

Background and Goals

The goal of the project is to develop and implement pedagogical instruction to extend and complement instructional materials that have already been created.

The summer intensive program will give science instructors exposure to concepts in science pedagogy that are grounded in neuroscience-specific content, but scalable across disciplines. Science teachers, in addition to learning science content, must learn how to teach it, not only in general, but with knowledge of how to teach specific science topics at the appropriate level for their students. **Neuroscience content knowledge in particular has the capacity to influence pedagogy.** Cognitive studies reinforce that the transfer of knowledge occurs when the learner sees the knowledge applied in a variety of situations (Donovan & Bransford, 2005). The **neuroscience of learning** provides teachers a new perspective on instruction (Dubinsky et al 2013) and is becoming increasingly popular in educator professional development. Teachers can envision themselves designing experiences that leverage the capacity to change students' brains.

Here, we capitalize on the strength of the 6 year ETSI neuroscience curriculum and employ the Neuroscience Core Concepts as outlined in the Essential Principles of Neuroscience (Society for Neuroscience) to inform our pedagogy and capture the critical neuroscience learning concepts over a 3 year course.

Learning Outcomes

By the end of the program, monastic science teachers will be able to:

- Monitor and evaluate their own content knowledge
- Recognize four basic pedagogies (didactic direct, active direct, guided inquiry, and open inquiry)
- Determine the appropriate balance of pedagogies to employ in their classes
- Identify discipline-based similarity and differences in instruction and evaluation methods
- Distinguish between formative and summative assessment
- Develop and implement curricula that are appropriate for their students
- Develop and adapt appropriate assessments of student content literacy and learning

Strategy

The Essential Principles of Neuroscience

- 1 The brain is the body's most complex organ.
- 2 Neurons communicate using both electrical and chemical signals.
- 3 Genetically determined circuits are the foundation of the nervous system.
- 4 Life experiences change the nervous system.
- 5 Intelligence arises as the brain reasons, plans, and solves problems.
- 6 The brain makes it possible to communicate knowledge through language.
- 7 The human brain endows us with a natural curiosity to understand how the world works.
- 8 Fundamental discoveries promote healthy living and treatment of disease.

Year 1: Learning about Learning

Concepts 2, 4, 7

2 Neurons communicate using both electrical and chemical signals.

4 Life experiences change the nervous system.

7 The human brain endows us with a natural curiosity to understand how the world works.

This year, the science teachers will be introduced to meaningful learning by direct and inquiry routes. We will explore how content knowledge influences the delivery and assessment in science teaching.

Year 2: Mind, Brain, and Education

Concepts 1, 3, 5

1 The brain is the body's most complex organ.

3 Genetically determined circuits are the foundation of the nervous system

5 Intelligence arises as the brain reasons, plans, and solves problems.

Pedagogy of science principles are aligned with complexity of the brain and nervous system and its capacity to reason, plan and solve problems. Practice using active learning strategies and cases and establishing evaluation criteria form the cornerstone of this year's content.

Year 3: Applied Educational Neuroscience and Community

Concepts 6, 8

6 The brain makes it possible to communicate knowledge through language.

8 Fundamental discoveries promote healthy living and treatment of disease.

Science teachers will make direct connections with the research questions being developed in other disciplines in ETSI as well as research collaborations to influence their pedagogy and tools.

Works Cited

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