



*Fall 2015*

***EDUC 4333: Multiple Teaching Practices in Math and Science***

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**Section Information:** EDUC 4333-001

**Time and Place of Class Meetings:** SH (Science Hall) 226, Tuesday and Thursday 11:00AM-12:20PM

**Description of Course:** Content restricted to students in the UTeach Arlington program who have earned a passing score on the preliminary portfolio. Multiple research-based teaching practices including foundations of project-based, case-based, and problem-based learning environments; principles of project-based curriculum development in mathematics and science education; classroom management and organization of inquiry-based, problem-based/project-based learning classrooms. Three lecture hours a week for one semester with additional fieldwork hours to be arranged. Prerequisite: A University grade point average of at least 2.50, and EDUC 4332 with a grade of C or better.

**Student Learning Outcomes:**

**COURSE GOALS**

- To support the UTeach student's development by building a deep understanding of Project Based Learning (PBL), including differentiating between strong and weak theoretical approaches to PBL, and between PBL and other inquiry-based approaches.
- To enhance UTeach students' ability to design or adapt activities, lesson plans and a complete project based upon theoretical frameworks of inquiry-based learning PBL
- To build UTeach students' capacity to analyze their own and others' instructional planning and enactment.
- To increase UTeach students' ability to measure student learning through the appropriate use of formative and summative measurements of student learning, and to respond instructionally to the assessment information.

## COURSE OBJECTIVES – Students will:

1. Discuss and critique the merits of PBL in terms of student’s cognitive development, content-specific participatory practices, equity, and motivation.
2. Reflect on applications of education theory (e.g., constructivist and situated perspectives) and findings from the Learning Sciences research base (e.g., the importance of context and metacognition) in relation to classroom practice in the area of PBL.
3. Compare, contrast, and evaluate project based and other instructional approaches, including other approaches also based on inquiry such as problem or case-based instruction.
4. Become familiar with and evaluate the usefulness of various technological tools in achieving learning objectives and select appropriate resources for student use based on the relationship of salient features of the technology to learning objectives.
5. Use inquiry methods with high school students in a problem based setting.
6. Be familiar with essentials of PBL as well as commonly perceived strengths and critiques of this form of instruction; describe examples of PBL in STEM (Science, Technology, Engineering, and Mathematics); and analyze those examples in terms of frameworks for PBL.
7. Use PBL design principles and theoretical frameworks to develop an interdisciplinary, multi-week PBL unit for secondary STEM courses, which explicitly links to district, state and/or national content and inquiry standards.
8. Create and evaluate “alternative” assessments appropriate for PBL.
9. Discuss lab safety and liability issues related to PBL and wet-lab or field environments.
10. Use relevant technology to develop projects, and integrate technology into curricular units
11. Become sensitive to and learn to proactively handle equity and diversity issues in classroom teaching, ensuring that all students have an opportunity to learn through instruction that promotes equitable and diverse participation, and become aware of students’ funds of knowledge as a resource.
12. Locate, access, read and analyze research results and theoretical literature on PBL and employ these in analyses of their own teaching or observed lessons.

## Required Textbooks and Other Course Materials Textbooks:

Required:

Larmer, J., Ross, D., Mergendoller, J. R., & Buck Institute for Education. (2009). *PBL starter kit: To--- the---point advice, tools and tips for your first project*. Novato, CA: Buck Institute for Education. ISBN: 978-0-9740343-2-4

Torp, L. & Sage, S. (2002). *Problems as possibilities: Problem-based learning for K-16 education (2nd ed.)*. Alexandria, VA: ASCD. ISBN-10: 0-87120-574-2

## Descriptions of major assignments:

<i>Class Participation/Dispositions/Attendance</i>	<i>20 pts</i>
<i>Assigned Readings and Discussions (BB)</i>	<i>40 pts</i>
<i>Observation and Written Analysis of Field Placement Setting (4 hours)</i>	<i>40 pts</i>
<i>Development of PBL Unit/Presentation</i>	
<i>Draft of Learning Cycle within PBL</i>	<i>20 pts</i>
<i>Final Learning Cycle within PBL</i>	<i>40 pts</i>
<i>Field Teaching Project</i>	<i>50 pts</i>
<i>Practice Presentations</i>	<i>30 pts</i>
<i>Draft of PBL Unit</i>	<i>20 pts</i>
<i>Final PBL Unit</i>	<u><i>80 pts</i></u>
<b>Total</b>	<b>350 pts</b>

\*Details, further instructions, and rubrics will posted in Blackboard and discussed in class.

## List of Resources:

### Videos

Project-Based Learning Explained/ Buck Institute <http://www.youtube.com/watch?v=LMCZvGesRz8>

LadyBird Johnson Middle School Irving, TX <http://www.youtube.com/watch?v=FVgCZICRIRk>

METSA (Carrollton, Texas) <http://www.newtechnetwork.org/schools/metsa-math-engineering-technology-and-science-academy>

Textbook Me Not [http://dp.hightechhigh.org/~jrobin/textbooks/textbook\\_ME\\_NOT.html](http://dp.hightechhigh.org/~jrobin/textbooks/textbook_ME_NOT.html)

### Websites on PBL

PBL Blog <http://projectbasedinstruction.wordpress.com/>

NewTech Network Website <http://www.newtechnetwork.org/>

Buck Institute Website <http://www.bie.org/>

PBL Checklist <http://pblchecklist.4teachers.org/index.shtml>

Project-Based Learning Space <http://college.cengage.com/education/pbl/background.html>

RubiStar <http://rubistar.4teachers.org/index.php>

CMAP Concept Mapping Tool <http://cmap.ihmc.us/conceptmap.html>

Modifying Projects for Differentiated Learners

<http://www.np.k12.mn.us/TechIntegration/intelcd/CourseCD/HTML/m8pp.html>

### Articles on PBL

Moving to Deeper Learning with PBL <http://ww2.kqed.org/mindshift/2014/03/24/moving-towards-inquiry-how-to-reinvent-project-based-learning/>

Powerful Learning Article (Edutopia): <http://www.edutopia.org/inquiry-project-learning-research>

Designing Your Project: Design Principles for Effective Project Based Learning <http://pbl-online.org/pathway2.html>

National Center for Case Study Teaching in Science <http://sciencecases.lib.buffalo.edu/cs/>

### Social Networking

Kid Blog <http://kidblog.org/home/>

Edmodo <https://www.edmodo.com/>

### Journal

The Interdisciplinary Journal of Problem Based Learning <http://docs.lib.purdue.edu/ijpbl/>

## Late Work and Attendance:

At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. **As a student in this class attendance, timely arrival to class, and remaining in class for the duration is expected and required.** When circumstances do occur, students must communicate with the professor in advance of any anticipated absence or late arrival to class. More than two absences and more than four late arrivals and early departures will result in a reduction by one letter grade in the student's final course grade.

Late work is subject to a reduction in assignment grade and final course grade.

## TK20 INFORMATION

The College of Education and Health Professions has implemented Tk20, a comprehensive data management system that provides powerful tools to manage growth and streamline processes to meet your needs more efficiently and effectively. The set of tools that is required as a course text is called *TK20 HigherEd*. The following is a partial listing of what the Tk20 system will enable you to do:

- ✚ Create your key assessments and performance artifacts online, which you will be able to access and use beyond graduation. This will enable you to present documented performance data and information to prospective employers, who are increasingly interested in data-supported evidence of an individual's

current and potential performance.

- ✚ Submit forms online, including applications for field-based experiences such as student teaching, practicum, internships, or other clinical practice required for teacher or administrator certification, and receive timely notification of placement details sent directly to your Tk20 account.
- ✚ Create multimedia portfolios for documenting your work for presentation to faculty and prospective employers that can be exported to CDs or other media.
- ✚ Monitor your progress throughout the program and have access to a fully documented record of your program performance, creating a vested partnership between you and faculty in your progress through your academic program.

On-line tutorials and training materials will orient you to the Tk20 system and its use. For additional information, go to <http://www.uta.edu/coehp/tk20>. We appreciate your hard work and dedication toward completing your education in the College of Education and Health Professions at the University of Texas at Arlington.

**Posting key assessments (Learning Cycle/5E and PBL) to TK20 is required. Failure to post the identified assessments to TK20 will render the assignments ungraded and will result in a failing course grade.**

**Other Requirements:** Course assignments must be word-processed, posted in the course Blackboard site, and citations will follow the rules from the American Psychological Association, 6<sup>th</sup> Edition <http://owl.english.purdue.edu/owl/section/2/10/>

The course website found at <https://elearn.uta.edu> will be utilized where all course materials and additional resources will be posted. Email messages and other discussion/correspondence will take place via the course website, as well as student posting of assignments and course grading. **Utilizing this website is a required function of the course. Students must access course materials and be able to post discussion on the course Blackboard website to be successful in this course.** Grading: Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels.

The grading system as per UTA policy is as follows: A= 90-100

B= 80-89

C= 70-79

D= 60-69

F= 59 or below

**Expectations for Out-of-Class Study:** For every credit hour earned, a student should spend 3 hours per week working outside of class.

**Revision Policy:** Revisions to PBL Units will be allowed as time permitted. However, first drafts will be factored into the overall grade.

**Grade Grievances:** Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate catalog. For undergraduate courses, see [http://www.uta.edu/catalog/content/general/academic\\_regulations.aspx#19](http://www.uta.edu/catalog/content/general/academic_regulations.aspx#19).

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

**Americans with Disabilities Act:** The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability) or by calling the Office for Students with Disabilities at (817) 272-3364.

**Academic Integrity:** Students enrolled in this course are expected to adhere to the UT Arlington Honor Code: *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*

*I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.* UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule 50101*,

§2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

**Professional Dispositions Statement:** *(Approved by Teacher Education Council, 2-7-2012)*

*The following statement on Professional Dispositions will appear in the Undergraduate and Graduate Catalogs and in all relevant documentation.*

Each student/candidate in the College of Education and Health Professions of UT Arlington will be evaluated on Professional Dispositions by faculty and staff. These dispositions have been identified as essential for a highly-qualified professional. Instructors and program directors will work with students/candidates rated as "unacceptable" in one or more stated criteria. The student/candidate will have an opportunity to develop a plan to remediate any digressions.

A full document regarding professional dispositions will be posted in Blackboard.

**Student Support Services:** UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to [resources@uta.edu](mailto:resources@uta.edu), or view the information at [www.uta.edu/resources](http://www.uta.edu/resources).

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

**Final Review Week:** A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate. **Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is the staircase located immediately to the right outside of the classroom doors. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.

UTA Emergency procedures may be found at <https://www.uta.edu/policy/procedure/7-6>.

**Title IX:** The University of Texas at Arlington is committed to upholding U.S. Federal Law “Title IX” such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit [www.uta.edu/titleIX](http://www.uta.edu/titleIX).

**Librarian to Contact:** Andy Herzog, MLS [amherzog@uta.edu](mailto:amherzog@uta.edu)  
Website: <http://libguides.uta.edu/profile.php?uid=33755>  
Phone: 817.272.7517

### University of Texas at Arlington College of Education Conceptual Framework



The conceptual framework of the UT Arlington College of Education was developed collaboratively and has evolved over time. Following the identification of a set of core values held by all involved in the preparation of candidates enrolled in the College, members of the University, PK-12 districts, higher education institutions, and area business and foundation communities worked together to develop a shared vision for education.

All activities in the College are guided by the premise that we are Partners for the Future, committed to fostering critical, creative thinkers prepared to engage meaningfully in a dynamic society. This premise is

characterized and distinguished by three core values: Professionalism, Knowledge, and Leadership. Research, Diversity, and Technology are themes woven throughout each core value. The College mission, core values, and themes serve as the coherent thread running through all professional programs, guiding the systematic design and delivery of clinical/field experiences, course curricula, assessments, and evaluation. The Conceptual Framework consists of six interrelated and interacting components, which are viewed as essential contexts for the shaping of informed, skilled, and responsible partners:

- The first core value, **Professionalism**, represents the contention that candidates develop an expertise and specialized knowledge of their field. A high quality of work, standard of professional ethics and behaviors, as well as work morale and motivation are all necessary factors of a developed interest and desire to excel in job performance.
- The second core value, **Knowledge**, represents candidate theoretical or practical understanding of a subject. In today's world, candidate knowledge includes not only academic content mastery, but also skills such as critical thinking, communication, technology literacy, and collaboration, each required for success in college, life, and career.
- The third core value, **Leadership**, represents candidate ability to organize, assist, and support others in the achievement of a common task. Candidates develop and refine their leadership skills within the context of their interactions with PK-20 students, curricula, faculty, and other professionals. The additional three components of the model, Research, Diversity, and Technology, represent themes woven into the core values:
  - **Research** encompasses the investigation of ideas and theories with the purpose of discovering, interpreting, and developing new systems, methods, and support for knowledge, behaviors, and attitudes.
  - **Diversity** is an indispensable component of academic excellence. A commitment to diversity means a dedication to the inclusion, welcome, and support of individuals from all groups, encompassing the various characteristics of persons in our community such as race, ethnicity, national origin, gender, age, socioeconomic background, religion, sexual orientation, and disability.
  - **Technology** is emphasized throughout all programs and is used to support and improve content delivery and student learning.

All components lead to the achievement of one goal—the development of informed and responsible Partners for the Future—who are committed to fostering analytical, innovative thinkers prepared to engage meaningfully in a dynamic society.

### Course Schedule

DATE	TOPIC	ACTIVITIES	TO DO
Thursday 8/27	Introductions Syllabus Blackboard Setup	Design Activity Syllabus Discussion	Purchase Textbooks by next Thursday
Tuesday 9/1	Inquiry Learning Revisited Model Lesson	5E and 3 E demonstration activity Discussion	
Thursday 9/3	Inquiry Continued	Readings Online Activity	<b>Read Renner &amp; Marek (1990) and West &amp; Skoog (2006) Complete Blackboard post by 9/7 at Midnight</b>
Tuesday 9/8	5E Improv Quiz over 5E model	Activities	Develop and Search Ideas for Learning Cycle/5E and PBL

Thursday 9/10	Class Discussion of Assigned Articles Discuss of Real-World Learning	Complete Inquiry-based Lesson Discussion of Drawbacks of Short, Inquiry-Based Units Brainstorm Real-World Issues	Read pp. 4-8; and p. 37 in PBL Starter Kit Explore Buck Institute Website <a href="http://www.bie.org/http://www.bi.org/">http://www.bie.org/http://www.bi.org/</a>
Tuesday 9/15	Brainstorming Real World Applications for PBL	Turn in List of Project Idea and Brainstorming	Read Spotighting Projects on pp. 9-28 of PBL Toolkit and Chapter 1 in Torp and Sage
Thursday 9/17	Overview of PBL Units	Look at the scope of a PBL unit from Start to finish	Read Chapter 2 in Torp and Sage before class Watch Buck Institute Video <a href="http://www.youtube.com/watch?v=LMCZvGesRz8">http://www.youtube.com/watch?v=L MCZvGesRz8</a>
Tuesday 9/22	Building an Objectives-Based PBL Unit Concepts versus Objectives	Introduction to an Entry Event Start with the End in Mind Discuss Knows, Need to Knows, and Next Steps Protocol	Review sample entry events and entry documents Review TEKS for Math or Science – bring sample to review
Thursday 9/24	Foundations of PBL Discussion of Field Experience	Theoretical Foundations of PBL	Read Chapter 3 in Torp and Sage
Tuesday 9/29	Building an Entry Event Team up and design an Entry Event Discuss and do short entry event presentations	Discuss Knows, Need to Knows and Next Steps Protocol	Discuss and do short entry event presentations
<b>DATE</b>	<b>TOPIC</b>	<b>ACTIVITIES</b>	<b>TO DO</b>
Thursday 10/1	Overview of Different Types of Learning Cycles	Divide into teams and brainstorm end products for each type of learning cycle	
Tuesday 10/06	Scaffolding Your PBL	Refresher on ZPD (Vygotsky's Zone of Proximal Development) Formative and Summative Assessment in PBL	<b>Read Strobel article and respond to post in Blackboard by 10/10 Midnight</b>
Thursday 10/8	Scaffolding Your PBL	What kind of teacher are you? Discussion of guidance during PBL	Work on PBL Effective and Ineffective methods of Guidance during PBL Projects
Tuesday 10/13	Team Dynamics	Team Dynamics and Cooperative Learning Refresher	<b>Observations and Teacher Interviews Due by Midnight 10/6</b> Brainstorm a List of Problems and Solutions with Student Dynamics
Thursday 10/15	Lesson Plan Work Day	Required attendance to work on lesson plans	<b>Draft of Written Learning Cycle within PBL Due by Midnight 10/16 (Teacher Guide)</b>
Tuesday 10/20	Practice Learning Cycle/5E within PBL Unit in Class	<b>Practice Teaching Learning Cycle/5E (SIGN UP)</b>	Edit Learning Cycle based on Feedback
Thursday 10/22	Practice Learning Cycle/5E within PBL Unit in Class	<b>Practice Teaching Learning Cycle/5E (SIGN UP)</b>	Edit Learning Cycle based on Feedback
Tuesday 10/27	Students will Teach Their 5E Lessons in the Field	<b>CLASS WILL NOT MEET</b>	
Thursday 10/29	Students will Teach Their 5E Lessons in the Field	<b>CLASS WILL NOT MEET</b>	
Tuesday 11/3	FIELD EXPERIENCE DEBRIEF	DISCUSSION OF FIELD EXPERIENCES	
Thursday 11/5	Introduction to Project Based Learning Rubric	Explore different models of learning and design	<b>Blackboard discussion of field experience Due Friday 11/6 by midnight</b>



<b>DATE</b>	<b>TOPIC</b>	<b>ACTIVITIES</b>	<b>TO DO</b>
Tuesday 11/10	Work Period: Work on Ideas for PBL Units	Get rough overview in place for PBL Unit	<b>Final Learning Cycle (Teacher Guide and Student Guide) by Midnight 11/14</b>
Thursday 11/12	Tour of Fab Lab	Central Library	
Tuesday 11/17	Other Technology Considerations	Computer/Technology activities AUPs and Technology Abuse Laptop Courtesy/Technology Etiquette	
Thursday 11/19	Criticisms of PBL Discussion of Field Experience and Requirements	Quiz over Design Learning Cycles	<b>Draft of PBL Unit Due by 11/20 Midnight</b>
Tuesday 11/24	<b>THANKSGIVING HOLIDAY</b>	<b>CLASS WILL NOT MEET</b>	Work on Presentations
Thursday 12/1	Discussion of PBL End Product Anchored Instruction Technology in PBL	Review of TK20 Requirements Explore ideas about Differentiating Instruction	Computers - Technology in the PBL Environment Accommodating ELL Students Differentiating Instruction in PBL
Tuesday 12/3	Work on PBL Unit End Products	Required Class Attendance	
Thursday 12/8	Class Presentations of PBL Units	Presentation of PBL Unit (Critical Friends)	Team Presentations
Tuesday 12/10	Class Presentations of PBL Units	Presentation of PBL Unit (Critical Friends)	Team Presentations
Thursday 12/15	Last Day of Class		
Tuesday 12/17	SUBMIT PROJECT TO TK20 AND BLACKBOARD	<b>CLASS WILL NOT MEET</b>	<b>FINAL PBL UNIT DUE MIDNIGHT ON 12/16</b>

***As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. –Dr. David M. Sparks***