Appendix A. Writing prompts for the two Science Autobiographies that PSTs wrote at the beginning and end of the methods course semester.

First Assignment:  Write a 2-page Science Autobiography. Turn it at the beginning of class. Be sure to address the following:

* Your overall impressions about science. Do you enjoy it? Do you feel that you are “good” at it?
* A description of your science learning experiences (the most memorable ones).
* How these memories/experiences affect my current feelings about science and teaching science?
* What you want your science classroom to be like when you are an elementary teacher?
* Describe your feelings about students and children as learners of science.

Final Assignment: Revisit your autobiography. Write 2 additional pages about your current feelings about engaging in and teaching science. Provide specific examples of experiences from this term that have impacted/changed your perspective (both positively and negatively). Submit both your original autobiography and your second autobiography at the start of class.

Appendix B. Assignment directions and rubric for the Written Commentary assignment derived from the National Board for Professional Teaching Standards program.

National Board for Professional Teaching Standards Preparation

*Integrating Mathematics with Science*

*Written Commentary Reflection*

*Analysis Information Packet*

Your assignment will include four areas: description, planning and instruction, analysis, and reflection.   The submitted assignment will be written as one narrative.

**Description:**   This section will describe the classroom setting and situation.   Give details that will allow the reader to visualize and understand what is happening during the teaching in a clear and logical order.

**Planning and Instruction:** In this section you will present your ability to develop an interdisciplinary theme to engage students in work that helps them acquire a «big idea» in science and integrate mathematics to help the students acquire scientific and mathematical knowledge in thinking, observing, and communicating.

**Analysis:**  This section deals with reasons, motives, and interpretations.  To analyze your teaching you will use evidence of student work or student behaviors.  The analysis is based on concrete observation or student work, not on your feelings about the lesson.

**Reflection:**  This section allows for self-analysis or retrospective ideas on how well the lesson unfolded.   Include your personal insight and feelings to better understand how you will improve on subsequent lessons.   Use this section to include ideas for future teaching situations that will be improved from what you have learned.

*Adapted from National Board for Professional Teaching Standards (NBPTS).* [*www.nbpts.org*](http://www.nbpts.org)

You will plan, present, analyze and reflect on a whole group math and science lesson at the end of your clinical experience. This lesson will demonstrate how you help students better understand a «Big Idea» in science using relevant science and mathematical knowledge. You engage students in the discovery, exploration, and implementation of these science and mathematics concepts, procedures and processes by integrating these two disciplinary areas. This assignment is designed for you to provide evidence of your ability to plan, describe, illustrate, assess, and reflect on your teaching practice. **You will submit in FOLDER PACKET: a 6-8 page Written Commentary, a Video Timeline (typed summary of major activities in lesson and their start/end time), Professor GRADED lesson plan and rubric, revised lesson plan, a flashdrive with your video recording and digital copies of Written Commentary and Lesson Plan, and 2-3 samples of student work.**

**1. Planning/Description:**

This section will describe the classroom setting, situation & observations you made of your teaching science.   Give details that will allow the reader to visualize and understand what is happening during the teaching in a clear and logical order.  Also observe the grouping of students within the room. When planning your lesson be sure to include a description/instructional context and the rational while following the COEHS approved lesson plan for clinical experiences. Refer to your lesson plan and **Instructional Context guide.**

**Instructional Context Guide**

       *What are the numbers, ages, and grade of the students in the class featured in this assignment?*

       *What are the relevant characteristics of this class regarding ethnic, cultural, and linguistic diversity?*

       *What are the range of abilities of the students in this class, i.e., exceptional needs and abilities regarding the cognitive, social/behavioral, attentional, sensory, and/or physical challenges of your students?* Give any other information that might help your instructor and peers “see” this class.

       *What are the relevant features of your teaching context?* This might include a teacher’s aide assisting in the room, students who are pulled out for additional instruction, resources available to you, e.g., computer lab or a specific reading program.

       \*\*\**What is the physical setup of the room? Where are the diverse students located? How might this physical arrangement impact student learning?* Describe in detail the physical arrangement of the classroom being observed. You should describe seating arrangements, instructional delivery areas, and areas where non-structured activities occur (game areas, coat area, etc.). You should describe any learning activity center and the educational skills that are targeted with the center. You will also observe the grouping of students within the room. (Where is/are the diverse student(s) located?) How might this physical arrangement impact student learning?

       \*\*\**How does the instructional style observed by the classroom teacher, compare with those discussed in this course?* In your opinion, did the classroom teacher address the needs of all students or did he/she meet the needs of a specific group of students? In your opinion, was the method used for instruction appropriate for the number and type of students being instructed? Was there a variation of styles for instruction that occurred in larger or smaller groups? Did the teacher use one-on-one instruction with any students? Describe his/her methods of teaching in this manner.

       \*\*\* *What were the assessment styles that you observed in your placement utilized by the classroom teacher? In your opinion, did the classroom teacher address the needs of all students or did he/she meet the needs of a specific group of students? In your opinion, was the method used for instruction appropriate for the number and type of students being instructed? Was there a variation of styles for instruction that occurred in larger or smaller groups? Did the teacher use one-on-one instruction with any students?* Describe his/her methods of teaching in this manner.

**2. Planning and Instruction:**

In this section you will present your ability to develop an interdisciplinary theme to engage students in work that helps them acquire a «big idea» in science and integrate mathematics to help the students acquire scientific and mathematical knowledge in thinking, observing, and communicating.

**Planning and Instruction Guide**

       *Identify the theme and «big idea» addressed during this unit. Explain why you chose this theme to demonstrate your approach to the integration of mathematics and science.*

       *What were your overarching math and science goals, and rationale for your selection of these goals?*

       *Why did you choose these learning experiences as a way to achieve your gaosl? Pay particular attention to students' knowledge, natural curiosities, and experiences prior to the learning experience and the diversity of the students in your classroom?*

       *What method(s) of assessment did you employ to determine the success and/or progress of your students during this unit of study?*  Discuss method(s) of assessment used for both the math and the science-related learning, and cite how these methods of asessment provided constructive feedback for you.

**3. Analysis:**

This section deals with reasons, motives, and interpretations.  To analyze your teaching you will use evidence of student work or student behaviors.  Select TWO students (at least ONE of these students should represent a DIVERSE population) to focus your analysis and thinking. YOU SHOULD EXPLICITLY UTILIZE THE STUDENT WORK INCLUDED IN YOUR ANALYSIS along with their observed behavior and dialogue in the video. The analysis is based on concrete observation (for example, dialogue that you hear on video) or student work, not on your feelings about the lesson.   During the analysis of your lesson consider student responses or work to determine the effectiveness of the plan and delivery of your instruction. Based on student assessment address how your plans need to change in order to strengthen your students’ skills, i.e., Do you need to review the lesson the following day or move on to a new skill? What does it show you that they did or did not understand? How effective was it in uncovering student understanding?

**Analysis of the Lessons/Video Recording Guide**

       \*\*\**How did you first encounter with your targeted students.* Describe your first opportunity to work with the targeted students. How did you establish rapport? What skills were targeted for improvement? Describe the student’s current level of performance in regards to the skill needing developed. What is your plan for improving his/her skills?

       \*\*\**How do your TWO students work in non-structured and group-centered activities? What are their interactions with their peers?* Describe the pro-social skills that were needed by the student. Did the peer group accept the targeted diverse student? Why or why not? When given the opportunity to self-select (recess, lunch, etc.), did the student have a peer group? Who comprised the group?

       \*\*\**What were the specific objectives for the learning experience featured on/in the lesson/video recording? To what extent were the learning goals for this lesson achieved?* What instructional methods, assessments, materials, and management techniques did you utilize? How did this student perform in your assessments? How effectively did he/she demonstrate mastery of your learning objectives? How do you know? What did this student’s work tell you?

       *How do the interactions of the lesson/seen in the video recording illustrate students’ efforts toward the stated goals?* Analyze student- to-student interactions with their group members regarding how they consider the perspectives of their group members and assume responsibility for their own learning.

       *What were specific procedures and teaching strategies you used in the lesson to support student learning?*

       *What samples of student work did you include? Why? What does it show you that they understood? How effective was it in uncovering student understanding?*

**4. Reflection:**

This section allows for self-analysis or retrospective ideas on how well the lesson unfolded.   Include your personal insight and feelings to better understand how you will improve on subsequent lessons.   Use this section to include ideas for future teaching situations that will be improved from what you have learned.  After presenting and analyzing the lesson’s effectiveness based on student work and or responses reflect on how the lesson unfolded and changes to strengthen or enhance your future lessons. Refer to the **Reflection Guide**.

**Reflection Guide**

       \*\*\**What was your experience working with the two particularly targeted students?* *What was the most important change that you have made within your own thinking (about diverse students) after this experience? How has your philosophy of education changed after working with this student?* Describe your experience working with this student. Describe the progress (academically or socially) made by the student with your assistance.

       *Evaluate the overall effectiveness of this lesson. How did the integration of math and science enable you to meet your goals for student learning.*

       *What was the most successful aspect of your lesson and why? How might you conduct this learning experience differently if you were to do it again?*

       *What did you learn about integrating math and science from this lesson and how will this knowledge impact your future instruction?*

*Adapted from National Board for Professional Teaching Standards (NBPTS).* [*www.nbpts.org*](http://www.nbpts.org)

**National Boards & Contextual Reflection RUBRIC**

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| --- | --- | --- | --- | --- |
| **Standard** | **Mastery ( 6 … 5 )** | **Partial Mastery (4 … 3)** | **Emerging (2 … 1)** | **Unsatisfactory (0)** |
| **1.**  **Classroom Factors & Arrangement** | Analyzes the classroom arrangement in detail with special focus on barriers for students of all abilities levels, intellectual and physical. Specifically notes the placement of the targeted diverse student in relationship to his/her peers. | Appropriately recognizes the need for special arrangements for the targeted diverse student. | Description of classroom does not indicate a clear understanding of the importance of a specifically designed classroom and its direct effect upon students of any ability level. | Student does not describe the classroom in detail. The focus is on the physical environment and does not include the implications of the arrangement on class participation. |
| **2. Instructional Strategies & Implications** | In-depth comparison and contrast of instructional styles for the targeted diverse student. Discusses appropriateness of instruction for meeting the needs of all students. | Describes the traditional teaching styles with some specific references to strategies used when teaching specific skills, including a description of variation in teaching styles. | Recognizes only traditional expository model for teaching students, regardless of ability level. | Lacks description of specific instructional strategies observed during practicum. |
| **3. Learning Goals** | Worthwhile goals for learning through a clearly described theme and Big Idea includes a description why the teacher chose this theme. The lesson will significantly enrich students’ understanding of the selected interdisciplinary unit. | Goals for learning through a theme and Big Idea includes a description the theme. The lesson will enrich students’ understanding of the selected interdisciplinary unit. | Goals are less clear and the Big Idea is not sufficient to guide the lesson. The lesson may enrich student understanding of the interdisciplinary unit. | Goals are not clear and the Big Idea is insufficient to guide the unit. The lesson will not enrich student understanding of the interdisciplinary unit. |
| **4. Insights into Assessment Methods** | Detailed description of assessments observed/utilized and correctly identifies authentic versus traditional forms. Describes modification and accommodations and explains why they are necessary. The teacher expertly used evidence of student work/behaviors to analyze the teaching. | Recognizes and describes traditional and authentic assessment. Describes modifications and accommodations without the why. The teacher utilized the evidence of student work but did not draw clear conclusions. | Only discusses traditional forms of assessment. Very little description of modifications and accommodations. The teacher did not clearly utilize the evidence of student work. | Descriptions of assessments are lacking. No discussion of modifications or accommodations. The teacher did not utilize evidence of student work. |
| **5. Non-structured vs. Structured Group Activities** | Detailed analysis of the differences in students’ interactions during structured and non-structured activities. Discusses skills needed by diverse students to “fit in” with peers. Notices whether or not student is accepted or rejected by peers and can explain acceptance or rejection. | Describes students in different social situations, including interactions between students. Discusses pro-social skills or problems with socialization. | Discusses socialization but does not compare structured vs. non-structured activities. Little discussion of how targeted diverse student interacts with others. | Very little discussion of socialization. No comparison of socialization across activities. |
| **6. Rapport** | Detailed description of how rapport was developed with students and how rapport was maintained throughout the clinical. Methods for developing rapport are appropriate for the student’s age and skill level. | Describes how rapport was developed with students. Most methods are appropriate for the student’s age and skill level. | Some discussion of developing a relationship with students; most interactions are not age-appropriate. | Very little discussion of rapport development. Interactions with student are inappropriate. |
| **7. Interpretation of Student Learning & Efficiency** | Describes the student’s current level of performance and can identify target skills to be improved. Provides an accurate connection between identified skills and future success. A plan of action has been established for skill remediation for the target student. | Discussion of student’s educational performance levels along with identification of target skills to be developed or enhanced. | Present levels of educational performance are identified however specific target skill may not correspond with the student’s specific needs. | Very little discussion of the student’s present levels of education functioning with few skills being identified for targeted assistance. |
| **8. Implications and Reflective Practices** | Identifies the need for specific changes in instruction, assessment, and management of the targeted diverse student. Provides specific and relevant ideas for redesigning instruction and assessment and explains why these changes would improve diverse student learning. | Identifies some of the need for specific changes in instruction, assessment, and management of the targeted diverse student. Provides few ideas for redesigning instruction and assessment and explains why these changes would improve diverse student learning. | Minimal changes are suggested for instruction, assessment, and management of the targeted diverse student. Minimal ideas are suggested for redesigning instruction and assessment. | Reflects that few changes are needed when working with the targeted diverse student. Ideas for redesigning instruction will not impact diverse student learning. |
| **9. Grammar & Punctuation** | Entire submission is free of punctuation, grammatical and spelling errors. | Submission has a few punctuation, grammatical and spelling errors. | Submission has several errors in spelling and grammar/punctuation. | Submission has numerous distracting errors in grammar/punctuation and spelling. |
| **10. Video of Teaching Effectiveness** | A complete & thorough v**ideo timeline** is provided that gives a clear summary of the major activities of both the students as learners and as the teacher facilitating that learning.  The teacher uses a variety of questioning strategies. The teacher is professional in appearance. The teacher demonstrates a supportive, congenial and purposeful learning environment. The teacher demonstrates a strong command of math and science knowledge. | A complete video time is provided that mostly provides a summary of the major activities of the students and teacher.  The teacher uses a few questioning strategies. The teacher is mostly professional in appearance. The teacher demonstrates a supportive learning environment. The teacher demonstrates a somewhat strong command of math and science knowledge. | A video timeline is provided but does not provide sufficient detail to reflect the activities of the lesson.  The teacher uses just one questioning strategy. The teacher is somewhat professional in appearance. The teacher demonstrates a somewhat supportive learning environment. The teacher demonstrates a weak command of math and science knowledge. | No video timeline is provided.  The teacher does not use sufficient questioning strategies. The teacher is not professional in appearance. The teacher does not demonstrate a supportive learning environment. The teacher does not demonstrate a command of math and science knowledge. |

Appendix C. The rubric for the Science and Math lesson which was the key lesson that was taught to elementary students in both sections of the methods course. This was also the lesson that was analyzed in the Written Commentary assignment described in Appendix B.

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| **STANDARD** | **DISTINGUISHED**  **(3 points)** | **PROFICIENT**  **(2 points)** | **BASIC**  **(1 point)** | **UNSATISFACTORY**  **(0 point)** |
| **STANDARDS** | | | | |
| **WVCSO’S**  **(ACEI 1.0, 3.1)**  **Next Gen Standards** | Cites thorough and descriptive objectives in terms of WV Content Standards and Objectives; objectives are WELL tied to all aspects of the lesson. Includes all 3 standards in Science, Next Gen standards for science, RLA, math when integrated. | Cites somewhat descriptive objectives in terms of WV Content Standards and Objectives for the lesson; objectives adequately meet the goals of the lesson. | Is beginning to cite objectives in terms of WV Content Standards and Objectives; objectives somewhat meet the goals of the lesson. | Does not cite WV Content Standards and Objectives as a part of lesson planning; inadequate objectives to meet goals of the lesson plan. |
| **21ST CENTURY SKILLS**  **(ACEI 1.0, 3.1)**  **ACEI Standards**  **(ACEI 1.0, 3.1)** | Objectives are WELL tied to all aspects of the lesson and effectively targets/incorporates 21st Century Skills.  Cites objectives in terms of Association for Childhood Education International standards. | Vaguely describes learning objectives in terms of 21st Century Skills; objectives adequately align with the goals of the lesson.  Cites somewhat descriptive objectives in terms of Association for Childhood Education International standards. | Is beginning to cite learning objectives in terms of 21st Century Skills; objectives somewhat align with the goals of the lesson.  Is beginning to cite objectives in terms of Association for Childhood Education International standards. | Does not cite 21st Century Skills as a part of lesson planning.  Does not cite objectives in terms of Association for Childhood Education International standards. |
| **BIG IDEA**  **(ACEI 1.0)** | The concept statement is a big idea or core principle at the heart of the discipline. The Big Idea is stated clearly and specifically and is framed as a generalization. | The concept statement is important but not of the highest priority; or it may be more accurately described as important knowledge and skill. | The concept statement as stated is a straightforward fact, skill, or attitude, not a big idea or core process at the heart of the discipline. | The statement is too vague or general to guide instruction and assessment. |
| **LEARNING**  **OBJECTIVES(S)**  **(ACEI 1.0, 3.1)** | Sets appropriate learning objectives based on detailed knowledge of student needs; learning targets are based on the breakdown of standards. | Sets appropriate learning objectives based on knowledge of student needs; learning targets are identified and connected to standards. | Objectives are vaguely articulated, of limited significance, and loosely related to the instruction or student needs; learning targets are listed but connection to the standards is not easily discernible. | Objectives may not be objectives at all, but rather activities. As stated, they are vague, trivial, inappropriate and/or not connected to instruction and/or student needs; learning targets may not be listed and a connection to the standards is not apparent. |
| **ESSENTIAL QUESTION(S)**  **(ACEI 1.0)** | The essential question(s) is/are important and thought provoking. There is more than one correct answer and requires inquiry rather than recall; great potential for engaging students; provides a unifying focus. | The essential question(s) is/are appropriate for the topic but does/do not focus on the most important ideas or core processes. Although there is not a single correct answer, inquiry and student engagement may or may not be present. | The essential question(s) does/do not focus on big ideas or core processes; not particularly thought provoking and are not likely to engage students; may have only one correct answer and may be too narrow to guide the unit. | Does not cite an essential question that adequately addresses the concepts and skills of the lesson. |

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| **Rationale** | In-depth, clear, thoughtful reasoning for the importance of the lesson; clear connection to the overall unit and authentic relevant connection to the student’s real life. | Somewhat clear and thoughtful reasoning for the importance of the lesson; connection to the overall unit | Vague reason for the importance of lesson; connection to unit Is not clear | Importance for teaching lesson has no relevance and/or is not connected to unit |
| **QUESTIONING**  **(ACEI 3.3)** | Questioning is evident throughout unit to promote learning that requires students to critically think. | Questioning is present throughout the unit and is clearly connected to the unit’s objectives. | Questioning exists in the unit. It may or may not be clearly tied to the unit objectives and may be only at the knowledge and comprehension levels. | Questioning is vague and many times unrelated to unit objectives. It does not promote critical thinking in students. |
| **LESSON DEVELOPMENT**  **(ACEI 3.1, 3.3, 3.4, 3.5)** | Lessons clearly identifies multiple strategies for students to learn new information, actively investigate information, and use knowledge in a new situation; students are active participants in learning | Lessons identify strategies for students to learn new information. Students are actively participating in the learning environment. | Lessons involve students in their own learning, although it may be passive involvement and the students may or may not be making connections to previous knowledge. | Lessons do not involve active student participation. Lessons are not tied to previous knowledge nor do they identify strategies for students to use. |
| **Activating Strategy** | Lesson clearly identifies multiple strategies designed to activate student’s prior knowledge such as open-ended questions or having students try out their own ideas. | Lesson identifies strategies designed to activate student’s prior knowledge. | Lesson identifies just one strategy designed to activate student’s prior knowledge. | Lesson provides no opportunity for open-ended questions and/or other learning strategies designed to activate student’s prior knowledge and have students try their own ideas. |
| **Exploration** | Lesson clearly identifies a clear and appropriate strategy where students actively investigate the answer to the FOCUS question by collecting “evidence” and manipulating data. | Lesson identifies an appropriate strategy where students actively investigate the answer to the FOCUS question by collecting “evidence” and manipulating data.. | Lesson identifies a strategy where students do not clearly investigate through the collection of “evidence” and manipulating data. | Lesson provides no opportunity for students to actively investigate the answer to the FOCUS question by collecting “evidence” |
| **Explanation** | Lesson clearly integrates student evidence collected from Explore to develop new ideas. Lesson clearly specifies new knowledge and how new knowledge will be taught through multiple strategies for students such as student group learning, student written explanations, etc | Lesson attempts to integrate student evidence collected from Explore to develop new ideas. Lesson specifies new knowledge and how new knowledge will be taught using strategies for students such as student group learning, student written explanations, etc | Lesson does not clearly integrate student evidence collected from Explore. Lesson does not clearly specify new knowledge and how new knowledge will be taught through multiple strategies. | Lesson does not integrate student evidence collected from Explore. Lesson does not specify new knowledge and how new knowledge will be taught. |
| **Application (Elaboration)** | Lesson clearly identifies multiple strategies for students to use knowledge already developed in lesson in a slightly new situation (real world, other subjects, etc). | Lesson identifies at least one strategy for students to use new knowledge already developed in a new situation (real world, other subjects, etc). | Lesson identifies a strategy for students to use new knowledge already developed but also includes new knowledge not developed in lesson. | Lesson does not identify a strategy for students to use new knowledge in a slightly new situation. |
| **FORMATIVE ASSESSMENT**  **(ACEI 4.0)** | Uses a variety of effective strategies to assess student learning process and performance towards meeting the learning objectives. | Assessment measures student learning process and performance towards meeting the learning objectives. | Some appropriate assessment strategies used; may or may not be tied to learning objectives. | Lacks appropriate or varied assessments strategies; no connection to learning objectives. |
| **Lesson Summary**  **Lesson Contingency** | Closing activities are relevant to the objectives and provide a clear opportunity to conduct a final check for understanding and prepare the next day’s plan of study; students are active participants.  There is a clear plan of what to do with extra time with developmentally appropriate materials, activities, strategies and assessment techniques included. | Closing activities are relevant to the objectives and provide a clear opportunity to conduct a final check for understanding, but are done by the teacher.  There is a plan of what to do with extra time with most of the materials, activities, strategies and assessment techniques being developmentally appropriate. | Closing activities are poorly developed and done primarily by the teacher.  There is a plan of what to do with extra time with one of the following missing: materials, activities, strategies and assessment techniques being developmentally appropriate | The lesson contains no closure.  There is a plan of what to do with extra time with more than one of the following missing: materials, activities, strategies and assessment techniques being developmentally appropriate OR there is no plan of what to do with extra time. |
| **LESSON ORGANIZATION**  **SPELLING/**  **GRAMMAR** | Lessons are professionally organized; lesson is labeled; all materials are attached and easily distinguished Entire unit is free of grammatical and spelling errors | Lesson is organized; lesson is labeled with most materials attached and easily distinguished  Lesson has a few grammatical and spelling errors | Lesson is not clearly organized; lesson is barely labeled and has very little materials are attached  Lesson plan includes several errors in spelling and grammar | Lesson is not organized; lesson is not labeled; materials are not attached  Lesson plan includes numerous grammatical and spelling errors |

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| **ELEMENTARY EDUCATION KNOWLEDGE/APPLICATION/DESIGN** | | | | |
| **SCIENCE-A**  **(ACEI 2.2)**  **SCIENCE-B**  **(ACEI 2.2)** | All lessons show a thorough understanding and knowledge of the fundamental concepts of physical, life, and/or earth/space sciences.  All lessons are designed and implemented to be age-appropriate and inquiry-based to teach science. | Most lessons show a thorough understanding and knowledge of the fundamental concepts of physical, life, and/or earth/space sciences.  Most lessons are designed and implemented to be age-appropriate and inquiry-based to teach science. | Some lessons show an understanding and knowledge of the fundamental concepts of physical, life, and/or earth/space sciences.  Some lessons are designed and implemented to be age-appropriate and inquiry-based to teach science. | None of the lessons show an understanding and knowledge of the fundamental concepts of physical, life, and/or earth/space sciences.  None of the lessons are designed and implemented to be age-appropriate and inquiry-based to teach science. |
| **MATHEMATICS-A**  **(ACEI 2.3)**  **MATHEMATICS-B**  **(ACEI 2.3)** | All lessons show a high level of knowledge and understanding of the major concepts and procedures of mathematics.  All lessons consistently engage students in problem solving, reasoning and proof, communication, connections, and representations. | Most lessons show a high level of knowledge and understanding of the major concepts and procedures of mathematics.  Most lessons consistently engage students in problem solving, reasoning and proof, communication, connections, and representations | Some lessons show knowledge and understanding of the major concepts and procedures of mathematics.  Some lessons engage students in problem solving, reasoning and proof, communication, connections, and representations | None of the lessons show knowledge and understanding of the major concepts and procedures of mathematics.  None of the lessons engage students in problem solving, reasoning and proof, communication, connections, and representations |

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| **Embedded in Lessons** | | | | |
| **DIFFERENTIATED INSTRUCTION**  **(ACEI 3.2)**  **(yellow)** | Lessons include strategies that reflect the differing needs of students (learning styles, choice, and readiness). All activities and strategies are developmentally appropriate; activities include maximum student participation and schema building | Most of the lesson includes materials, activities, strategies, and assessment techniques that reflect the needs of students. Most activities are developmentally appropriate; most activities and strategies include some student participation and schema building | Some of the lesson includes materials, activities, strategies, and assessment techniques that reflect the needs of students. Some activities are developmentally appropriate; lesson is beginning to incorporate schema building and student participation | Materials, activities, strategies, and assessment techniques do not fully reflect the needs of students. Activities are not developmentally appropriate; activities do not allow for student participation or use of students’ schema. |
| **RESEARCH-BASED INSTRUCTIONAL STRATEGIES**  **(ACEI 3.1, 3.3, 3.4) (pink)** | Lesson clearly identifies multiple instructional strategies for student-centered learning such as student group learning, student written explanations, etc. that have a positive effect on student learning. | Sometimes varies instructional strategies; uses strategies that have some positive effects on learning | Limited variety of instructional strategies; little positive effect on learning | Fails to use appropriate instructional strategies; there is no positive effect on learning |
| **MATERIALS/ RESOURCES/ WEBSITES**  **(blue)**  **TECHNOLOGY**  **(green)** | Includes all materials and resources to be used throughout lesson; variety and appropriate use of materials and resources to enhance the objective(s) of the lesson  Technology is used in an appropriate manner throughout the unit to enhance and extend student learning | Includes a listing of materials and resources to be used throughout lesson; some variety of materials and resources; mostly uses appropriate materials and resources to enhance lesson objectives  Technology is used as a supplement in the unit to extend student learning. | Includes a partial listing of materials and resources to be used throughout the lesson; is beginning to vary materials and resources; uses some appropriate materials and resources to enhance lesson  The unit includes a technology piece, but the technology does not extend or enhance student learning. | Minimal list of materials and resources; lack of variety in choosing materials and resources; inappropriate use of materials and resources for enhancement of lesson objective(s)  Technology is not used in the unit or the technology does not relate to the unit goals/objectives. |