

Course Syllabus

Title

Inquiry in Physical Science Education

Target Audience

This course is intended for pre-service and in-service teachers of physical sciences in grades 9-12.

Prerequisites

To successfully participate and complete the assignments in this course, the learner must:

- Be familiar with taking an online course or have completed the PBS “Practice Learning Online with TeacherLine” course.
- Have some experience in grades K-12 classrooms.
- Have an interest in physical sciences.

Course Description

This course focuses on three elements: content knowledge, inquiry and other teaching strategies, and use of multimedia and visualization tools in teaching and learning about inquiry in physical science education. Inquiry in Physical Science Education examines how teachers can use inquiry-based learning to improve students' understanding of atomic and molecular structure and other topics in physical science. Through the readings, videos, discussions, assignments, and other interactive experiences, learners in this course will have multiple opportunities to develop content knowledge about processes of science and inquiry in science and learning. Learners will experience a rich multimedia, inquiry-based learning environment as their students ideally would in their own classrooms. The course provides effective teaching methodologies, strategies and tools that can be used when teaching physical science concepts.

Instructor/Facilitator

See instructor/facilitator sheet.

Credits

To be determined by college or university.

Course Goals

As a result of participating in this course learners will:

- Explore how to bring the scientific process into the classroom as a teaching and learning tool.
- Understand and apply the essential elements of classroom inquiry.

Outline of Content and Assignments

Learners in this course are expected to participate in discussions and complete assignments. Learners are also expected to keep a personal notebook (which is not assessed) to keep notes, complete exercises and record reflections about their learning experiences in this course.

Discussion Activities

- **Essential Question** – Each session includes a discussion about an essential question and teaching and learning issues related to this question. Learners post responses to questions posed in the course and respond to posts submitted by their colleagues.

Assignments - Learners are expected to submit assignments. Rubrics are provided for assessment of all assignments, and the course content includes assignment samples.

Assignments in this course include:

- **Writing Assignments** - Short writing assignments (essays) are submitted to the facilitator.

Required Readings

- “Nature of Science (from ENSI)”
- “The Nature of Science (from Project 2061)”
- “The Fallacy of Induction in Science Teaching”
“View Science Learning from a Constructivist Perspective”
- “Learning Through Inquiry and Its Implications for Teaching”
- “Pendulums”
- “Some Myths About Inquiry-Based Learning and Teaching”

SESSION 1: PROCESSES OF SCIENCE

Objectives - After completing this session, learners will be able to:

- Describe how scientists follow systematic processes of making observations, asking questions, making predictions, taking measurements, collecting data, and making conclusions based on evidence.
- Describe how scientific knowledge can change in light of new evidence or interpretations.
- Identify ways to bring the scientific process into the classroom as a teaching and learning tool.

Using an inquiry-based approach, the session is divided into the following sections: Invitation, Exploration, Explanation, Application and Putting It into Practice. The **Essential Question** for this session is: ***How do scientists investigate the natural world, and how can teachers and students apply scientific inquiry to better understand physical science?***

Activities in this session delve into how inquiry can be used as a tool for understanding and teaching science. This session also introduces learners to the online course and the experience of being a student again as they work out a common understanding of “science” and the scientific process.

Assignments in this session require learners to improve a lesson to demonstrate more clearly to students how science is done and analyze how the five essential features of inquiry may help students better understand a specific concept.

Discussions in this session focus on finding solutions for the essential question for this session.

Learners will record notes and reflections in their personal notebook about different concepts, methods, activities and ideas presented throughout the session.

SESSION 2: INQUIRY IN SCIENCE AND LEARNING

Objectives - After completing this session, learners will be able to:

- Describe the essential elements of inquiry in the science classroom.
- Explain key findings from research about learning and apply them in the classroom.
- Discuss how an instructional model that sequences learning experiences can help students build a deeper understanding of important physical science concepts.
- Develop strategies for improving one of their current lessons to increase the level of inquiry and to reflect understandings about how people learn.



Using an inquiry-based approach, the session is divided into the following sections: Invitation, Exploration, Explanation, Application and Putting It into Practice. The **Essential Question** for this session is: ***How can the nature and sequence of learning opportunities improve students' understanding of physical science?***

Activities in this session delve into the definition of inquiry. Learners discuss how inquiry-based teaching and learning strategies can activate students and help deepen their understanding of physical science concepts. Learners also review research about how people learn and analyze instructional models to improve classroom practices.

Assignments in this session require learners to explain their understanding of inquiry and what they believe inquiry looks like in the classroom and redesign a lesson plan to increase the level of inquiry.

Discussions in this session focus on finding solutions for the essential question for this session.

Learners will record notes and reflections in their personal notebook about different concepts, methods, activities and ideas presented throughout the session.

Schedule

This course is scheduled to take approximately 30 hours to complete.

Requirements

Learners are expected to:

- Complete all assignments.
- Participate and actively engage in discussions with fellow learners while contributing to the social construction of knowledge.
- Be self-directed and self-motivated.
- Ask for assistance when they need it.

Facilitators are expected to:

- Provide feedback to all learners.
- Participate in discussions to keep them moving forward.
- Provide assistance to learners who need it.

Technical Requirements

- Word Processor
- Internet service provider
- E-mail
- Shockwave and Flash: <http://www.macromedia.com/downloads/>
- Acrobat Reader: <http://www.adobe.com/products/acrobat/readstep.html>
- QuickTime: <http://www.apple.com/quicktime/download/>

Standards of Academic Integrity

As posted on PBS TeacherLine Web site at
http://teacherline.pbs.org/teacherline/help/help_template3.cfm?subID=197

Evaluation

This course is evaluated on a letter grade basis, and graduate credit may be available. See the PBS TeacherLine Web site for details pertaining to specific graduate credit instructions.

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