BI 698: Introduction to Educational Research Methods
1 graduate credit
Sept 16-Nov 17, 2018

Instructor: Murray Jensen, Ph.D.
Associate Professor
Department of Biology Teaching & Learning
College of Biological Sciences, University of Minnesota
Minneapolis, MN 55455
Email: msjensen@umn.edu

Course Location:
- Online using Google MEET (nine weeks)
- There is no required face-to-face component for this course.

Required Texts:
1. National Research Council. (2001) How People Learn: Brain, Mind, Experience and School, Washington, D.C.: National Academy Press (you may download a free PDF of the entire book at: http://www.nap.edu/openbook.php?isbn=0309070368)
2. Gurung, RAR and Schwartz B (2012) Optimizing Teaching and Learning: Practicing Pedagogical Research; Wiley-Blackwell. ISBN-13: 978-1118344668

Required YouTube Video Series - Requires HAPS Membership.

Valerie D. O'Loughlin's video series, "How to Develop a Scholarship of Teaching and Learning Project." (The videos are a component of a HAPS President's Initiative.)

Computer Requirements:
- Participants must have access to Google MEET. (Note: we might move class sessions to the U of Minnesota supported webex.com site.)
- For synchronous online discussions, participants should have access to a computer with both a camera and a microphone (so the individual can project video and be heard in discussions).
- Participants should have a relatively fast internet connection (dial-up connections may be problematic) for online discussions and to access any additional online videos the instructor assigns.

Course Format: This is an online course, with no face-to-face component. The first part of the course will be online, and we will use the QUBES / CC Bio INSITES website to access assigned

readings and communicate with classmates. Weekly online synchronous video discussions will be held on Google MEET. Final assignments will be peer reviewed, and both the peer review process and the submission of the final assignments will be done online via the QUBES / CC Bio INSITES website and Google MEET.

Course Description: This course is for college level instructors who want to become more familiar with basic educational research methods. Participants will learn about metacognition, how people learn, the basics of quantitative versus qualitative educational research methods, how to search the educational literature database, the scholarship of teaching, and develop a foundation for implementing classroom research and assessment. Participants will learn the material through directed readings, and online weekly synchronous discussion forums. In addition, participants will apply the information they have learned to the development of an educational research question they want to examine in their own classroom.

Course Expectations: This is a graduate-level course, and participants should expect to be able to devote a significant amount of time in course work, which will include:
- Directed readings in educational research methods (~15 hours)
- Participation in weekly online discussion forums (through Google Hangouts) to discuss the educational research readings, and final project (~10 to 15 hours)
- Searching online databases for background literature about a specific anatomy and physiology educational research question (~at least 5-10 hours)
- Development and write-up of a 3-5 page proposal for an educational research project in your classroom (~5 hours)
- Peer evaluation of at least one other educational research project proposal of another HAPS-I participant (~2 hours)
- Incorporation of peer evaluation feedback into your final educational research project proposal (~2-3 hours)

Course Outcomes: Upon completion of this course, participants should be able to:
- Define the concept of metacognition and explain how an individual develops metacognitive skill
- Compare and contrast novice versus expert learners
- Explain how learning may be contextualized and may be affected by misconceptions
- Explain the basics of classroom research and the assessment techniques used in such research.
- Describe and evaluate the Scholarship of Teaching and classroom research literature that is most related to the issues the participant wants to explore.
- Search online databases for anatomy and physiology educational research literature
- Compare and contrast quantitative and qualitative educational research methods, and evaluate which method(s) are most appropriate for a specific research question
- Frame an educational research question that is clear, defined, assessable and meaningful
- Evaluate educational research studies regarding their research design and assessment methods
- Synthesize your knowledge by developing a proposal of an educational research question in the participant's classroom

<u>**Course Assessments and Grading Policy:**</u>
In order to pass this course, participants must earn 70% of the 200 total points assessed. Participants will be assessed in a variety of ways:

1. **Participation in the synchronous discussion forums on Google Hangouts (50 points total):** During 10 of the weeks of online instruction, participants will be expected to participate in weekly online discussion forums through Google hangouts. Participants will be expected discuss the online readings, ask questions related to the readings and educational research, and assist in answering student questions. Should a participant not be able to attend an online discussion session, an individual may make up online discussion points by submitting a 1 page summary of the week's online readings and list questions and ideas raised by the readings.

2. **Chapter summary / leading online discussion (20 points).** Each member of the class will be required to generate a summary for one of the chapters in the required reading. The summary will be archived on the course website. They will also be required to generate discussion questions and lead the Google Hangouts session when that chapter is scheduled.

3. **Research review for final project (20 points).** During the course participants will explore one specific evidence based instructional practice (EBIP), such as guided inquiry, cooperative quizzes, or peer instruction (clicker technology). It will be expected that a thorough research review will conducted of one EBIP, and four one-half page reviews of research articles generated. (Note: this assignment is expected to compliment the final project.)

4. **Final project (50 points): prepare a 3-5 page proposal about an educational research study designed by the participant**: Participants must submit a culminating project in the form of a 3-5 page proposal that outlines an original educational research question, is clearly defined, outlines appropriate methodology and assessment methods, and provides a review of relevant background literature. The project must be creatively and <u>originally</u> designed by the participant. Submissions will be peer-reviewed by classmates.

5. **Peer review of a final project (20 points):** Participants are required to write up a peer review of one of your classmates' educational research proposals. The peer review will include constructive criticism as described in the workshop session and related to the classroom readings, and should be approximately 1-2 pages long. Post the peer evaluation via email (and copy the instructor) and include information about whether the assessment methods are appropriate, whether the participant developed a question that relates to the background literature, and whether the research question is well defined and assessable.

6. **Submission of revised final educational research proposal (40 points):** Read the peer review of the educational research proposal and incorporate the suggestions that are appropriate for your project and submit a revised proposal via email. In addition, participants should address all the peer review comments and how they were incorporated (or why they were not incorporated) in a separate document that is posted with the revised final project (much like when an author submits both a revised manuscript and a separate response to the journal editor

about your revisions). Failure to turn in a timely peer review or failure to incorporate appropriate peer review comments will result in a partial or complete loss of these points.

1. Discussion Forum Participation	50 points
2. Book chapter summary (1 page) / leading an online discussion / discussion questions	20 points
3. Research review for final project (Four ½ page reviews of research articles)	20 points
4. Final Project (3 to 5-page research proposal)	50 points
5. Peer review of final project (1 to 2-page critique)	20 points
6. Revised final project (3 to 5 page research proposal)	40 points
TOTAL	200 points

Course Schedule:

Date	Topic	Reading or Class Assignment
Week 1: Sept 16	Introduction to Course, Metacognition, What is Pedagogical Research.	How People Learn, Ch 1 Optimizing Teaching, Ch 1
Week 2: Sept 23	How to assess effective teaching, Expert vs. Novice Learners.	How People Learn, Ch 2 Optimizing Teaching, Ch 2 (Note: two discussion leaders for this chapter.) SoTL Video 1: Part 1 Introduction to Educational Research and the Scholarship of Teaching Learning (SOTL)
Week 3: Sept 30	How to Assess effective learning, Learning and Transfer	How People Learn, Ch 3 Optimizing Teaching, Ch 3 (Note: two discussion leaders for this chapter) SoTL Video 2 & 3: Developing a Clear Research Question and Reviewing the Educational Research Literature, and Determining Appropriate Methods of Assessment

Week 4: Oct 7	Quantitative vs. Qualitative Research Methods, How People Learn, Motivating Students	Optimizing Teaching, Ch 4 SoTL Video 4 & 5: Obtaining Human Subjects (IRB) approval; Collecting and Analyzing your Data, and Presenting and Publishing your Educational Research
Week 5: Oct 14	How to Develop a Scholarship of Teaching Project	Reading: How to Develop a Scholarship of Teaching Project, *Adv. Physiol. Ed.*, 2006 http://advan.physiology.org/content/30/2/83
Week 6: Oct 21	Develop Educational Research Question / Research reviews	Review research articles / research questions
Week 7: Oct 28	Discussion of Final Educational Research Proposals	**Final Project (3 to 5-page research proposal)**
Week 8: Nov 4	Peer Review of Educational Research Proposals	Critiques / peer review of final projects
Week 9: Nov 11	Modify, edit and finalize educational research proposal	Final, revised, educational research proposal due at a time TBD.

Valerie D. O'Loughlin's video series

Scholarship of Teaching and Learning – Part 1
Part 1 Introduction to Educational Research and the Scholarship of Teaching Learning (SOTL)

Scholarship of Teaching and Learning – Part 2 (Requires HAPS Membership)
Part 2 Developing a Clear Research Question and Reviewing the Educational Research Literature

Scholarship of Teaching and Learning – Part 3 (Requires HAPS Membership)
Part 3 Determining Appropriate Methods of Assessment

Scholarship of Teaching and Learning – Part 4 (Requires HAPS Membership)
Part 4 Obtaining Human Subjects (IRB) approval; Collecting and Analyzing your Data

Scholarship of Teaching and Learning – Part 5 (Requires HAPS Membership)
Part 5 Presenting and Publishing your Educational Research

Recommended Resources

Peer Reviewed Papers

Freeman, S, et. al., (2014) Active learning increases student performance in science, engineering, and mathematics. Proc Natl Acad Sci USA **111**:8410–8415.

Dolan EL. Grappling with the literature of education research and practice. CBE Life Sci Educ. 2007; 6:289–296.

Tanner K. D. (2013). Structure matters: Twenty-one teaching strategies to promote student engagement and cultivate classroom equity. *CBE—Life Sciences Education*, , 322.

Books

Scientific Teaching, by Jo Handelsman, Sarah Miller, and Christine Pfund.

The Core Concepts of Physiology, by Joel Michael, William Cliff, Jenny McFarland, Harold Modell and Ann Wright.

Singer, S. R., Nielsen, N. R., & Schweingruber, H. A. (Eds.). (2012). *Discipline-based education research: Understanding and improving learning in undergraduate science and engineering*. Washington, DC: National Academies Press.

Videos

Biology Education Scholarship – by Erin Dolan