Indiana University  
J762: Topical Seminar/Teaching Introduction to Scientific Inquiry  
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Background:
Teachers, to be effective science instructors, must understand the conceptual underpinnings of science and the scientific processes. This scientific conceptual understanding must be coupled with the pedagogical ability to transmit the knowledge to students through inquiry instruction. However, science education research has shown that teachers’ lack such conceptual understanding and pedagogical skills.

The development of elementary science teachers who have adequate pedagogical content knowledge is a worthy goal of science teacher preparation programs throughout the world. However, achievement of this goal is hampered by the fact that many pre-service elementary teachers lack: 1) experiences in inquiry learning; and 2) a solid understanding of science content. In Q200, Introduction to Scientific Inquiry, we seek to address these concerns by embedding scientific inquiry within a science content course in order to allow the pre-service teachers to experience scientific inquiry in a way that enhances their understanding of science and ultimately, their understanding of how to teach science. It has been found that special science courses designed specifically for teachers completed prior to science methods courses may be the best way to help teachers both understand and ultimately teach science content by inquiry, and this can be done without “watering down” the content.

As an instructor for Q200, you are not only expected to foster an understanding of professional content knowledge in science, but also serve as an inquiry teaching role model. The purpose of this seminar is to support your efforts as such. Through weekly meetings, collaborative discussions, assigned readings, self-study and reflections on our teaching practices, we will develop a community of practice focused on exploring what it means to be a role model for inquiry science teaching.

Theoretical Approach:  
Constructivist Scientific Inquiry:  
The theoretical basis for instruction associated with Q200 is CONSTRUCTIVIST SCIENTIFIC INQUIRY. Constructivist pedagogy is a belief about learning that is based on the notion that reality cannot be seen as a set of truths to be given to the learner. Learning is a process in which individuals create their understandings from interactions
between what they already know and what they encounter through interaction with objects and/or people\(^1\).

The *National Science Education Standards* defines inquiry as:

A multifaceted activity that involves making observations; posing question; examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyze, and interpret data; proposing answers, explanations, and predictions; and communicating the results. Inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations\(^2\).

As an instructor for a course based in constructivist scientific inquiry, you can expect to engage students in the creation of understandings through scientific investigations. This requires that your students 1) be engaged in scientifically oriented questions, 2) give priority to evidence in responding to questions, 3) formulate their own explanations from evidence, 3) connect explanations to scientific knowledge, and 4) communicate and justify their explanations.

*Teaching as Reflective Practice:*

The theoretical basis for this accompanying seminar for Q200 is teacher as reflective scholar. The underlying assumptions of this seminar include: 1) teaching is not separate from research; 2) theory and practice are interdependent and constantly shifting in response to the educational environment; 3) inquiry sits at the center of the education process, and 4) self-study stems from educator’s questions and reflections of their everyday practice and their desire to improve teaching and learning.

As a participant in this seminar, you can expect to examine and improve your own teaching practice systematically using the practice of inquiry.

**Course Goals:**

As a participant in this seminar, you will:

- enhance your understanding of inquiry teaching and learning,
- understand theoretical and methodological approaches to inquiry,
- understand how science teacher educators have utilized and contributed to educational theories,
- reflect on your own experiences with inquiry teaching,
- identify an area of need and develop a self-study, and
- develop/refine the teaching skills necessary to successfully engage pre-service teachers in scientific inquiry.

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Background Readings:

Assignments:
*Note: This seminar is designed to support your teaching in higher education. The requirements for the seminar do not replace your regular teaching duties associated with that teaching assignment (i.e., lesson planning, grading, submitting grade rosters).*

1. Attendance and Participation: Due to the co-operative inquiry approach of this course, regular attendance and active participation are expected. This component of the course is worth 25%.

Assignments that are included in participation will be assessed on a +, √, - system. These assignments include:
   a. Written Reflections. To prepare for class discussions, you will need to have read the assigned readings and prepare a 1 page single-spaced summary. These summaries will be assessed on the following criteria.
      i. Description. A brief but thorough summary of the article.
iii. Justification. Adequate justification for the evaluation.
iv. Presentation. The information is utilized to support a thorough and
thought-provoking discussion with peers.

b. You will post weekly reflections on teaching and learning in teacher
education on our Oncourse site.

2. Teaching Philosophy. You will be developing a statement of your teaching
philosophy for your doctoral portfolio, and possibly to send to employers when
you are applying for academic positions. This statement will be developed
throughout the semester with the final version being due at the end of the
semester. This component of the course is worth 25%.

3. Self-Study or Action Research. You will be developing a self-study or action
research plan focused on one aspect of your development as a science teacher
educator/researcher. This project plan will include 1) plan for change or question
on your own teaching practice in higher education, 2) acting and observing your
teaching practice and consequences for learning, 3) reflecting on the process and
empirically-based consequences, and 4) reflecting/re-planning. Although a large
portion of this assignment will be collaborative in nature, each student will
develop their own component. In accordance with the inquiry/constructivist
underpinning of this seminar, the grading criteria will be defined as part of
seminar discussions. The instructor will utilize these criteria in assessing the
assignment. This component of the course is work 40%.

4. Revised Syllabus and Supporting Rationale. You will be revising an existing
syllabus for Q200 based on the course readings and discussions. A rationale will
accompany this syllabus. In this rationale, you will describe the major aspects of
the syllabus and the rational for these components. In accordance with the
theoretical underpinning of this course, the grading criteria will be defined as part
of group discussions. The instructor will utilize these criteria in assessing the
assignments. This component of the course is worth 10%.

Writing Style:
Papers should adhere to the APA (5th ed.) style format. If you do not already have a copy
of the APA 5th education manual, we highly recommend that you purchase one as you
will need it throughout your program.


Course Assessment:
Students will be evaluated on the quality of the following items:
1) Participation 25%;
2) Teaching Philosophy 25%;
3) Self-Study or Action Research Plan 40%
4) Revised Syllabus and Supporting Rationale 10%.
The following grading scale will be used:

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<tr>
<th>100% A+</th>
<th>89% B+</th>
<th>79% C+</th>
<th>69% D+</th>
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<tbody>
<tr>
<td>95% A</td>
<td>85% B</td>
<td>75% C</td>
<td>65% D</td>
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<tr>
<td>Excellent</td>
<td>Very Good/Highly Satisfactory. Performance that is apparently better than Satisfactory but less than Excellent.</td>
<td>Satisfactory</td>
<td>Attempted Evidence that a minimal amount of effort was put in assignment, but serious flaws exist</td>
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<tr>
<td>90% A-</td>
<td>80% B-</td>
<td>70% C-</td>
<td>60% D-</td>
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