

EDUC 5389: Interdisciplinary Methods Spring 2020

Instructor Information

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Course Catalog Description:

Science, Technology, Engineering, and Mathematics (STEM) Education is by definition interdisciplinary. This course will explore how K-12 teachers can best integrate multiple disciplinary concepts within their STEM and Non-STEM classrooms. Interdisciplinary methods related to STEM; STEM with Fine Arts; STEM with Language Arts; and STEM with Social Studies will be addressed in this course.

Student Learning Outcomes & Assessments:

1. The student will be able to discuss, critique, and reflect on the research and experiences related to interdisciplinary methods in STEM education.
 - a. (Texas Educator Standards: 1ai, 1aii, 1aiii, 1bi, 1biii and 1cii; 2ai, 2bi, 2bii, 2biii, and 2ciii; 3ai, 3aii, 3aiii, 3bi, 3bii, 3biii, 3ci, 3cii, and 3ciii; 5ai; 6ai)
 - b. (INTASC Standards: 1, 2, 4, 5, 7, and 8)
2. The student will be able to prepare, implement, and reflect on instructional lesson planning regarding interdisciplinary methods in STEM education.
 - a. (Texas Educator Standards: 1ai, 1aiii, 1bi, and 1cii; 2bi, 2ciii)
 - b. (INTASC Standards: 1, 2, and 7)
3. The student will be able to synthesize personal perspectives and research literature as it relates to interdisciplinary methods in STEM education.
 - a. (Texas Educator Standards: 1bii 1biii, 1ci; 2bi, 2bii, 2biii, and 2ciii; 3ai, 3aii, 3aiii, 3bi, 3bii, 3biii, 3ci, 3cii, and 3ciii)
 - b. (INTASC Standards: 1, 2, 4, 5, and 8)

Course Calendar: See Canvas

The last day to withdraw from Spring 2020 courses is Monday, March 30, 2020.

Evaluation and Grading

Discussion Posts 30%

--Students will be asked to engage in discussions and provide reflections throughout the semester related to interdisciplinary methods.

Readings and Videos 30 %

-- Readings and Lectures focused on specific topics will be viewable and launched throughout the semester. Short issue papers will be used to evaluate these resources. An example of the guidelines and work sample are provided with the syllabus.

Interdisciplinary PBL Unit Project 40%

-- Students will be expected to generate an interdisciplinary STEM PBL unit illustrating the integration of STEM with other disciplines as appropriate.

A = 90-100% B = 80-89% C = 70-79% D = 60-69% F = 0-59%

Course Policies (attendance, make-up assignments, etc.)

All assignments are due on or before the dates provided in each **Canvas Module**. Each written assignment must be typewritten and submitted in Canvas. No email attachments of assignments will be accepted.

Submission deadlines are final and links will be removed after deadline has expired. NO LATE assignments will be accepted unless a valid pre-approved or medical reason has been discussed with the professor. If an assignment is not completed on time due to a documented illness, funeral, or other university related activity, then a make-up date can be scheduled with the professor. All late assignments or non-submitted assignments will receive a score of zero points.

Note that the Canvas program SafeAssign will be used during the semester to make sure no assignment has been plagiarized. This program will check your assignment against their database of resources then produce a percentage match. This percentage will tell me how much of your assignment matches the resources available. If an assignment is plagiarized, then the student will receive a zero for the assignment. Academic dishonesty is not tolerated. The professor reserves the right to assign a failing grade for the course and report student behavior to university officials if offenses are egregious or occur more than once.

Required Texts, Materials/Supplies, and Related Readings:

The following FREE Books will be used in the course. You can download FREE PDF version from the National Academy Press. You may have to create a FREE account to download. If you are not familiar with the National Academy Press it is a great resource for empirical and other research in many fields.

National Research Council. 2011. *Successful STEM Education: A Workshop Summary*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/13230>.

National Research Council. 2014. *STEM Learning Is Everywhere: Summary of a Convocation on Building Learning Systems*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/18818>.

National Academy of Engineering and National Research Council. 2014. *STEM Integration in K-12 Education: Status, Prospects, and an Agenda for Research*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/18612>.

Project-based Learning Resources

PBL Works (Formerly Buck Institute)
<https://www.pblworks.org/>

Edutopia
<https://www.edutopia.org/>

PBS PBL
<https://opb.pbslearningmedia.org/resource/nvsof-sci-pblearning/wgbh-nova-school-of-the-future-project-based-learning/>

This course will also utilize published articles for its literature.

Sample Readings:

The Impact of PBL as a STEM School Reform Model

Authors: Michael Odell, Ph.D.; Teresa J. Kennedy, Ph.D.; Eric Stocks, Ph.D.

Abstract

Project/problem-based learning (PBL) can provide an effective model for school reform when implemented with fidelity. In the report, *Rising Above the Gathering Storm*, it was recommended that if the U.S. is to remain competitive in the 21st-century economy, there must be a serious effort to “enlarge the pipeline of students who are prepared to enter college and graduate with a degree in STEM” (National Academy of Sciences, National Academy of Engineering, & Institute of Medicine, 2007, p. 6). The report included the recommendation that states develop statewide specialty STEM high schools (National Academy of Sciences, National Academy of Engineering, & Institute of Medicine, 2007, p. 6). In 2010, the Texas Science, Technology, Engineering, and Mathematics Academy (T-STEM) initiative was implemented to develop specialty STEM schools similar to those described in *Rising Above the Gathering Storm*. The primary instructional strategy of T-STEM academies is problem- and project-based learning. In the STEM context, PBL is well suited as a primary pedagogy for STEM learning. This paper examines the following questions: What outcomes occur when PBL is implemented in a low performing school district? What is the role of PBL in school improvement? What are the challenges to implementing PBL with high fidelity?

Recommended Citation

Odell, M. R. , Kennedy, T. J. , & Stocks, E. (2019). The Impact of PBL as a STEM School Reform Model. *Interdisciplinary Journal of Problem-Based Learning*, 13(2). Available at: <https://doi.org/10.7771/1541-5015.1846>

Definitions and Uses: Case Study of Teachers Implementing Project-based Learning.

Tamim, Suha R.; Grant, Michael M.,

Abstract

The purpose of this descriptive study was to explore inservice teachers' definitions of **project-based learning** (PjBL) and their accounts on the meaning of their PjBL implementations. A purposive sample of six teachers from grades four through twelve in public and private schools participated. Three themes evolved from inductive analysis: (1) teachers define PjBL through its perceived advantages on **learning**, (2) teachers vary in their use of PBL over the continuum of the **learning** process, and (3) teachers adopt student-centered approaches in PjBL. Interpretations and implications of the findings are also presented.

Source:

Interdisciplinary Journal of Problem-based Learning; Fall2013, Vol. 7 Issue 2, p71-101, 31p

Considerations for Teaching Integrated STEM Education.

Authors: Stohlmann, Micah; Moore, Tamara J.; Roehrig, Gillian H.

Abstract:

Quality Science, Technology, Engineering, and Mathematics (**STEM**) **education** is vital for the future success of students. **Integrated STEM education** is one way to make learning more connected and relevant for students. There is a need for further research and discussion on the knowledge, experiences, and background that teachers need to effectively teach **integrated STEM education**. A support, **teaching**, efficacy, and materials (s.t.e.m.) model of **considerations for teaching integrated STEM education** was developed through a year-long partnership with a middle school. The middle school was implementing Project Lead the Way's Gateway to Technology curriculum. The s.t.e.m. model is a good starting point for teachers as they implement and improve **integrated STEM education**.

Source: [Journal of Pre-College Engineering Education](#); Apr2012, Vol. 2 Issue 1, p28-34, 7p

Development of Theme-based, Interdisciplinary, Integrated Curriculum: A Theoretical Model.

Authors: [Lonning, Robert A.](#); [DeFranco, Thomas C.](#)

Abstract:

Presents information as it pertains to the development of **interdisciplinary** integrated curriculums, with emphasis on **education**. Information on efforts launched to redefine mathematics, science and social studies curriculums; Role of a teaching curriculum; Reference to the book 'A Bibliography of Integrated Science and Mathematics Teaching and Learning Literature.'

Source: School Science & Mathematics; Oct98, Vol. 98 Issue 6, p312, 8p

UNIVERSITY POLICIES**UT Tyler Honor Code**

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

For a full list of university policies including information related to the topics listed below, click [here](#).

- Students Rights and Responsibilities
- Campus Carry
- Tobacco-Free University
- Grade Replacement/Forgiveness and Census Date Policies
- State-Mandated Course Drop Policy
- Disability Services
- Student Absence due to Religious Observance
- Student Absence for University-Sponsored Events and Activities
- Social Security and FERPA Statement
- Emergency Exits and Evacuation
- Student Standards of Academic Conduct

UT Tyler Resources for Students:

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu, <http://www.uttyler.edu/writingcenter/>
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu, <https://www.uttyler.edu/tutoring/>
- The Mathematics Learning Center, RBN 4021, This is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254) <https://www.uttyler.edu/counseling/>

[University Guidelines, Links and Policies](#)

COLLEGE OF EDUCATION AND PSYCHOLOGY (CEP) VISION AND MISSION

Vision: The College of Education and Psychology is nationally recognized and respected for its academic programs and opportunities. It is a center of academic excellence, scholarly inquiry, and public service. The College prepares leaders to meet the critical challenges of the 21st Century through productive contributions to local and global communities and toward individual and cultural equity.

Mission: The mission of the College of Education and Psychology is to provide a positive environment that fosters the acquisition of knowledge and skills. The mission is individually and collectively realized through a community of scholars that contributes to knowledge through scholarly inquiry; organizes knowledge for application, understanding and communication; and provides leadership and service. We affirm and promote global perspectives that value individual and cultural diversity to enhance learning, service, and scholarship.

UT TYLER'S SCHOOL OF EDUCATION STANDARDS FOR EDUCATOR PREPARATION PROGRAMS

Texas Education Standards: The School of Education are committed to teaching and implementing the Texas Educator Standards at the highest level. The School of Education faculty use the Texas Education Standards, along with the Interstate New Teacher Assessment and Support Consortium (InTASC) standards used by educator preparation programs throughout the United States.

The list of [Texas Education Standards](#) can be accessed [here](#).

Access the [Code of Ethics and Standard Practices for Texas Educators](#).