

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 8 to 14) that explains and demonstrates scientific inquiry in depth with interactive activities and locally relevant classroom examples. The course builds a foundation for inquiry and provides the rationale and research basis, common misconceptions, and specific strategies for inquiry as part of any science learning, regardless of the science discipline. It promotes best practices for improving scientific inquiry and helps the teacher with limited scientific inquiry background but it also reinforces teachers more experienced with scientific inquiry.

Similar to other Intel® Teach Elements courses, it can be delivered in flexible formats: facilitated online, F2F, or hybrid. It provides at least five hours of e-learning with 10-15 hours of application work. Facilitated courses 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 Scientific Inquiry Phases and consider how to use the Phases 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: Scientific Inquiry Practices
- Lesson 4: Module Review

Module 2: Phases of Scientific Inquiry

In this module, participants learn the essential elements of scientific knowledge to support scientific inquiry and how to help their students develop information literacy and research skills necessary for scientific inquiry. Participants also examine the Scientific Inquiry Phases and learn how to support habits of mind and higher levels of student-directed scientific inquiry.

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
- Examine the Scientific Inquiry Phases.
- Explore ways students can use data collection to effectively support their scientific inquiry

Lessons

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

Module 3: Instructional Design for Scientific Inquiry

In Module 3, participants look at how to design open inquiry experiences, integrate scientific 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 a scientific 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: Assessment in Inquiry-Based Science Classrooms
- Lesson 4: Module Review

Module 4: Science Inquiry in the Classroom

Module 4 explores the practical concerns of teachers who wish to implement scientific inquiry experiences in their classrooms. Participants learn how to create a classroom community of learners, how to promote scientific discourse and argument, teach scientific inquiry practices, 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 practices
- Learn practical tips for managing a classroom where students work on scientific inquiry activities

Lessons

- Lesson 1: Inquiry Learning Experiences
- Lesson 2: Environments that Support Inquiry
- Lesson 3: Scientific Discourse
- Lesson 4: Inquiry Practices Instruction
- Lesson 5: Module Review

Module 5: Technology that Supports Science Inquiry

In this module, participants explore how technology supports and enhances inquiry practices. They learn about specific tools that scientists currently use and how these tools can be integrated into a science classroom. In addition, participants 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 scientific inquiry in interactive tutorials and exercises
- **Action Planning:** 8–12 hours of individual work, applying scientific inquiry 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)