Intel® Teach Elements

Inquiry in the Science Classroom

Syllabus

Course Description

Inquiry in the Science Classroom is an e-learning course for teachers of students in 3rd to 8th grades (ages 9 to 13) that will explain and demonstrate the inquiry process in depth with interactive activities and locally relevant classroom examples. The course will build a foundation for inquiry and provide the rationale and research basis, common misconceptions, and specific strategies for inquiry as part of any science learning, regardless of the science discipline. It will promote best practices for improving scientific inquiry and will help both the teacher with weak science inquiry background but it will also reinforce teachers more experienced with inquiry.

Similar to other Intel® Teach Elements courses, it can be delivered in flexible formats: facilitated online, F2F, or hybrid. It will provide at least five hours of e-learning with 10-15 hours of application work. Facilitated courses would range from 20-30 hours.

Module 1: Introduction to Scientific Inquiry

In this module, participants gain an overview of scientific inquiry and its benefits. Participants explore examples of classrooms that employ the inquiry process and look at how inquiry relates to the scientific method and to engineering. Participants are also introduced to the continuum of scientific inquiry to understand the many forms that inquiry may take. Finally, they gain an understanding of the inquiry process and consider how to use the process in their classrooms.

Outcomes

- Understand scientific inquiry and what makes it unique from other scientific approaches
- Appreciate how scientific inquiry is used in and out of the classroom
- Understand the benefits of inquiry and some misconceptions
- Explore the continuum of scientific inquiry
- Identify scientific inquiry practices and habits of mind

Lessons

- Lesson 1: Scientific Inquiry
- Lesson 2: Scientific Inquiry in the Classroom
- Lesson 3: Inquiry Practices
- Lesson 4: Module Review

Module 2: The Phases of Scientific Inquiry

In this module, participants learn the essential elements of scientific knowledge to support inquiry, how to help their students develop information literacy skills to conduct background research, understand the process of scientific inquiry, and learn how data collection can help to support that process.

Outcomes

- Understand the underpinning beliefs of scientific knowledge and how they can apply 21st century thinking skills and habits of mind to further that knowledge
- Explore methods to improve student information literacy skills to support background and scientific inquiry research
- Learn the basic steps of the scientific inquiry process
- Explore ways students can use data collection to effectively support their scientific inquiry

Lessons

- Lesson 1: The Nature of Scientific Knowledge
- Lesson 2: Scientific Inquiry Phases Examined
- Lesson 3: Skills for Scientific Inquiry
- Lesson 4: Module Review

Module 3: Instructional Design for Scientific Inquiry

In Module 3, participants look at how to design inquiry-based projects, integrate inquiry into their curriculum, and assess student learning of inquiry processes and scientific concepts.

Outcomes

- Review science standards to identify inquiry and concept standards appropriate for planning.
- Learn how to design an inquiry project
- Explore methods for incorporating inquiry activities into a conventional science curriculum.
- Plan formative and summative assessment of inquiry processes and science concepts

Lessons

- Lesson 1: Standards and Objectives
- Lesson 2: Inquiry Projects
- Lesson 3: Inquiry Learning Experiences
- Lesson 4: Assessment in Inquiry-Based Science Classrooms
- Lesson 5: Module Review

Module 4: Science Inquiry in the Classroom

Module 4 explores the practical concerns of teachers who wish to implement a scientific inquiry project or create more inquiry-like experiences in their classrooms. Participants will learn how to create a classroom community of learners, how to promote scientific discourse and argument, provide critical instruction in inquiry processes, and manage classrooms where students conduct scientific inquiry.

Outcomes

- Learn how to create a community of learners that focuses on scientific inquiry
- Explore methods for promoting constructive scientific discourse in the classroom
- Examine strategies for teaching inquiry processes
- Learn practical tips for managing a classroom where students work on scientific inquiry activities

Lessons

- Lesson 1: Environments that Support Inquiry
- Lesson 2: Scientific Discourse
- Lesson 3: Inquiry Skills Instruction
- Lesson 4: Management of Inquiry Activities
- Lesson 5: Module Review

Module 5: Technology that Supports Science Inquiry

In this module, participants will explore how technology supports and enhances inquiry practices. They will learn about specific tools that scientists currently use and how these tools can be integrated into a science classroom. In addition, participants will explore how technology can be used to foster communication and collaboration while students engage in scientific inquiry.

Outcomes

- Explore online resources that support the collection and organization of data
- Examine methods for using technology to draw meaning from data
- Investigate online resources for presenting and discussing data conclusions
- Learn practical tips for keeping students safe and responsible online

Lessons

- Lesson 1: Technology Tools for Exploration and Investigation
- Lesson 2: Technology Tools for Interpretation
- Lesson 3: Technology Tools for Presentation and Collaboration
- Lesson 4: Module Review

Course Length

Total hours to complete the course depend on how the course is taken (self-paced or facilitated), the number of optional activities completed, and the delivery method (face-to-face or online):

- **E-learning:** 5–6 hours individual work, learning concepts of critical thinking with data in interactive tutorials and exercises
- **Action Planning:** 8–12 hours of individual work, applying critical thinking with data principles to the classroom
- **Facilitated Discussions:** 5–8 hours of sharing ideas with other teachers and giving feedback on Action Plans (varies with format, face-to-face or online, and optional exercises)