EDUT 4370 Project-Based Instruction, Fall 2018
(Th 11:00 – 1:30) BEP 218

Instructor Information: Jaclyn Pedersen, M.Ed.
Office Hours: M 9:30 – 11:30, T 9:30 – 11:30 or by apt.
Telephone: 903-730-3988
Email address: jpedersen@uttyler.edu
Indication of best way to contact the instructor: Email

Course Catalog Description:
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 project-based learning classrooms. Thirty hours of field experience are required for this course.
Pre-requisite: EDUT 3371

Student Learning Outcomes & Assessments:
1. The student will be able to discuss, critique, and reflect on the applications of project-based instruction as it relates to teaching and learning.
2. The student will be able to prepare, implement, and reflect on instructional lesson planning addressing both teacher directed and inquiry-based inclusive of evidence promoting equitable and diverse participation.
3. The student will be able to describe, evaluate, and use various instructional technologies relevant to the mathematics and science classroom.
4. The student will be able to collaboratively develop and implement mini-project-based activities with middle to high school students in a real world setting with.
5. The student will be able to collaboratively develop a 3-4 week project-based integrated unit and display the project in a web-based environment.
6. The student will be able to describe and develop multiple assessment items and procedures addressing standards based objectives.
7. The student will successfully complete 30 hours of field inclusive of at least two classroom observations of planned lessons. (Texas Educator Standards 6)

<table>
<thead>
<tr>
<th>Course Topics and/or Student Learning Outcomes</th>
<th>Activities</th>
<th>Assessment (including performance-based)</th>
<th>Standards Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student will be able to discuss, critique, and reflect on the applications of project-based instruction as it relates to teaching and learning.</td>
<td>o Discussions o Observations</td>
<td>o Discussion board reflections o Observations Paper</td>
<td>TES 3.A ISTE: 1c INTASC: 2, 3, 4, 5, 7, 8</td>
</tr>
<tr>
<td>The student will be able to prepare, implement, and reflect on instructional lesson planning addressing both teacher directed and inquiry-based inclusive of evidence promoting equitable and diverse</td>
<td>o Lesson Plans o PBL Design</td>
<td>o Teaching Reflection Papers o PBL Design Rubric o Lesson Plan Rubric</td>
<td>TES 1, 2Ai,ii, 2B, 2C, 3, 4, 6.A,B ISTE: 1c, 4a, 4b, 4c INTASC: 2, 3, 4, 5, 7, 8,10 TEKS: 112.15, 112.16, 112.17,</td>
</tr>
</tbody>
</table>
The student will be able to describe, evaluate, and use various instructional technologies relevant to the mathematics and science classroom.

- PBL Website
- Use of graphing calculators and TI-Nspire
- Use of science probes and lab equipment

| Participation. | 112.18, 112.19, 112.20, 112.31, 112.61; 111.6, 111.7, 111.25, 111.26, 111.27, 111.28, 111.38, 111.51 |

The student will be able to collaboratively develop and implement mini-project-based activities with middle to high school students in a real world setting with

- Design PBL Workshops
- PBL Design

| TES 1, 3, 6 ISTE: 4a, 4b, 4c INTASC: .7 8 |

The student will be able to collaboratively develop a 3-4 week project-based integrated unit and display the project in a web-based environment.

- PBL Design
- PBL Website

| TES 1, 2Ai,ii, 2B, 2C, 3, 6.B INTASC: 7,8,10 TEKS: 112.15, 112.16, 112.17, 112.18, 112.19, 112.20, 112.31, 112.61; 111.6, 111.7, 111.25, 111.26, 111.27, 111.28, 111.38, 111.51 |

The student will be able to describe and develop multiple assessment items and procedures addressing standards based objectives.

- PBL deliverables
- PBL pre and post tests
- PBL rubrics

| TES 1, 2Ai,ii, 2B, 2C, 3, 6.B INTASC: 1, 2, 3, 4, 5, 7, 8, 10 TEKS: 112.15, 112.16, 112.17, 112.18, 112.19, 112.20, 112.31, 112.61; 111.6, 111.7, 111.25, 111.26, 111.27, 111.28, 111.38, 111.51 |
The student will successfully complete 30 hours of field inclusive of at least two classroom observations of planned lessons.

- Observations
- Co-teaching
- Teaching

- Observations Log
- Observations Paper
- Teaching Reflection Paper

### Evaluation and Grading

**Professional Article Discussions (Flipped Assignments)** 30%

**Interviews and Observation Paper** 10%

**Field Teaching Papers** 20%

**Classroom/Online Participation/Attendance** 10%

**Final Project** 30%

TOTAL 100%

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

NOTE: I expect that for every hour spent in class, two hours should be spent outside of class reading and working on assignments.

*Last Day to Withdraw from Courses: Monday, November 6*

### Related Field Experiences:

A student must successfully pass field in order to pass this class. Passing field is based on the following factors:

1. Completion of 30 contact hours
   a. 2 observations
   b. 2 individual teaches
   c. Active participation in classrooms
   d. Active participation in PBL planning meetings
2. Observable improvements in implementation of prepared lessons.
   (Minimum of TWO university supervisor observations)

### Teaching Strategies:

1. Professional Article Discussions: The student will be required to read the required professional articles and provide a reflection on theses using the discussion board in Canvas.

2. Interviews and Observations Paper: During the course of the semester, you will be required to conduct one teacher interview with your mentor teacher, one student interview with a group of students along with two official observations of your mentor teacher’s classroom as they conduct workshops connected to a PBL. The student will also be required to reflect on his/her experiences in traditional schools and compare and contrast the teaching strategies, environment and students with the assigned classroom at the Innovation Academy. You will be required to summarize and critique the results of these interviews and observations in a paper structured by the planning, implementation, and reflection of the practices of the observed classroom teacher and students. The final paper should be 3-5 pages and submitted through canvas no later than October 5th.

3. Field Teaching Paper: The student will be required to individually teach two complete workshops during their field experience that are directly related to their mentor teacher’s current project. In order to do this, students will need to plan time to meet with the teachers during their PBL planning time. The student will need to make sure to establish their teaching times with the mentor teacher as well as Mrs. Pedersen. The
Field Teaching Papers will have the student reflect on the areas of preparation for the workshops, implementation of the workshops, and reflection of the workshops that were taught. Submission will be done through canvas. **Field Teaching Paper #1 is Due November 2nd and Field Teaching Paper #2 is due December 7th.**

4. Online and in-class Participation/Attendance: The student will be required to complete online discussions, participate in in-class discussions and attend class regularly. Active participation through Blackboard is imperative.

5. Final Project: Each student collaboratively prepares a Project-Based Instructional unit to be taught in the secondary class of their choice. It is required that the unit be prepared to meet curricular objectives and state and national standards. Groups will present their project designs using the guidelines and rubrics attached during their Finals. All information related to the PBI unit will be constructed within a website. All components of the project must be made available through this website. Assessment of this project and its components will be made from the information and resources found on the created website.

**Required Readings:**
Articles are assigned throughout the semester via Canvas. Articles are relevant to coursework and student needs as apparent through formative assessments throughout the semester.

**Bibliography:**


**Internet Resources:**
- TEA http://www.tea.state.tx.us/
- National Technology Standards http://cnets.iste.org/index2.html
- National Council of Teachers of Mathematics http://www.nctm.org
- Texas Council for Teachers of Mathematics http://tctmonline.org/
- Science Teachers Association of Texas http://www.statweb.org/
- National Science Teachers Association http://www.nsta.org/
- Shodor Interactivate http://www.shodor.org/interactivate
- WisWeb: http://www.fi.uu.nl/wisweb/en/
- Database search for educational journals http://library.utttyler.edu/
- Creative Publications www.creativepublications.com
- EAI Education www.eaieducation.com
- Texas instruments http://education.ti.com/
- AIMS www.AIMSedu.org
- Eye on Education www.eyeoneducation.com
- Casio http://www.casio.com/education/
- NASCO www.eNASCO.com
- Lead4ward www.lead4ward.com

**Course Policies (attendance, make-up assignments, etc.)**
All assignments are due on or before the dates provided in the Topical Outline. Each assignment must be type written and submitted in Blackboard. No email attachments will be accepted. **Ten percentage points** will be subtracted from your assignment score for each calendar day the assignment is late. Assignment dates may be moved to later (but not earlier) scheduled dates during the course of the semester. All exam dates are final. If an exam is not taken due to a documented illness, funeral, or other university related
activity, then a makeup date must be scheduled with the professor. Note that the Blackboard 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. Each student may submit his or her assignments as drafts prior to final submission to check this percentage.

**Canvas:** Students will access class notes, assignments, grades and course information through Canvas. Any changes to the course schedule, schedule of assignments, or any special assignments will be posted on Canvas. Students are expected to regularly check Canvas for updates and to download any class handouts.

**Course Rationale from UTeach Austin:**
“Project-based instruction engages learners in exploring authentic, important, and meaningful questions of real concern to students. Through a dynamic process of investigation and collaboration and using the same processes and technologies that scientists, mathematicians, and engineers use, students work in teams to formulate questions, make predictions, design investigations, collect and analyze data, make products and share ideas. Students learn fundamental science and mathematical concepts and principles that they apply to their daily lives. Project-based instruction promotes equitable and diverse participation and engages students in learning.”

**Course Description from UTeach Austin:**
PBI has three essential components:
- **Theory-driven perspective:** Students learn about how people learn and how project-based instruction may be among our most informed classroom learning environments for bridging the gap between theory and practice.
- **Instructional Development:** Technological and pedagogical content knowledge are developed as UTeach students work toward the design of project-based units. Competency is continually built as students read about and discuss the principles of PBI; reflect on observations of project-based learning environments in high school settings; and incorporate what they are learning into the design of problem-based lessons and ultimately, an entire project-based unit.
- **Field Experience:** An intensive field component includes observation of well-implemented project-based instruction in local schools as well as implementation of problem-based lessons with area secondary students on a study field trip.

**Perspective from UTeach Austin:**
A major hurdle in implementing project-based curricula is that they require simultaneous changes in curriculum, instruction and assessment practices – changes that are often foreign to students as well as practicing teachers. In this course we will develop an approach to designing, implementing and evaluating problem- and project-based curricula and processes for PBI curriculum development that has emerged from collaboration with teachers and researchers. Previous research has identified four common design principles that appear to be especially important: (1) Defining learning appropriate goals that lead to deep understanding; (2) Providing scaffolds such as beginning with problem-based learning activities before completing project; using “embedded teaching”, “teaching tools” and set of “contrasting cases”; (3) Including multiple opportunities for formative self assessment; (4) Developing social structures that promote participation and revision. We will first discuss these principles individually and then compare them to other design principles suggested by other groups involved with project-based instruction.

**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.

**Students Rights and Responsibilities**
To know and understand the policies that affect your rights and responsibilities as a student at UT
Tyler, please follow this link: http://www.uttyler.edu/wellness/rightsresponsibilities.php

**Campus Carry**
We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at [http://www.uttyler.edu/about/campus-carry/index.php](http://www.uttyler.edu/about/campus-carry/index.php)

**Tobacco-Free University**
All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit [http://www.uttyler.edu/tobacco-free](http://www.uttyler.edu/tobacco-free)

**Grade Replacement/Forgiveness and Census Date Policies**
Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. (For Fall, the Census Date is Sept. 12.) Grade Replacement Contracts are available in the Enrollment Services Center or at [http://www.uttyler.edu/registrar](http://www.uttyler.edu/registrar). Each semester’s Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date (Sept. 12th) is the deadline for many forms and enrollment actions of which students need to be aware. These include:
- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

**State-Mandated Course Drop Policy**
Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date).

Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

**Disability Services**
In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University offers accommodations to students with learning, physical and/or psychiatric disabilities. If you have a disability, including non-visible disabilities such as chronic diseases, learning disabilities, head injury, PTSD or ADHD, or you have a history of modifications or accommodations in a previous educational environment you are encouraged to contact the Student Accessibility and Resources office and schedule an interview with the Accessibility Case Manager/ADA Coordinator, Cynthia Lowery Staples. If you are unsure if the above criteria applies to you, but have questions or concerns please contact the SAR office. For more information or to set up an appointment please visit the SAR office located in the University Center, Room 3150 or call 903.566.7079. You may also send an email to cstaples@uttyler.edu

**Student Absence due to Religious Observance**

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

**Student Absence for University-Sponsored Events and Activities**

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

**Social Security and FERPA Statement:**

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

**Emergency Exits and Evacuation:**

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor’s directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

**Student Standards of Academic Conduct:** Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

(i) “Cheating” includes, but is not limited to:

- copying from another student’s test paper;
- using, during a test, materials not authorized by the person giving the test;
- failure to comply with instructions given by the person administering the test;
- possession during a test of materials which are not authorized by the person giving the test, such as class notes or specifically designed “crib notes”. The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test;
- using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program;
- collaborating with or seeking aid from another student during a test or other assignment without authority;
- discussing the contents of an examination with another student who will take the examination;
- divulging the contents of an examination, for the purpose of preserving questions for use by another, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;
• substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment;
• paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program or information about an unadministered test, test key, home solution or computer program;
• falsifying research data, laboratory reports, and/or other academic work offered for credit;
• taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
• misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.

(ii) “Plagiarism” includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another’s work and the submission of it as one’s own academic work offered for credit.

(iii) “Collusion” includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.

(iv) All written work that is submitted will be subject to review by SafeAssign™, available on Blackboard.

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/

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.

Texas Educator Standards

Title 19: Chapter 149, Subchapter AA

Rule: 149.1001

(a) Purpose. The standards identified in this section are performance standards to be used to inform the training, appraisal, and professional development of teachers.
Standards.

1) Standard 1: Instructional Planning and Delivery. Teachers demonstrate their understanding of instructional planning and delivery by providing standards-based, data-driven, differentiated instruction that engages students, makes appropriate use of technology, and makes learning relevant for today’s learners.

(A) Teachers design clear, well organized, sequential lessons that build on students’ prior knowledge.
   (i) Teachers develop lessons that build coherently toward objectives based on course content, curriculum scope and sequence, and expected student outcomes.
   (ii) Teachers effectively communicate goals, expectations, and objectives to help all students reach high levels of achievement.
   (iii) Teachers connect students’ prior understanding and real-world experiences to new content and contexts, maximizing learning opportunities.

(B) Teachers design developmentally appropriate, standards-driven lessons that reflect evidence-based best practices.
   (i) Teachers plan instruction that is developmentally appropriate, is standards driven, and motivates students to learn.
   (ii) Teachers use a range of instructional strategies, appropriate to the content area, to make subject matter accessible to all students.
   (iii) Teachers use and adapt resources, technologies, and standards-aligned instructional materials to promote student success in meeting learning goals.

(C) Teachers design lessons to meet the needs of diverse learners, adapting methods when appropriate.
   (i) Teachers differentiate instruction, aligning methods and techniques to diverse student needs, including acceleration, remediation, and implementation of individual education plans.
   (ii) Teachers plan student groupings, including pairings and individualized and small-group instruction, to facilitate student learning.
   (iii) Teachers integrate the use of oral, written, graphic, kinesthetic, and/or tactile methods to teach key concepts.

(D) Teachers communicate clearly and accurately and engage students in a manner that encourages students’ persistence and best efforts.
   (i) Teachers ensure that the learning environment features a high degree of student engagement by facilitating discussion and student-centered activities as well as leading direct instruction.
   (ii) Teachers validate each student’s comments and questions, utilizing them to advance learning for all students.
   (iii) Teachers encourage all students to overcome obstacles and remain persistent in the face of challenges, providing them with support in achieving their goals.

(E) Teachers promote complex, higher-order thinking, leading class discussions and activities that provide opportunities for deeper learning.
   (i) Teachers set high expectations and create challenging learning experiences for students, encouraging them to apply disciplinary and cross-disciplinary knowledge to real-world problems.
   (ii) Teachers provide opportunities for students to engage in individual and collaborative critical thinking and problem solving.
   (iii) Teachers incorporate technology that allows students to interact with the curriculum in more significant and effective ways, helping them reach mastery.

(F) Teachers consistently check for understanding, give immediate feedback, and make lesson adjustments as necessary.
   (i) Teachers monitor and assess student progress to ensure that their lessons meet students’ needs.
   (ii) Teachers provide immediate feedback to students in order to reinforce their learning and ensure that they understand key concepts.
   (iii) Teachers adjust content delivery in response to student progress through the use of developmentally appropriate strategies that maximize student engagement.

2) Standard 2: Knowledge of Students and Student Learning. Teachers work to ensure high levels of learning, social-emotional development, and achievement outcomes for all students,
taking into consideration each student's educational and developmental backgrounds and focusing on each student's needs.

(A) Teachers demonstrate the belief that all students have the potential to achieve at high levels and support all students in their pursuit of social-emotional learning and academic success.

(i) Teachers purposefully utilize learners' individual strengths as a basis for academic and social-emotional growth.

(ii) Teachers create a community of learners in an inclusive environment that views differences in learning and background as educational assets.

(iii) Teachers accept responsibility for the growth of all of their students, persisting in their efforts to ensure high levels of growth on the part of each learner.

(B) Teachers acquire, analyze, and use background information (familial, cultural, educational, linguistic, and developmental characteristics) to engage students in learning.

(i) Teachers connect learning, content, and expectations to students' prior knowledge, life experiences, and interests in meaningful contexts.

(ii) Teachers understand the unique qualities of students with exceptional needs, including disabilities and giftedness, and know how to effectively address these needs through instructional strategies and resources.

(iii) Teachers understand the role of language and culture in learning and know how to modify their practices to support language acquisition so that language is comprehensible and instruction is fully accessible.

(C) Teachers facilitate each student's learning by employing evidence-based practices and concepts related to learning and social-emotional development.

(i) Teachers understand how learning occurs and how learners develop, construct meaning, and acquire knowledge and skills.

(ii) Teachers identify readiness for learning and understand how development in one area may affect students' performance in other areas.

(iii) Teachers apply evidence-based strategies to address individual student learning needs and differences, adjust their instruction, and support the learning needs of each student.

(3) Standard 3--Content Knowledge and Expertise. Teachers exhibit a comprehensive understanding of their content, discipline, and related pedagogy as demonstrated through the quality of the design and execution of lessons and their ability to match objectives and activities to relevant state standards.

(A) Teachers understand the major concepts, key themes, multiple perspectives, assumptions, processes of inquiry, structure, and real-world applications of their grade-level and subject-area content.

(i) Teachers have expertise in how their content vertically and horizontally aligns with the grade-level/subject-area continuum, leading to an integrated curriculum across grade levels and content areas.

(ii) Teachers identify gaps in students' knowledge of subject matter and communicate with their leaders and colleagues to ensure that these gaps are adequately addressed across grade levels and subject areas.

(iii) Teachers keep current with developments, new content, new approaches, and changing methods of instructional delivery within their discipline.

(B) Teachers design and execute quality lessons that are consistent with the concepts of their specific discipline, are aligned to state standards, and demonstrate their content expertise.

(i) Teachers organize curriculum to facilitate student understanding of the subject matter.

(ii) Teachers understand, actively anticipate, and adapt instruction to address common misunderstandings and preconceptions.

(iii) Teachers promote literacy and the academic language within the discipline and make discipline-specific language accessible to all learners.

(C) Teachers demonstrate content-specific pedagogy that meets the needs of diverse learners, utilizing engaging instructional materials to connect prior content knowledge to new learning.

(i) Teachers teach both the key content knowledge and the key skills of the discipline.

(ii) Teachers make appropriate and authentic connections across disciplines, subjects, and students’ real-world experiences.
(4) Standard 4—Learning Environment. Teachers interact with students in respectful ways at all times, maintaining a physically and emotionally safe, supportive learning environment that is characterized by efficient and effective routines, clear expectations for student behavior, and organization that maximizes student learning.

(A) Teachers create a mutually respectful, collaborative, and safe community of learners by using knowledge of students’ development and backgrounds.

(i) Teachers embrace students’ backgrounds and experiences as an asset in their learning environment.

(ii) Teachers maintain and facilitate respectful, supportive, positive, and productive interactions with and among students.

(iii) Teachers establish and sustain learning environments that are developmentally appropriate and respond to students’ needs, strengths, and personal experiences.

(B) Teachers organize their classrooms in a safe and accessible manner that maximizes learning.

(i) Teachers arrange the physical environment to maximize student learning and to ensure that all students have access to resources.

(ii) Teachers create a physical classroom set-up that is flexible and accommodates the different learning needs of students.

(C) Teachers establish, implement, and communicate consistent routines for effective classroom management, including clear expectations for student behavior.

(i) Teachers implement behavior management systems to maintain an environment where all students can learn effectively.

(ii) Teachers maintain a strong culture of individual and group accountability for class expectations.

(iii) Teachers cultivate student ownership in developing classroom culture and norms.

(D) Teachers lead and maintain classrooms where students are actively engaged in learning as indicated by their level of motivation and on-task behavior.

(i) Teachers maintain a culture that is based on high expectations for student performance and encourages students to be self-motivated, taking responsibility for their own learning.

(ii) Teachers maximize instructional time, including managing transitions.

(iii) Teachers manage and facilitate groupings in order to maximize student collaboration, participation, and achievement.

(iv) Teachers communicate regularly, clearly, and appropriately with parents and families about student progress, providing detailed and constructive feedback and partnering with families in furthering their students’ achievement goals.

(5) Standard 5—Data-Driven Practice. Teachers use formal and informal methods to assess student growth aligned to instructional goals and course objectives and regularly review and analyze multiple sources of data to measure student progress and adjust instructional strategies and content delivery as needed.

(A) Teachers implement both formal and informal methods of measuring student progress.

(i) Teachers gauge student progress and ensure student mastery of content knowledge and skills by providing assessments aligned to instructional objectives and outcomes that are accurate measures of student learning.

(ii) Teachers vary methods of assessing learning to accommodate students’ learning needs, linguistic differences, and/or varying levels of background knowledge.

(B) Teachers set individual and group learning goals for students by using preliminary data and communicate these goals with students and families to ensure mutual understanding of expectations.

(i) Teachers develop learning plans and set academic as well as social-emotional learning goals for each student in response to previous outcomes from formal and informal assessments.

(ii) Teachers involve all students in self-assessment, goal setting, and monitoring progress.

(iii) Teachers communicate with students and families regularly about the importance of collecting data and monitoring progress of student outcomes, sharing timely and comprehensible feedback so they understand students’ goals and progress.

(C) Teachers regularly collect, review, and analyze data to monitor student progress.

(i) Teachers analyze and review data in a timely, thorough, accurate, and appropriate manner, both individually and with colleagues, to monitor student learning.
(ii) Teachers combine results from different measures to develop a holistic picture of students’ strengths and learning needs.

(D) Teachers utilize the data they collect and analyze to inform their instructional strategies and adjust short- and long-term plans accordingly.

(i) Teachers design instruction, change strategies, and differentiate their teaching practices to improve student learning based on assessment outcomes.

(ii) Teachers regularly compare their curriculum scope and sequence with student data to ensure they are on track and make adjustments as needed.

(6) Standard 6--Professional Practices and Responsibilities. Teachers consistently hold themselves to a high standard for individual development, pursue leadership opportunities, collaborate with other educational professionals, communicate regularly with stakeholders, maintain professional relationships, comply with all campus and school district policies, and conduct themselves ethically and with integrity.

(A) Teachers reflect on their teaching practice to improve their instructional effectiveness and engage in continuous professional learning to gain knowledge and skills and refine professional judgment.

(i) Teachers reflect on their own strengths and professional learning needs, using this information to develop action plans for improvement.

(ii) Teachers establish and strive to achieve professional goals to strengthen their instructional effectiveness and better meet students’ needs.

(iii) Teachers engage in relevant, targeted professional learning opportunities that align with their professional growth goals and their students’ academic and social-emotional needs.

(B) Teachers collaborate with their colleagues, are self-aware in their interpersonal interactions, and are open to constructive feedback from peers and administrators.

(i) Teachers seek out feedback from supervisors, coaches, and peers and take advantage of opportunities for job-embedded professional development.

(ii) Teachers actively participate in professional learning communities organized to improve instructional practices and student learning.

(C) Teachers seek out opportunities to lead students, other educators, and community members within and beyond their classrooms.

(i) Teachers clearly communicate the mission, vision, and goals of the school to students, colleagues, parents and families, and other community members.

(ii) Teachers seek to lead other adults on campus through professional learning communities, grade- or subject-level team leadership, committee membership, or other opportunities.

(D) Teachers model ethical and respectful behavior and demonstrate integrity in all situations.

(i) Teachers adhere to the educators’ code of ethics in §247.2 of this title (relating to Code of Ethics and Standard Practices for Texas Educators), including following policies and procedures at their specific school placement(s).

(ii) Teachers communicate consistently, clearly, and respectfully with all members of the campus community, including students, parents and families, colleagues, administrators, and staff.

(iii) Teachers serve as advocates for their students, focusing attention on students’ needs and concerns and maintaining thorough and accurate student records.

SCHOOL OF EDUCATION PROGRAM STANDARDS

The School of Education has adopted program standards that guide the development of teacher candidates in their understanding of the complexity of teaching. These standards are based on those developed by the Interstate New Teacher Assessment and Support Consortium (InTASC) and shared by other accredited universities in Texas and across the United States. The Standards are broad understandings and practices gained throughout the program using a constructivist model in which new learnings are assimilated and attached to prior understandings, thus, over time, building a mental structure (schema) of educational concepts.

Standard #1: Learner Development (students in general)

The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.
Standard #2: Learning Differences (individual students)
The teacher uses understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.

Standard #3: Learning Environments
The teacher works with others to create environments that support individual and collaborative learning, and that encourage positive social interaction, active engagement in learning, and self-motivation.

Standard #4: Content Knowledge
The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make these aspects of the discipline accessible and meaningful for learners to assure mastery of the content.

Standard #5: Application of Content
The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.

Standard #6: Assessment
The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher’s and learner’s decision making.

Standard #7: Planning for Instruction
The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.

Standard #8: Instructional Strategies
The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.

Standard #9: Professional Learning and Ethical Practice
The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet the needs of each learner.

Standard #10: Leadership and Collaboration
The teacher seeks appropriate leadership roles and opportunities to take responsibility for student learning, to collaborate with learners, families, colleagues, other school professionals, and community members to ensure learner growth, and to advance the profession.

Standard #11: Technology
The teacher is able to create, implement, and evaluate technology to enhance teaching, student learning, and other obligations (e.g. reports, grades, tests, etc.) required of teachers.

Teacher Ethics: The School of Education is committed to producing highly ethical educators for the K-12 students of Texas. Our program interweaves the Code of Ethics and Standard Practices for Texas Educators throughout our program.

Code of Ethics and Standard Practices for Texas Educators

Texas Administrative Code

TITLE 19

EDUCATION
(b) Enforceable Standards.

(1) Professional Ethical Conduct, Practices and Performance.

(A) Standard 1.1. The educator shall not intentionally, knowingly, or recklessly engage in deceptive practices regarding official policies of the school district, educational institution, educator preparation program, the Texas Education Agency, or the State Board for Educator Certification (SBEC) and its certification process.

(B) Standard 1.2. The educator shall not knowingly misappropriate, divert, or use monies, personnel, property, or equipment committed to his or her charge for personal gain or advantage.

(C) Standard 1.3. The educator shall not submit fraudulent requests for reimbursement, expenses, or pay.

(D) Standard 1.4. The educator shall not use institutional or professional privileges for personal or partisan advantage.

(E) Standard 1.5. The educator shall neither accept nor offer gratuities, gifts, or favors that impair professional judgment or to obtain special advantage. This standard shall not restrict the acceptance of gifts or tokens offered and accepted openly from students, parents of students, or other persons or organizations in recognition or appreciation of service.

(F) Standard 1.6. The educator shall not falsify records, or direct or coerce others to do so.

(G) Standard 1.7. The educator shall comply with state regulations, written local school board policies, and other state and federal laws.

(H) Standard 1.8. The educator shall apply for, accept, offer, or assign a position or a responsibility on the basis of professional qualifications.

(I) Standard 1.9. The educator shall not make threats of violence against school district employees, school board members, students, or parents of students.

(J) Standard 1.10 The educator shall be of good moral character and be worthy to instruct or supervise the youth of this state.

(K) Standard 1.11. The educator shall not intentionally or knowingly misrepresent his or her employment history, criminal history, and/or disciplinary record when applying for subsequent employment.

(L) Standard 1.12. The educator shall refrain from the illegal use or distribution of controlled substances and/or abuse of prescription drugs and toxic inhalants.

(M) Standard 1.13. The educator shall not consume alcoholic beverages on school property or during school activities when students are present.

(2) Ethical Conduct Toward Professional Colleagues.

(A) Standard 2.1. The educator shall not reveal confidential health or personnel information concerning colleagues unless disclosure serves lawful professional purposes or is required by law.

(B) Standard 2.2. The educator shall not harm others by knowingly making false statements about a colleague or the school system.

(C) Standard 2.3. The educator shall adhere to written local school board policies and state and federal laws regarding the hiring, evaluation, and dismissal of personnel.

(D) Standard 2.4. The educator shall not interfere with a colleague's exercise of political, professional, or citizenship rights and responsibilities.

(E) Standard 2.5. The educator shall not discriminate against or coerce a colleague on the basis of race, color, religion, national origin, age, gender, disability, family status, or sexual orientation.

(F) Standard 2.6. The educator shall not use coercive means or promise of special treatment in order to influence professional decisions or colleagues.
Standard 2.7. The educator shall not retaliate against any individual who has filed a complaint with the SBEC or who provides information for a disciplinary investigation or proceeding under this chapter.

(3) Ethical Conduct Toward Students.

(A) Standard 3.1. The educator shall not reveal confidential information concerning students unless disclosure serves lawful professional purposes or is required by law.

(B) Standard 3.2. The educator shall not intentionally, knowingly, or recklessly treat a student or minor in a manner that adversely affects or endangers the learning, physical health, mental health, or safety of the student or minor.

(C) Standard 3.3. The educator shall not intentionally, knowingly, or recklessly misrepresent facts regarding a student.

(D) Standard 3.4. The educator shall not exclude a student from participation in a program, deny benefits to a student, or grant an advantage to a student on the basis of race, color, gender, disability, national origin, religion, family status, or sexual orientation.

(E) Standard 3.5. The educator shall not intentionally, knowingly, or recklessly engage in physical mistreatment, neglect, or abuse of a student or minor.

(F) Standard 3.6. The educator shall not solicit or engage in sexual conduct or a romantic relationship with a student or minor.

(G) Standard 3.7. The educator shall not furnish alcohol or illegal/unauthorized drugs to any person under 21 years of age unless the educator is a parent or guardian of that child or knowingly allow any person under 21 years of age unless the educator is a parent or guardian of that child to consume alcohol or illegal/unauthorized drugs in the presence of the educator.

(H) Standard 3.8. The educator shall maintain appropriate professional educator-student relationships and boundaries based on a reasonably prudent educator standard.

(I) Standard 3.9. The educator shall refrain from inappropriate communication with a student or minor, including, but not limited to, electronic communication such as cell phone, text messaging, email, instant messaging, blogging, or other social network communication. Factors that may be considered in assessing whether the communication is inappropriate include, but are not limited to:

(i) the nature, purpose, timing, and amount of the communication;
(ii) the subject matter of the communication;
(iii) whether the communication was made openly or the educator attempted to conceal the communication;
(iv) whether the communication could be reasonably interpreted as soliciting sexual contact or a romantic relationship;
(v) whether the communication was sexually explicit; and
(vi) whether the communication involved discussion(s) of the physical or sexual attractiveness or the sexual history, activities, preferences, or fantasies of either the educator or the student.

Source Note: The provisions of this §247.2 adopted to be effective March 1, 1998, 23 TexReg 1022; amended to be effective August 22, 2002, 27 TexReg 7530; amended to be effective December 26, 2010, 35 TexReg 11242

Additional Bibliography
Barron, B. (2003). When smart groups fail (PDF). The Journal of the Learning Sciences, 12(3), 307–359. This study analyzed conversations of twelve sixth-grade groups of three in order to investigate how their collaborative interactions influenced problem-solving outcomes. The uptake of correct ideas by the group was correlated with partners' responsiveness to proposals. Less successful groups ignored or rejected correct proposals, whereas more successful groups discussed or accepted them. Conversations in less successful groups were less coherent; their proposals for solutions were disconnected from preceding discussion. These differences in groups' interactions extended to students' subsequent success on
independent problem-solving tasks. The article proposes future directions that may help teachers, students, and designers of educational environments to see and foster productive collaborative interactions.

**Barron, B., & Darling-Hammond, L.** (2008). *Teaching for meaningful learning: A review of research on inquiry-based and cooperative learning (PDF).* Powerful Learning: What We Know About Teaching for Understanding. San Francisco, CA: Jossey-Bass. A comprehensive review of research on inquiry-based learning outcomes and best practices in project-based learning, problem-based learning, and design-based instruction. Barron and Darling-Hammond describe evidence-based approaches to support inquiry-based teaching in the classroom: (1) clear goals and guiding activities; (2) a variety of resources (e.g., museums, libraries, Internet, videos, lectures) and time for students to share, reflect, and apply resources, while debating over information discrepancies; (3) participation structures and classroom norms that increase the use of evidence and a culture of collaboration (i.e., framing debates as productive conflicts, using public performances); (4) formative assessments that provide opportunities for revision; and (5) summative assessments that are multidimensional and representative of professional practice. Ultimately, these practices will support students in evaluating their own work against standards (i.e., through revising and modifying work, redirecting energies, and taking initiative to promote their own progress).


**Boss, S., Johanson, C., Arnold, S. D., Parker, W. C., Nguyen, D., Mosborg, S., Nolen, S., Valencia, S., Vye, N., & Bransford, J.** (2011). *The quest for deeper learning and engagement in advanced high school courses.* The Foundation Review, 3(3), 12-23. Starting in 2008, GLEF and a research team from the University of Washington have been working with Washington's Bellevue School District to develop and assess the impact of project-based learning approaches on upper-level AP courses in high school. This paper describes the approach and methods used by researchers to implement and study the impact of PBL in AP U.S. Government and Politics. In most cases, students in the PBL AP courses perform as well or better than students in traditional AP courses on the AP test.

**Chang, C.** (2001). *Comparing the impacts of problem-based computer-assisted instruction and the direct-interactive teaching method on student science achievement (Abstract).* Journal of Science Education and Technology, 10(2):147-53. Tenth-grade earth science students who received PBL earned higher scores on an achievement test than students who received traditional instruction.

**Cognition and Technology Group at Vanderbilt (1992).** *The Jasper series as an example of anchored instruction: Theory, program description and assessment data (PDF).* Educational Psychologist, 27(3): 291-315. A study of 700 students from 11 school districts in Tennessee found that students doing projects using videotaped problems over a three-week period performed better in a number of academic areas later in the school year. Students who had experience in the project work performed better in basic math, word problems, planning capabilities, and attitudes toward math.

**Condliffe, B., Visher, M. G., Bangser, M. R., Drohojowska, S., & Saco, L.** (2016). *Project-Based Learning: A Literature Review.* MDRC. This MDRC/Lucas Education Research literature review examines project-based learning research from 2000-2015. While many studies identify a positive relationship between PBL and student learning outcomes, an insufficient number use research methodologies that allow for causal inferences. The study authors, however, find that the design principles most commonly used in PBL align well with the goals of preparing students for deeper learning, higher-level thinking skills, and intra/interpersonal skills.

**Darling-Hammond, L.** (1996). *What matters most: Teaching for America's future (PDF).* New York, NY: National Commission on Teaching and America's Future. According to Darling-Hammond, teacher expertise has a direct correlation to high student achievement. "Students who have highly effective teachers three years in a row score as much as 50 percentile points higher on achievement tests than those who have ineffective teachers for three years in a row." The report offers a strategy for recruiting, preparing, and supporting excellent teachers in America's schools.
Drake, K. N. & Long, D. (2009). Rebecca's in the dark: A comparative study of problem-based learning and direct instruction/experiential learning in two fourth-grade classrooms (Abstract). *Journal of Elementary Science Education, 21*(1), p 1-16. Researchers at Elon University compared fourth graders receiving PBL in science with a corresponding group receiving the same teacher instruction in thematic form. The PBL curriculum involved figuring out a way to create electricity during a blackout, since blackouts had commonly affected the school's region. PBL students had fewer stereotypical images of scientists on a "draw-a-scientist" test and were able to generate more problem-solving strategies than students in the thematic group. Content knowledge learned was equivalent in both groups.

Dweck, C. (2000). *Self-Theories: Their role in motivation, personality and development. Essays in social psychology*. Psychology Press/Taylor & Francis Group. Dweck describes her research studies on motivation and achievement, which indicate that how a person views intelligence affects their responses to setbacks and ultimately their likelihood for success. "Entity Theory" learners view intelligence as fixed, (i.e., people are born smart or not) and tend to avoid challenging situations that make them feel less intelligent. "Incremental learners" view intelligence as malleable, developed through effort, and tend to seek out challenging experiences that develop their skills and knowledge. "Incremental learners" showed significantly higher achievement levels than "entity theory" learners over the years they were studied by Dweck. Teachers can change students' mind-sets by valuing good learning over high achievement and by praising effort, resilience, and strategies that lead to success. Teachers should avoid praising "intelligence," "cleverness," or "talent," which defines intelligence in terms of attributes that are beyond the control of the learner. Teachers can celebrate and reward good learning by recognizing the "best mistake of the day," "best question of the day," and good group work. When children are focused on learning, as opposed to measuring themselves, failure is more likely to provoke continued effort, as opposed to a helpless response.

Ertmer, P. A., & Simons, K. D. (2005). Scaffolding teachers' efforts to implement problem-based learning (PDF). *International Journal of Learning, 12*(4), 319-328. Instructors frequently experience frustration due to the time and workload involved in PBL, difficulty transitioning students into more active roles, and assessing student learning. The authors describe specific ways to structure and simplify the PBL process, with tips on identifying the driving question, structuring students' research efforts, motivating students, creating a collaborative classroom atmosphere, and assessing students' learning with rubrics and class reflections.

Finkelstein, N., Hanson, T., Huang, C. W., Hirschman, B., & Huang, M. (2010). Effects of problem-based economics on high school economics instruction (PDF) (NCEE 2010-4110). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory West. This randomized-controlled experiment examined the effects of project-based economics curriculum developed by the Buck Institute for Education on student learning and problem solving skills in a sample of 7,000 twelfth graders, taught by 76 teachers in 66 high schools. Teachers received either a 40-hour, five-day, professional-development course in the PBL economics curriculum, or participated in their regular annual professional-development activities. Results indicated that both students and teachers benefited from the PBL curriculum. PBL students outscored students who received traditional instruction on the standardized Test of Economic Literacy, and a test of applying economic concepts to solve real-world economic challenges. PBL teachers reported higher satisfaction with materials and methods.


Geier, R., Blumenfeld, P. C., Marx, R. W., Krajcik, J. S., Fishman, B., Soloway, E., & Clay-Chambers, J. (2008). Standardized test outcomes for students engaged in inquiry-based science curricula in the context of urban reform. *Journal of Research in Science Teaching, 45*(8), 922-939. Researchers from the University of Michigan, the University of Arizona, and Detroit Public Schools studied 5,000 students in grades seven and eight in 18 historically underserved middle schools who learned science with traditional instruction or the LeTUS inquiry-based science curriculum. Developed by the Center for Learning...
Technologies in Urban Schools, LeTUS consists of eight- to ten-week units such as What Is the Quality of Air in My Community? What Is the Water Like in My River? and Why Do I Need to Wear a Helmet When I Ride My Bike? and is aligned with professional-development activities (e.g., week-long summer institutes, monthly Saturday workshops, teacher discussion groups, online resources, and classroom support by graduate students and peer teachers). The inquiry-based science students scored higher on the high-stakes state assessment, and these gains lasted up to one and half years. The authors concluded that when the curriculum is highly specified, developed, and aligned with professional development and administrative support, the use of standards-based, inquiry-science curriculum can lead to standardized achievement test gains in historically underserved urban students.


Hattie, J. (2008). Visible Learning: A synthesis of over 800 meta-analyses relating to achievement. New York, NY: Routledge. Hattie points out that in education most things work, more or less. The questions are around those things that work best and therefore best repay the effort invested. Hattie analyzed a total of about 800 meta-analyses, encompassing 52,637 studies, 146,142 effect sizes, and millions of students (p. 15). According to Hattie, the simplest prescription for improving teaching is to provide "dollops of feedback." Providing students with feedback had the largest effect size on learning of any intervention studied.

Halvorsen, A., Duke, N. K., Brugar, K. A., Block, M. K., Strachan, S. L., Berka, M. B., & Brown, J. M. (revised 2014). Narrowing the achievement gap in second-grade social studies and content area literacy: The promise of a project-based approach (PDF). Theory and Research in Social Education, 40, 198-229. Two project-based units in content literacy plus three of the five strands of the Michigan second-grade social studies curriculum (economics; civics and government; and public discourse, decision making, and citizen involvement) were taught to second-grade children in low-SES school settings in Michigan. The outcomes on standards-based social studies and content literacy assessments rendered statistically insignificant the achievement gap between second graders in very low-SES and very high-SES school districts.

Hernandez-Ramos, P., & De La Paz, S. (2009). Learning history in middle school by designing multimedia in a project-based learning experience (Abstract). Journal of Research on Technology in Education, 42(2), 151-173. Researchers from Santa Clara University and the University of Maryland compared learning outcomes for eighth graders who completed a six-week unit on early 19th-century U.S. history using traditional instructional methods versus project-based learning. In the PBL curriculum, groups of students created mini- documentaries, constructing an interpretation of a historical time period from the 1800s, with state standards as the basic required content guides, and public presentation. Results showed significant gains in content knowledge and historical-thinking skills for students engaged in the PBL curriculum as compared to students who received traditional instruction.


Johnson, D.W., & Johnson, R. T., 2009. An educational psychology success story: Social interdependence theory and cooperative learning (Abstract). Educational Researcher, 38(5), 365- 379. This article provides a qualitative review of findings from more than 1,200 research studies conducted in the past 11 decades on cooperative, competitive, and individualistic efforts. The authors describe the findings and implications of this vast body of research for educators. For small groups working together over a class period to several weeks, the authors recommend (1) structuring group work, (2) explaining the task and positive interdependence, (3) monitoring students' learning and intervening to provide assistance and
increase interpersonal group skills, and (4) evaluating students' learning and helping students process how well their group is doing.


Kolodner, J. L., Camp, P. J., Crismond, D., Fasse, B., Gray, J., Holbrook, J., Puntambekar, S., & Ryan, M. (2003). *Problem-based learning meets case-based reasoning in the middle-school science classroom: Putting Learning by Design into practice (PDF).* *Journal of the Learning Sciences, 12*(4), 495-547. Researchers at Georgia Institute of Technology studied 240 middle school students who learned science in groups of four via Learning by Design (LBD) or traditional methods with matched teachers. LBD students learned science content as well as or better than comparison students, and these gains were often largest among the most socioeconomically disadvantaged students. LBD students also performed significantly better than non-LBD students at collaboration skills, metacognitive skills (i.e., checking work), and science skills (i.e., designing fair tests, justifying with evidence, and explaining). Visit this Web page for further information on LBD.

Krajcik, J. S., Blumenfeld, P. C., Marx, R.W., & Soloway, E. (1994). *A collaborative model for helping middle grade science teachers learn project-based instruction (Abstract).* *The Elementary School Journal, 94*(5): 483-497. The authors describe the essential elements for project-based learning, and how middle school teachers learned to teach with project-based learning through collaboration, classroom enactment, and reflection.


Lou, Y., Abrami, P.C., Spence, J. C., Poulson, C., Chambers, B., & d'Apollonia, S. (1996). *Within-class grouping: A meta-analysis (Abstract).* *Review of Educational Research, 66*(4), 423-458. Lou et al. summarized studies comparing grouping versus no grouping, and homogeneous versus heterogeneous grouping, at the primary, secondary, and post-secondary levels. Overall, results showed a slight advantage of grouping as compared to non-grouping in promoting student learning, with large variability in the effect sizes. The gains from within-class grouping were greater in math and science than in reading, language arts, and other subject areas. Low-, medium-, and high-ability students all seemed to benefit from being taught in small groups. Low-ability students performed better in heterogeneous as opposed to homogeneous groups (mean effect size=0.60), medium-ability students performed better in homogeneous groups (mean effect size=0.51), and high-ability students performed equally well in either type of group (mean effect size=0.09).


Maxwell, N., Mergendoller, J. R., & Bellisimo, Y. (2005). *Problem-based learning and high school macroeconomics: A comparative study of instructional methods.* *The Journal of Economic Education, 36*(4), 315-331. Researchers at California State University, East Bay; the Buck Institute for Education; and the College of Marin analyzed data from 252 economics students at 11 high schools, while controlling for individual characteristics, such as verbal ability. PBL modestly increased learning of macroeconomics at
the high school level as compared with traditional classes. Findings suggest that problem-based instruction can improve student learning if instructors are well trained in both the PBL technique and economics.

Mergendoller, J. R., Maxwell, N. L., & Bellisimo, Y. (2006). The effectiveness of problem-based instruction: A comparative study of instructional methods and student characteristics. *Interdisciplinary Journal of Problem-based Learning, 1*(2). Five veteran teachers at four high schools taught macroeconomics using PBL with one or more classes and traditional lecture format in another class. Results from 246 students in 11 classes who completed a pre- and post-test showed that PBL was more effective than traditional instruction in teaching macroeconomics concepts.

Mergendoller, J. R., & Thomas, J. W. (2005). Managing project-based learning: Principles from the field (PDF). Based on the Buck Institute for Education's extensive fieldwork in schools seeking to implement PBL methods, the authors report seven themes and 18 sub-themes systematically derived from 12 teacher interviews. Useful tips from veteran PBL teachers are organized around themes such as Getting Started, Creating a Culture of Self-Management, Managing Student Groups, Technology, and Assessment/Evaluation. Teachers emphasized time management (setting the number of days and then building in a 20 percent overrun), flexibility (being prepared to give alternative instruction to reinforce subject matter versus knowing when to maintain a deadline), and priming (starting project dialogue and setting expectations early).

National Clearinghouse for Comprehensive School Reform. (2004). *Putting the pieces together: Lessons from comprehensive school reform research* (PDF). Washington, DC. The strongest models that are not direct instruction included Success For All; Highly Promising Evidence of Effectiveness. Models in this category are those that had positive and statistically significant results from comparison or third-party comparison studies but did not have research bases that were as broad and generalizable as those of the models that met the highest standard.

Newmann, F. M., & Wehlage, G. G. (1995). *Successful school restructuring: A report to the public and educators*. A five-year study by the University of Wisconsin's Center on Organization and Restructuring of Schools found that structural school reform only works when (1) students are engaged in activities that build on prior knowledge and allow them to apply that knowledge to new situations, (2) students use disciplined inquiry, and (3) school activities have value beyond school. Even innovative school improvements, such as portfolio assessment and shared decision making, are less effective without accompanying meaningful student assignments based on deep inquiry. Researchers analyzed data from more than 1,500 elementary schools, middle schools, and high schools and conducted field studies in 44 schools in 16 states between 1990 and 1995.


Parker, W., Mosberg, S., Bransford, J., Vye, N., Wilderson, J., & Abbott, R. (2011). Rethinking advanced high school coursework: Tackling the depth/breadth tension in the AP U.S. Government and Politics course. *Journal of Curriculum Studies, 43*(4), 533-559. Researchers from the University of Washington, the Bellevue Schools Foundation, and The George Lucas Educational Foundation conducted a multiyear study to test a rigorous project-based learning approach to teaching Advanced Placement (AP) U.S. Government and Politics. Three hundred fourteen students from Washington's Bellevue School District were randomly assigned to a traditional course or project-based learning course on AP U.S. Government and Politics (AP+). The PBL course included five project cycles: (1) role-playing a United
Nations task force advising a new nation on the various forms and features of democracy, (2) proposing a public policy and actions to improve society, (3) role-playing legislators in the U.S. Congress, (4) role-playing party campaign strategists in an election, and (5) role-playing a Supreme Court case. The PBL students performed as well as or better than traditionally taught students on the AP test and better on a complex scenario test, which measures strategies for realistically monitoring and influencing public policy. More information on the project is available on Edutopia.


Slavin, R. (1991). Synthesis of research of cooperative learning (PDF). Educational Leadership 48(5), 71-82. For enhancing student achievement, the most successful cooperative learning approaches have incorporated two key elements: group goals and individual accountability. Consistently, cooperative-learning effects have been found on outcomes such as self-esteem, intergroup relations, acceptance of academically handicapped students, attitudes toward school, and ability to work cooperatively.

Slavin, R. (1996). Research on cooperative learning: What we know, and what we need to know (Abstract). Contemporary Educational Psychology 21, 43-69. In this article, Slavin presents two essential components that are necessary for effective group work.


Strobel, J., & van Barneveld, A. (2009). When is PBL more effective? A meta-synthesis of meta-analyses comparing PBL to conventional classrooms (Abstract). The Interdisciplinary Journal of Problem-Based Learning, 3(1). Researchers from Purdue University and Concordia University synthesized eight meta-analyses of PBL studies spanning 40 years in order to evaluate the effectiveness of problem-based learning and the conditions under which PBL is most effective. The meta-analyses included medical students and adult learners in postsecondary settings. PBL was more effective than traditional instruction for long-term retention, skill development, and satisfaction of students and teachers. Traditional approaches, on the other hand, were more effective for improving performance on standardized exams, considered by the researchers as a measure of short-term retention.


Thomas, J. W. (2000). A review of research on project-based learning (PDF). This review defines PBL as involving projects that are complex tasks, which typically results in a realistic product, event, or presentation, which is central to the curriculum, and which is organized around a driving question that leads to central principles or concepts of a discipline. PBL is student driven and constructive, involving inquiry, investigation, knowledge building, and resolution. PBL students are responsible for making choices and designing and managing their work, and they experience gains in factual learning that are equivalent or superior to those experienced by students engaged in traditional learning.

Walker, A. & Leary, H. (2009). A problem-based learning meta-analysis: Differences across problem types, implementation types, disciplines, and assessment levels (Abstract). Interdisciplinary Journal of Problem-Based Learning, 3(1): 12-43. In a meta-analysis of 82 studies, 201 outcomes favored problem-based learning over traditional instructional methods. The authors review a typology of 11 problem types proposed by Jonassen (2000), which range from highly structured problems (focused on an accurate and efficient path to an optimal solution), to "ill-structured" problems (which do not necessarily have solutions and which prioritize evaluation of evidence and reasoning). The typology includes: logical problems, algorithmic problems, story problems (which are algorithmic problems with a story wrapper), "rule-using" problems, decision-making problems (e.g., cost-benefit analysis), troubleshooting (systematically diagnosing a fault, eliminating a problem space), "diagnosis-solution" problems (characteristic of medical
school, which involve small groups understanding the problem, researching different possible causes, generating hypotheses, performing diagnostic tests, and monitoring a treatment to restore a goal state), strategic-performance, case analysis (characteristic of law or business school, which involve adapting tactics to support an overall strategy and reflecting on authentic situations), design problems, and dilemmas (such as global warming, which are complex and involve competing values, and which may have no solutions). Strategic-performance and design problems were deemed most effective in producing positive PBL outcomes.


Zimmerman, B. (2002). Becoming a self-regulated learner: An overview (PDF). Theory into Practice 41(2), 64-70. Self-directed learners are more likely to succeed academically and view their futures optimistically.