples from the lesson you choose for the portfolio.
- Reflection- narrative of the impact of the lesson on students’ science learning and your science teaching. The reflection will incorporate reference to course readings throughout.

The Reflection: The reflective analysis will address the following questions related to knowledge you acquired over the course of the semester.

How do your artifacts demonstrate your knowledge of:
- Students’ learning needs and interests?
- The community, school and classroom in which you taught your science lesson?
- The science concepts and conceptual understandings related to your lesson
- Practical strategies and resources, including the use of technology to support student learning?
- Inquiry-based practices?
- Appropriate assessments of student learning of science?

Submission of the portfolio: You will submit the required artifacts on Taskstream as attachments. Student work will be scanned and submitted.

EACH STUDENT MUST SUBMIT A PORTFOLIO ELECTRONICALLY. STUDENTS WHO DO NOT DO SO WILL FAIL THE COURSE.

Performance on the portfolio will be assessed using the Block V Teaching performances Rubric for Gate C: EDCI 365: Teaching Science in the Elementary School.
### Block IV Teaching Performances Rubric for Gate C:
EDCI 365: Teaching Science in the Elementary School

I. Lesson Plan Analysis: This instrument will be used to assess the following artifacts in your e-portfolio: 1) one science lesson plan (either the Productive Questioning/Fair Test or Learning Cycle lesson plan); 2) a minimum of two examples of student work gathered from the lesson; and 3) your reflective analysis (narrative) of the impact of the lesson on students’ science learning and your science teaching.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>1: Beginning (little or no evidence)</th>
<th>2: Developing (limited evidence)</th>
<th>3: Proficient (sufficient evidence)</th>
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</thead>
<tbody>
<tr>
<td>I.1 Knowledge of Students’ Learning Needs and Interests</td>
<td>The artifacts demonstrate minimal, stereotypical, or irrelevant knowledge of student needs and interests, skills, culture, abilities/disabilities, and prior learning in science.</td>
<td>The artifacts demonstrate general knowledge of student needs and interests, skills, culture, abilities/disabilities, and prior learning in science.</td>
<td>The artifacts demonstrate general and some specific knowledge of student needs and interests, skills, culture, abilities/disabilities, and prior learning in science.</td>
<td>The artifacts demonstrate specific and relevant understanding of student needs and interests, skills, culture, abilities/disabilities, and prior learning in science.</td>
</tr>
<tr>
<td>I.2 Knowledge of Community, School, and Classroom Factors</td>
<td>The artifacts demonstrate minimal, irrelevant, or biased knowledge of the characteristics of the community, school, and classroom.</td>
<td>The artifacts demonstrate some knowledge of the characteristics of the community, school, and classroom.</td>
<td>The artifacts demonstrate much knowledge of the characteristics of the community, school, and classroom.</td>
<td>The artifacts demonstrate a comprehensive understanding of characteristics of the community, school, and classroom.</td>
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<tr>
<td>I.3 Subject Matter Focus of the Unit/Lesson(s)</td>
<td>The objectives reflect one level of learning; are unclear; reflect activities rather than learning outcomes; are not appropriate for students’ learning needs; are not standards-based. Science conceptual understandings appear to have many inaccuracies and its focus on isolated facts. Objectives do not demonstrate how science concepts are logically organized.</td>
<td>The objectives show some variety but lack significance. Some objectives are: clearly stated as learning outcomes; appropriate for students’ learning needs; and standards-based. Science conceptual understandings appear to be mostly accurate and its focus shows some awareness of the big ideas or structure of the discipline. Objectives do demonstrate how science concepts are logically organized.</td>
<td>Most objectives are significant; challenging and show variety; clearly stated as learning outcomes; appropriate for students’ learning needs; and standards-based. Science conceptual understandings appear to be mostly accurate and its focus shows good awareness of the big ideas or structure of the discipline. Objectives demonstrate how science concepts are logically organized.</td>
<td>The objectives are significant; challenging and show variety; clearly stated as learning outcomes; appropriate for students’ learning needs; and standards-based. Science conceptual understandings appear to be accurate and its focus is congruent with the big ideas or structure of the discipline. Objectives demonstrate how science concepts are logically organized.</td>
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<td>I.4 Strategies and Resources, Including Technology, to Support Student Learning</td>
<td>The reflective analysis provides little description of how strategies and resources are aligned with learning objectives. Little variety in resources, heavy reliance on textbook or worksheets. No references to contextual factors and prior learning data. Technology inappropriately used or not used and no or inappropriate rationale provided.</td>
<td>The reflective analysis describes how many strategies and resources are aligned with learning objectives. Some variety but with limited contribution to learning. Some references to contextual factors and prior learning data. Technology makes some contribution or the lesson plan includes a limited rationale for not using technology.</td>
<td>The reflective analysis describes how most strategies and resources are aligned with learning objectives. Much variety contributes to learning. Many references to contextual factors and prior learning data appear productive and appropriate for each student. Technology makes a good contribution or the lesson plan includes a plausible rationale for not using technology.</td>
<td>The reflective analysis describes how all strategies and resources are aligned with learning objectives. Significant variety makes a clear contribution to learning. Most references to contextual factors and prior learning data appear productive and appropriate for each student. Appropriately integrated technology makes a significant contribution or the lesson plan includes a strong rationale for not using technology.</td>
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<td>1.4 sc 1.2 Opportunities to engage in scientific inquiry</td>
<td>The nature and sequence of the lesson activities provided students with limited opportunities to engage in scientific inquiry.</td>
<td>The nature and sequence of the lesson activities provided students with opportunities to apply basic science process skills.</td>
<td>The nature and sequence of the lesson activities provided students with opportunities to apply science inquiry skills.</td>
<td>The nature and sequence of the lesson activities provided students with opportunities to apply science inquiry skills and develop understanding of the nature of science.</td>
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<td>II.1 sc II.1 The nature of the featured inquiry</td>
<td>In the featured inquiry, the pre-service teacher engaged students in performing hands-on activities, but students had limited opportunities to analyze data and discuss the meaning of their findings.</td>
<td>In the featured inquiry, the pre-service teacher engaged students in performing hands-on activities, analyzing the data and describing their findings in writing (e.g., journals) or classroom discussions.</td>
<td>In the featured inquiry, the pre-service teacher engaged students in designing and performing experiments, analyzing the collected data and discussing their findings with peers, and writing in journals. Attempts to using evidence to explain results are made.</td>
<td>In the featured inquiry, the pre-service teacher engaged students in designing and performing experiments, analyzing the collected data and using evidence to build explanations of science concepts.</td>
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<tr>
<td>1.5 Focus of Student Assessments</td>
<td>The content and methods of assessment lack congruence with lesson objectives, state standards, or lack cognitive complexity. No clear assessment criteria are developed. The lesson plan includes only one assessment mode at one point in time. Assessments are not valid; some directions, scoring procedures and items are absent or poorly written and likely confusing to students. Adaptations are absent or inappropriate for individual needs of students.</td>
<td>Assessments are not congruent with lesson objectives, state standards, science conceptual understanding, or cognitive complexity. Criteria are developed, but not clear or linked to objectives or state standards. The lesson plan includes multiple modes, but not performance, and/or do not require integration of knowledge, skills and reasoning ability. Assessments appear to have some validity; some directions, scoring procedures and items are clearly written for explaining to students. Adaptations are appropriate for individual needs of some students.</td>
<td>Some assessments are not congruent with lesson objectives, state standards, science conceptual understanding, or cognitive complexity. Criteria are clear and generally linked to objectives. The lesson plan includes multiple modes (e.g., performance) but does not require integration of knowledge, skills and reasoning ability. Assessments appear to be reasonably valid; many directions, scoring procedures and items are clearly written for explaining to students. Adaptations are appropriate for individual needs of many students.</td>
<td>Assessments are congruent with lesson objectives, state standards, science conceptual understanding, and cognitive complexity. Criteria are clear and explicitly linked to objectives. Plan includes multiple modes (e.g., performance) and assesses students throughout instructional sequence. Assessments appear to be valid; directions, scoring procedures and most items are clearly written for explaining to students. Adaptations are appropriate for individual needs of most students.</td>
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</tbody>
</table>
Holistic Summative Assessment: The holistic summative assessment rates the overall performance based on the artifacts submitted.

<table>
<thead>
<tr>
<th>Key Indicator</th>
<th>1: Beginning (little or no evidence)</th>
<th>2: Developing (limited evidence)</th>
<th>3: Proficient (sufficient evidence)</th>
<th>4: Expert (clear, consistent, and convincing evidence)</th>
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</thead>
<tbody>
<tr>
<td>Overall Performance on the Lesson Plan Analysis</td>
<td>The artifacts provide little or no evidence of the pre-service science teacher's ability to plan a standards-based instructional sequence to improve science teaching practice.</td>
<td>The artifacts provide limited evidence of the pre-service science teacher's ability to plan a standards-based instructional sequence to improve science teaching practice.</td>
<td>The artifacts provide sufficient evidence of the pre-service science teacher's ability to plan a standards-based instructional sequence to improve science teaching practice.</td>
<td>The artifacts provide clear, consistent, and convincing evidence of the teacher's ability to plan a standards-based instructional sequence to improve science teaching practice.</td>
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