



Professional Development Institute

Flex Course Syllabus

Science Inquiry Using the 5E Model (K-6)

PDI Course Number: 117T02

UCSD Course Number: EDUC40271

If you would like information about receiving post-baccalaureate (graduate) credit for completing this course, [please click here](#).

Course Timeline

Participants have one year to complete the course. Participants must spend a minimum of three weeks in this course.

Course Description

Do you find that, even after having students perform a variety of hands-on experiments and activities, they still struggle to truly understand the scientific phenomena being presented? The advent of the 21st century science standards has virtually changed how science is taught and subsequently learned, and the 5E model of science instruction has been proven to stimulate students' curiosity through an inquiry-based approach to learning. This online course is designed for K-6 teachers who wish to explore how to develop their students' deep critical-thinking skills through an inquiry approach to teaching called the 5Es. After being introduced to the 5E model of scientific inquiry, teachers will take a deep dive through each of the five phases — engagement, exploration, explanation, elaboration, and evaluation. Teachers will learn a variety of engaging instructional techniques and activities that are designed to encourage student exploration and stimulate students' metacognitive skills. Teachers will learn a variety of strategies to elicit and develop students' explanations of natural phenomena, including how to weave specific technology components into each phase of their 5E lessons so that students are further engaged in scientific inquiry. By the end of this course, teachers will be able to use the 5E instructional model to design and differentiate their science lessons and units so that the inquiry process becomes student-led, collaborative, and metacognitive.

Educational Outcomes

1. Teachers will be introduced to the Next Generation Science Standards and will learn about the history behind them and why they are so important to current science teaching practices.
2. Teachers will learn about the three dimensions of scientific learning and will understand how the Next Generation Science Standards support best practices in science instruction.
3. Teachers will learn the principles for inquiry-based instruction and will understand the six stages of inquiry-based learning.
4. Teachers will be given an overview of the 5E Instructional Model (5Es) and will understand how each stage of the model supports best practices in the teaching and learning of science.
5. Teachers will take a deep dive into the first phase of the 5E model (engage) where they will learn specific instructional techniques and strategies for engaging students in the exploration of scientific phenomena.
6. Teachers will learn how to effectively and efficiently elicit students' ideas so that they are engaged in the investigation of scientific phenomena.
7. Teachers will take a deep dive into the second phase of the 5E model (explore) in which they will learn several strategies to support student-led exploration of the scientific phenomena under investigation.
8. Teachers will learn specific strategies to support exploration-based learning so that students are active participants in the learning process.
9. Teachers will take a deep dive into the third phase of the 5E model (explain) in which they will learn how to help students synthesize new knowledge as it pertains to scientific investigations.
10. Teachers will learn specific techniques and strategies which can be used to elicit and develop students' scientific explanations of phenomena.
11. Teachers will take a deep dive into the fourth phase of the 5E model (elaborate) in which they will learn how to further elaborate on students' scientific explanations.
12. Teachers will learn strategies to help students broaden their understanding and extend their ideas and hypotheses to new and different situations.
13. Teachers will take a deep dive into the fifth phase of the 5E model (evaluate) in which they will learn how to use a variety of formative and summative assessments to assess student's understanding of the scientific phenomenon under investigation.
14. Teachers will learn how to help students set goals which are S.M.A.R.T. (**S**pecific, **M**easurable, **A**ttainable, **R**ealistic, and **T**ime-Bound) so that they can monitor their progress in an effort to take ownership over their own learning process.
15. Teachers will learn how formative and summative assessment can be used to guide the scientific inquiry learning process, including how it can be applied to the 5E model of scientific instruction.
16. Teachers will understand how to plan science lessons and units using the 5E model of instruction.
17. Teachers will learn how to differentiate each phase of the 5E process so that students' needs can be better met.
18. Teachers will understand the benefits of incorporating technology into the science classroom.

19. Teachers will learn how to weave specific technology components into each phase of their 5E lessons so that students are further engaged in scientific inquiry.
20. Teachers will learn several tips for integrating technology into their 5E lessons.

Instructional Media

- Online Discussions
- Online Engagement
- Online Collaboration
- Instructor Feedback
- Instructor Interaction
- Online Resources and Websites
- Supplemental Instructional Materials
- Printable Classroom Resources

Evaluation

- Test #1 (5% of final grade)
- Test #2 (5% of final grade)
- Test #3 (5% of final grade)
- Test #4 (5% of final grade)
- Test #5 (5% of final grade)
- Autobiography and Goals for the Course (10% of final grade)
- Article/Video Reflection (15% of final grade)
- Course Collaboration/Share Ideas with the Class (10% of final grade)
- Design Three 5E Lesson Plans (20% of final grade)
- Culminating Practicum (20% of final grade)

Topical Outline

Unit One

- The Push for Next Generation Science Standards
- Inquiry-Based Instruction
- Introduction to the 5E Model
- **Assignment #1**
Write an autobiography including information about yourself, your grade level and what you specifically hope to learn about scientific inquiry using the 5E model in order to best reach all of the students in your classroom. Your autobiography should be a minimum of three paragraphs.
- **Test #1**

Unit Two

- Phase One: Engage
- Eliciting Students' Ideas
- Engaging Instructional Techniques
- **Assignment #2**

As an educator, it is important to be aware of the research, studies, and professional work done in the field. In the course, you will find an article and video that are relevant to the specific course content. Read the article and then write an essay with your thoughts.

- **Test #2**

Unit Three

- Phase Two: Explore
- Exploring and Investigating Scientific Phenomena
- Activities to Encourage Student Exploration
- **Assignment #3**

Online Discussion Board Participation/Engagement: Please post a tip, strategy, or idea that specifically relates to effectively implementing the 5E model of instruction within the context of science and will make a difference to other teachers in their own classrooms. Your assignment should be a minimum of three paragraphs and detailed enough for another teacher to easily follow. This is a great opportunity to share and collaborate with other teachers at your grade level around the country. Take time to review and respond to other postings that are relevant to your classroom population in order to gain effective ideas to use immediately in your classroom.

- **Test #3**

Unit Four

- Phase Three: Explain
- Helping Students Synthesize New Knowledge
- Techniques and Strategies to Elicit and Develop Student Explanations
- **Test #4**

Unit Five

- Phase Four: Elaborate
- Phase Five: Evaluate
- Assessing Progression Toward Learning Outcomes
- **Test #5**

Unit Six

- Planning a Lesson Using the 5E Model

- Application and Differentiation of the 5E Model
- Technology and the 5Es
- **Assignment #4**
Choose three different science standards at your grade level and create a detailed science lesson using the 5Es to accompany each one. Each lesson plan should address a different area of emphasis (e.g., physical science, life science, earth and space science, engineering). Follow the example given in Unit Six (“Planning a Lesson Using the 5E Model”).
- **Assignment #5**
The culminating practicum is a three-step process. (1) In the first assignment, you were asked what goals you had and what you hoped to learn from the course. Think back to your original goals for this course. Write a minimum two-paragraph reflection specifically describing how what you learned can be used to help you reach those goal(s). (2) Next, write a minimum three-paragraph plan that specifically describes the ways in which you intend to implement a particular strategy you learned in this course into your own teaching situation. (3) Last, write a minimum two-paragraph reflection describing a student you have or have had in the past. Then, discuss how the strategies you learned in this course will specifically benefit that student as you put your plan into action.

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