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# Pedagogy of Curiosity: Initial Explorations of Instructional Practice in a Critical Thinking and Curious Classroom

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PEDAGOGY OF CURIOSITY:

INITIAL EXPLORATIONS OF INSTRUCTIONAL PRACTICE A CRITICAL THINKING

AND CURIOUS CLASSROOM

by

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SYNTHESIS*
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Abstract:  Through research on critical thinking, instructional practice, and curiosity I have developed the Pedagogy of Curiosity. This approach is implemented in the Curious classroom and a workshop for secondary teachers. The Curious classroom creates a structure and focus to encourage and develop curiosity and critical thinking of students. A questioning and research design redefines the learning expectations and the corresponding teacher and student roles in the classroom. An environment is constructed for students to take steps to become autonomous reflective learners.

This synthesis identifies two sources that inform my endeavor: 1) The accountability and results driven focus of No Child Left Behind has led to a narrowing of instructional practice and curriculum. Public secondary education classes have struggled to provide curriculum that addresses student thinking and curiosity; 2) I was once an average uninspired student who struggled to find motivation to study or even care about learning.  Luckily, starting in college, certain

significant influences fundamentally changed how I now perceive learning, education, and thinking.   The most recent influence has been the Critical and Creative Thinking graduate program, a place where being unsure and uncertain is accepted and even encouraged because that is where meaningful change and growth begin.

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* The Synthesis can take a variety of forms, from a position paper to curriculum or professional development workshop to an original contribution in the creative arts or writing.  The expectation is that students use their Synthesis to show how they have integrated knowledge, tools, experience, and support gained in the program so as to prepare themselves to be constructive, reflective agents of change in work, education, social movements, science, creative arts, or other endeavors.

Learning—my own and that of my students—has been central to my profession of teaching. I have come to realize that I have spent the majority of my time and effort on teaching information rather than developing learners. The question I began to ask myself is: what impact does teaching information have on student learning? One significant connection and observation I have made throughout my career is that many students are not intellectually curious. In a school and classroom setting, many students struggle to express genuine wonder and engagement in the content they are expected to learn. There are numerous explanations cited such as the lack of relevance of the content, little academic challenge, and the repetitive nature of activities and assignments. Disrupting these patterns is a challenge in public education in recent years because of the influence of the No Child Left Behind Legislation. It is, however, the challenge I take up in developing what I call Pedagogy of Curiosity.

One of the quotes popularly attributed to Einstein says, "Free curiosity has greater power to stimulate learning than rigorous coercion" ("Quotes About Curiosity (352 quotes)," n.d.). Curiosity may be defined as the deep and persistent desire to know and understand (Austin, n.d.). It drives meaningful learning and thinking by prompting proactive and intentional behaviors in activities that are novel, complex, and ambiguous (Kashdan, Rose, & Fincham, 2004). Researchers have found intellectual curiosity is associated with improved engagement, learning, and academic success (Harackiewicz, Barron, Tauer, & Elliot, 2002; von Stumm, Hell, & Chamorro-Premuzic, 2011). Curiosity is associated with many of the dispositions teachers want to see in their students. Curriculum should be designed to encourage curiosity through the structure and organization of the course and the activities.

**Background**

This has been a difficult task in public education in recent years because of the influence of the No Child Left Behind Legislation. Discussion and policy changes position much of public education in transition from NCLB's focus of accountability based in assessing content knowledge and facts to Common Core Standards' focus on thinking and college-and career readiness. As a result, I support and am encouraged by

the transition to Common Core. NCLB's emphasis on "the answer" implies a narrow definition of learning to what can be recalled for an exam which neglected the development of a student's learning process, thinking, and reasoning (Chalukian, 2013b). With the increased accountability pressure from the NCLB legislation, many district and school administrators encouraged curriculum be built to increase test scores by focusing on test items. As Popham points out, "teachers organize their instruction around either around actual items found on the test or around a set of look-like items."(2001) This "what to know" perspective centers its focus on content knowledge with a goal of what the students' need to know or remember for an exam. It comes from the assumption that learning begins with content knowledge and ends with answer to be recalled or solved with a memorized step-by-step process. Understanding and depth of knowledge are a constant struggle and rarely addressed in a purposeful way.

As a result, many educators utilize a limited number of traditional instructional strategies to increase retention.(Laitsch, 2006) The teacher becomes the delivery system of information, whether that is through lecture, text driven materials, answering questions, or review of class activities. The school day is largely composed of sitting, listening, taking notes, and completing worksheets. Student learning is prescriptive, repetitive, and lacks the variety to create authentic interest, thinking, and engagement as illustrated by this vignette.

> Mr. Jones begins class with bell work reviewing the previous day's content. The teacher prompts a small class discussion and takes volunteers to answer the question. He then reviews the learning objective and content standard for the day's lesson. Mr. Jones then opens a presentation and lectures for 30 minutes. Students copy the information and rarely ask questions. A handout is distributed for the students to complete independently. Finally, homework is assigned and students are reminded to study.

In classrooms like this information only goes one direction, from the teacher to the student. Learning is stagnant and uninspiring because it repetitive and provides little opportunity to think critically. Consequently, student motivation, interest, and curiosity suffer and dissipates in the "what to know" perspective. This perspective will not be

effective with the educational changes instituted through Common Core.  Educators must reevaluate their teaching practice to address the new focus and changes in expectation.

The transition to Common Core positions education on the cusp of a fundamental transformation.  The primary goals, purpose, and assumptions of NCLB and the "what to know" perspective that guide teaching and curricular decisions are being discussed through a new lens.  Common Core's College and Career Readiness Standards create an expectation of thinking, reasoning, understanding, communication, and collaboration.   These are standards that aim to develop what students can do through Literacy and Mathematical Practice anchor standards concentrated on reading, writing, speaking, listening, processes, and proficiencies ("Common Core State Standards - Resources (CA Dept of Education)," n.d.).  This describes foundational components of the "how to know" perspective, where the goal is developing students' learning process and the ability to acquire content with deep and meaningful understanding(Paul & Elder, 2005).  Content knowledge is utilized as an avenue to cultivate thinking and academic skills.

The "how to know" perspective is learner-centered emphasizing collaboration and inquiry as the principal content delivery system.  The teacher's role is that of an academic coach and facilitator of thinking.  To scaffold questioning and reflection to guide students through inquiry and to help students develop and refine their own learning process.  To accomplish this a teacher would need to expand and diversify their instructional practice incorporating strategies like Socratic seminar, problem-solving, real-life application, and decision making activities.  These types of activities inherently address student interest, motivation, and curiosity by instilling a responsibility and autonomy over their own learning. To implement the "how to know" perspective into a classroom and instruction will require a paradigm shift in educational assumptions, instructional goals, classroom structure, lesson planning, and student and teacher roles.  Ultimately, for educators to adequately address the rigors of Common Core, they must create an environment that creates, encourages, and cultivates curiosity by developing autonomous reflective learners/thinkers.  I understand this because of my own development and educational experience.

**Motivation for change**

        I am a product of the American public education system from primary school through graduate school.  In my educational experience, the majority of classes were largely based in traditional instructional strategies discussed earlier.  I was an average uninspired student who struggled to find motivation to study or even care about learning.  My interest waned and I lacked the curiosity to ask questions to understand, inquire, and explore.  There have been six significant influences that have fundamentally changed how I perceive learning, education, and thinking.

        In my college years, Daniel Quinn's *Ishmael* and my studies as a history major offered me a continuous lesson in perspective.  It allowed me to assess my frame of reference as an American to develop an awareness of personal and cultural bias.  Early in my teaching career I was assigned to teach AP Psychology.   Psychology introduced me to the complex world of science, humanity, and critical thinking.  I was amazed to learn about and teach topics like the biological basis of behavior, personality, the fallibility of memory, and thinking.  Much of what I thought I knew was based in anecdotal experience and faulty reasoning.  It challenged me to evaluate what I know, how I know it, and the belief system that guides it all.  Dr. Dean Edell's radio show and the Skeptics Guide to the Universe Podcast brought applied critical thinking and questioning into focus in the context of evolution, vaccinations, and other science related topics influencing me to think about my decisions and viewpoints.

        A chance dialogue with a colleague inspired an examination of my pedagogy and teaching philosophy emphasizing teaching and developing student thinking.  He articulated what I could only think about, but not quite piece together as a unified idea.  This colleague introduced me to Richard Paul's work, which offered a structure to organize and purposefully improve my thinking.  Lastly, I enrolled in the Masters program in Critical and Creative Thinking at University of Massachusetts, Boston.  The CCT program has unified the previous experiences to help build a clear and ever evolving understanding of critical thinking. My perspective has extended beyond Paul to give me a more complete and well-rounded foundation to develop and refine my own thinking, perspective, theory, and reflective practice.

All of these experiences have built a purposeful reflective critical thinking approach. My introspective nature has a purpose and it is through this reflective process that I continue to grow as a learner and person. I am not always consistent in application, but the most striking thing is how much my outlook and perspective has changed. I am genuinely interested and curious in the creative and incredible, but also in mundane daily decisions and situations. I can now see implications and consequences, question poor reasoning and decisions, identify logical fallacies, and most importantly reflect on my own thinking and choices with a more critical eye. I think in questions and seek to understand, just because I want to learn. It feels as if the world is opened up to me. As an educator, I want to share this feeling and understanding with others and to guide students to develop into autonomous reflective learners. The classroom should be a place of curious inquiry where students learn through research, collaboration, questioning, and experience. Where wonder and exploration underlie and guide instruction. To address this I have developed the Pedagogy of Curiosity to be implemented in the Curious Classroom. This framework will also be the foundation for a workshop for secondary teachers to reflect on and rethink their instructional practice in terms of developing learners.

### Pedagogy of Curiosity: The Curious Classroom

The "how to know" perspective is the foundation of a pedagogy that focuses on student learning, thinking, and inquiry. The Pedagogy of Curiosity follows this reasoning, but is centered on creating an environment of active curious engagement. Active curious engagement is characterized by:

- Learning is a result of active participation, active thinking, active questioning, and focused collaboration.
- Teacher and students take ownership and reflect upon the learning process, as individuals and groups.
- Students utilize inquiry-based research strategies and critical thinking as the means to build knowledge and understanding.
- Teacher takes the role of an academic coach, facilitator, and model of questioning/thinking.

These characteristics illustrate an effort to challenge the assumptions, practices, and roles of the "what to know" perspective and the traditional classroom. There is a shift of responsibility from the teacher to the student as the source of knowledge and information. Students acquire knowledge and information through research strategies, inquiry, exploration, and collaboration. The teacher structures the class and its activities to utilize and apply this knowledge to scaffold the development of academic skills and student thinking. This will allow the students to build and refine their own learning process and reflective practice throughout the school year emphasizing intellectual growth and continuous incremental improvement. The teacher workshop follows the same philosophy. The participants are supported through a series of activities designed to create professional introspection and reflection. The goal of which is to create a safe and curious environment that allows teachers to rethink pedagogy and instructional practice. To accomplish these goals the Curious Classroom and the workshop focus on Instructional and Learning focus.

**Instructional and Learning Focus**

The Instructional and Learning focus is learner-centered approach where the components of class structure and organization, collaboration, and research to understand work in concert to create an environment and expectation of active curious engagement. The student takes the collaborative role of a researcher or investigator utilizing the text, class activities, and lectures as a series of resources to build their evidence of understanding. Students then use this evidence to develop conclusions, think through implications, make decisions, and solve problems. Then students reflect on their learning process to emphasizing continuous improvement and growth.

**Class Structure and Organization**

The structure and organization of the curious classroom is vital in creating an environment of active curious engagement. Teachers must be deliberate in their unit and lesson planning to provide students with purpose, active learning, and a culture of wonder. Wonder is fostered through questioning. Therefore, it stands to reason, learning in a classroom should be constructed around asking questions rather than giving answers. Traditional unit and lesson planning is answer-driven. It begins and ends with

answers in the form of content standards and learning objectives focusing on recall and in many cases a shallow understanding of the material. The curious classroom is question-driven, which will encourage curiosity among other learning goals. Unit planning, lesson planning, and student learning are organized, presented, and developed in a question format or as a hierarchy of questions. Building the curriculum around questioning implies an inquisitive nature to learning that will produce more and more questions. As Ritchhart, Church, & Morrison(2011, p.1) point out,

> The importance of curiosity and questioning in propelling learning is easily seen in our experience as learners. We know that when our curiosity is sparked and we have a desire to know and learn something our engagement is heightened… The questions we ask at the outset of a learning journey change, morph, and develop as the journey moves forward. Even after extensive efforts to develop understanding, we find that we may be left with more questions than when we started, These new questions reflect our depth of understanding.

*Question Format*

The question format organizes learning for the teacher and students. As we can see in the illustration, the content is framed by the *essential question* and the *focus questions*. How to know, or how students approach an activity and their learning process is framed by the *questions to know*. Each unit is framed with an *essential question*. This *essential question* is open-ended focusing on overarching themes or ideas(McTighe & Wiggins, n.d.). These are designed to spark interest and curiosity by dealing with philosophical questions and situational real-world application centered on the human experience. Because of the expansive nature of the *essential question* students will have to think through multiple lines of evidence and perspectives to develop their own conclusion, solution, or decision. These lines of evidence are gathered from the daily lessons and activities of the unit. Lessons and activities are guided and framed by *focus questions*(Obenchain, Orr, & Davis, 2011).
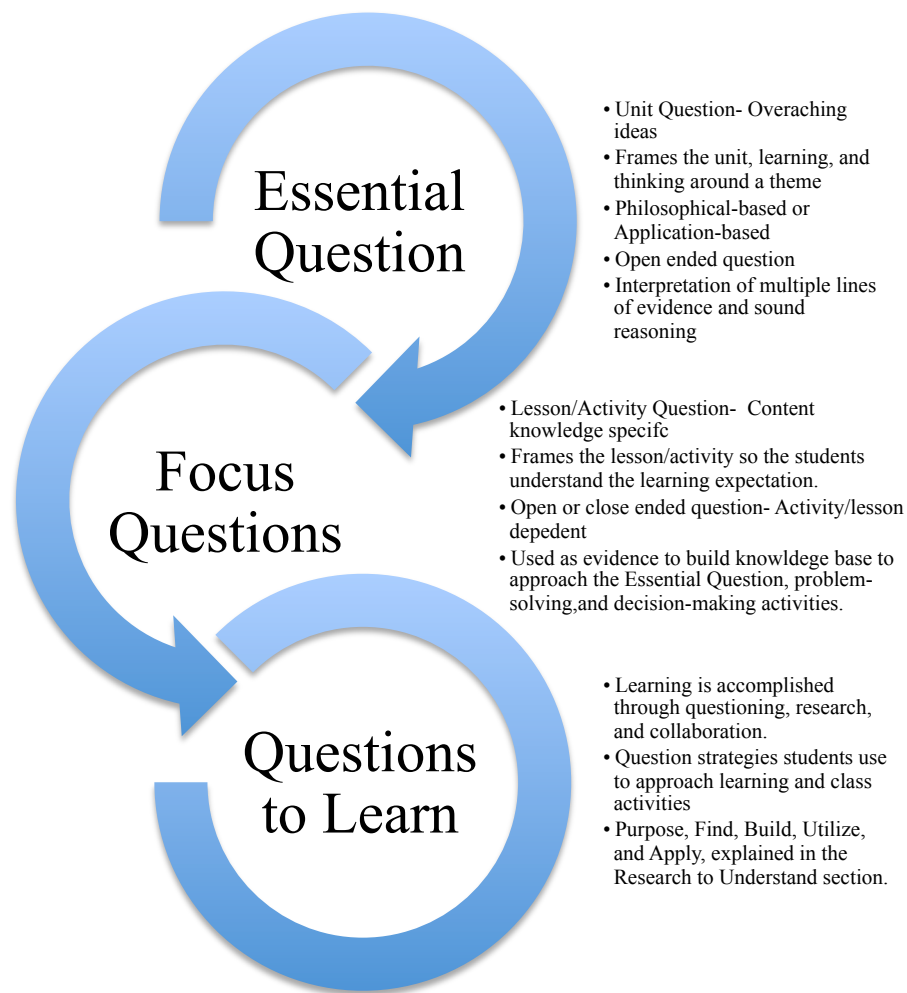
Essential Question

Focus Questions

Questions to Learn

- Unit Question- Overaching ideas
- Frames the unit, learning, and thinking around a theme
- Philosophical-based or Application-based
- Open ended question
- Interpretation of multiple lines of evidence and sound reasoning

- Lesson/Activity Question- Content knowledge specifc
- Frames the lesson/activity so the students understand the learning expectation.
- Open or close ended question- Activity/lesson depedent
- Used as evidence to build knowldege base to approach the Essential Question, problem-solving,and decision-making activities.

- Learning is accomplished through questioning, research, and collaboration.
- Question strategies students use to approach learning and class activities
- Purpose, Find, Build, Utilize, and Apply, explained in the Research to Understand section.

*Illustration 1*

The *focus question* is a content and lesson specific question that drives the daily learning expectation for the lesson.  They can be open or close-ended questions with a reliance on higher order thinking.  Each unit is a research project and each activity is a resource aimed for students build a body of evidence to form conclusions to address the focus question and essential question.  Students utilize *questions to learn* to complete and think through the activities.

The *questions to learn* are a series of six foundational questioning strategies that scaffold the learning, critical thinking, and improvement process(Browne & Keeley, 2001; R. Paul & Elder, 2005; Ritchhart et al., 2011).  The six strategies of purpose, find,

build, appraise, utilize, and improve are explained in detail in the research to understand section.  The question format changes the learning expectation of the classroom. Learning is no longer a static definitive process, but a progressive, active process accomplished through research, inquiry, and collaboration.  The transition from giving answers in the traditional classroom to asking questions in the curious classroom implies that learning is an ongoing process that seems to have no end.  Learning is about finding, interpreting, and thinking as opposed to receiving, recalling, and reciting transitioning the responsibility of learning from the teacher to the students.  This responsibility is a by-product of the level of student engagement.  Teachers can have a huge impact on engagement by how they structure the lesson and class period.

*Scaffolding lesson plans and instructional time*

An important facet of structure and organization is scaffolding the lesson plan and the instructional time.  In the curious classroom, lessons are broken up into smaller parts. Each of these smaller parts becomes a mini lesson.  The mini lessons are designed to build upon one another to target, scaffold, and develop specific academic skills, student thinking, and content knowledge. For example, a traditional lesson could incorporate three academic skills and three separate tasks for students to complete. The breadth of the lesson and the perceived amount of work involved overwhelms many students. In many cases students give up before they ever start. In contrast the mini lesson design allow students to approach each component individually making it seem more accessible because it is presented in smaller parts while using transitions to make the necessary connections between tasks.

Each mini lesson has a specific time limit. Time intervals range from 5 to 30 minutes.  This structured time driven by limiting the amount of time a student has to complete a task it creates a focused sense of urgency.  This allows multiple opportunities to incorporate collaboration each day.  If necessary, additional time can be added if the task is more difficult for the students than expected.   Time limits have another advantage; it is an easy and effective way to incorporate novelty and differentiated instructional strategies into daily practice.  For instance, it allows teachers to intentionally

incorporate structured collaboration in each day. By moving from mini-lesson to mini-lesson, teachers can purposefully build in multiple activities during a period students will see content in different modalities increasing engagement and student interest.  As Creemers & Reezigt (1996) state, "effective teachers are able to organize and manage the classroom environment as an efficient learning environment and thereby maximize engagement rates." (as cited in Kyriakides, Christoforou, & Charalambous, 2013) This structure creates an environment for active learning, but how the teacher approaches student learning is essential in consistent engagement.  One of the guiding principles of the curious classroom is moving learning from as an individual endeavor to a collaborative experience.

*Collaboration*

Traditional curriculum focuses on the teacher student relationship. Specifically, the teacher serving as the content expert whose major task is to impart knowledge to the students.  From my experience as a teacher and academic coach, collaboration is typically small groups that are primarily concerned with division of labor, finding answers, and completing assignments.  Student discussion centers on answers and completion rather than understanding.  This focus does not offer the students the meaningful opportunity to consistently hear multiple perspectives and approaches in the academic setting.  As Webb (2008) points out, "small groups, students exchanged low- level information such as answers and procedural descriptions much more frequently than explanations, they rarely shared their thinking and problem-solving strategies or probed others' thinking, and many students participated little if at all."

In the curious classroom, collaboration is a network of thinking, inquiry, and learning.  The goal of collaboration is the development of understanding, continuous improvement, and growth.  The collaborative network implies a shared responsibility of learning because everyone is connected.  This is built upon the concept of collaborative humility discussed earlier; where students and teachers castoff and overcome the traditional teacher-student roles. The environment encourages and supports students to leave behind the preconceptions of the right answer and the smart kids.  In part this is accomplished by crafting opportunities for students to develop a comfort with ambiguity,

an acceptance of confusion and mistakes, and a willful wonder.  In a supportive environment, these experiences will cultivate trust, teamwork, and empathy amongst classmates and teachers.   Students will utilize multiple perspectives to develop better questions and learn to think through class activities.  In doing so, they will be construct more well rounded foundational knowledge transitioning the classroom to a place where all members of the network work as a part of a community to develop and evolve as learners and thinkers.

The teacher plays a vital role as a model for collaborative humility.  He or she must rethink the traditional role of the content expert and answer giver.  Webb(2008) points out, "In particular, our results show correspondences between the ways in which teachers elicit student thinking during both whole-class and small-group instruction, the extent to which students explain their thinking when working with other students, and student achievement." Evolving into a facilitator of student exploration, inquiry, and discovery.  To encourage and illustrate this concept a teacher can:

- ask questions to understand and challenge students thinking and conclusions.
- say "I am not sure.  How can we find out?"
- admit confusion and mistakes
- acknowledge the vulnerability in being unsure and not knowing in the class and group setting.
- reason and think aloud with groups and in class discussions.
- position teacher desk in the middle of class surrounded by groups of students.

Learning is no longer an individual activity, it is a process supported by the entire network. Collaboration is utilized in all facets of learning in the classroom and plays a significant part in the *Research and Reflect to understand* component of the Curious Classroom.

*Research and Reflect to understand*

In many classrooms, the "what to know" perspective has created a culture of learning dependency for many students.  The teacher is in control of learning and the primary source of knowledge. Students are passive learners who depend on the teacher

for learning and thinking.  In the curious classroom, these traditional teacher and student roles are flipped.  Students are active learners who develop the skills and the efficacy to take control of their own learning.  Learning is built on the premise that students build their own understanding and content knowledge through investigation, exploration, and inquiry.  The teacher is a guide of inquiry and a facilitator of questioning and research.  This is the essence of Research and Reflect to Understand, which is composed of two components, the reflective researcher role and questions to learn.

The *reflective researcher role* changes the expectation for students in the classroom.  Students build skills and knowledge through questioning and research.  The reflective researcher investigator role is a student centered learning approach. The question format that was discussed earlier builds research topics into the curriculum beyond surface knowledge to be recalled seen in the "what to know" perspective. This role is grounded on an information-seeking mind set with the goal of depth of understanding rather than the right answer. Students individually and in collaborative groups utilize the *questions to learn* to think through the content and activities.

All assignments and activities are interrelated, connected, and relevant to learning.  For the student and their groups, each assignment will produce information to be used as evidence.  For example, a teacher's lecture is a resource, just information to be used, not the answer from an authority.  Multiple lines of evidence are combined and interpreted to synthesize understanding of content material.   This gives the students a frame of reference to address the essential and focus questions from an informed position(Chalukian, 2013a; Obenchain et al., 2011).   From an informed position, students will build and evaluate arguments, conclusions, and decisions.  This will translate to culminating activities in which student will utilize and apply the gathered evidence in problem-solving and decision-making activities.  To transition students away from the idea of seeing assignments and activities as finding the "right answer" *Questions to learn* offers a different approach.  Learning is a process of purpose, finding, building, appraising, utilizing, and reflecting.

*Questions to learn* is aimed to develop and improve student learning and thinking. This is accomplished through questioning strategies developed from the critical thinking process(Browne & Keeley, 2001; Paul & Elder, 2005). The strategies will initially be used to guide students in their research, inquiry, and reflection. Throughout the year, students will be encouraged to build upon the basic structure of these questioning strategies with the goal of constructing their own personal inquiry methodology as well as self-reflection to continue develop as a learner.(Paul & Elder, 2006)

Questioning Strategies

1) *Purpose- What am I doing?*

- Students will use this strategy to understand the expectation and reasoning of assignments and activities. Also, students will use these to identify the academic skills and questioning strategy they will utilize to complete the assignment. (Chalukian, 2013b)

- *Critical thinking skills: Identifying purpose*(Paul & Elder, 2005)

- Sample Questions: What do the directions say? What is the FQ/questions at hand? Can I break the assignment into smaller parts? How does this assignment relate to the essential questions? Is this assignment fact gathering or interpretation? Do I need any previous assignments to complete this assignment? Do I need my text to complete this book? Do I need other sources to complete the assignment? What academic skills will I use? Is it an informational or argument based text? How does this assignment relate to the EQ? FQ? Do I use the Find, Build, Utilize, or Apply question strategies? What questions do I have about the assignment/activity?

2) *Find- What information do I need?*

- Students will use this strategy to identify and record relevant information used to complete an assignment. This information is base knowledge that will be combined to create evidence for addressing the essential and focus questions.

- *Critical Thinking Skills: Distinguishing relevant information, Identifying academic vocabulary, Observing closely and describing, Reading critically*(Paul & Elder, 2011; Ritchhart et al., 2011)

- Sample Questions: What is/are the key vocabulary/concepts? Can I paraphrase the terms/concepts? How can I clarify the meaning or concepts/vocabulary? Are there any similar concepts to which I can compare the vocabulary? Who are the key figures? What decisions did he/she make? What actions did he/she take? What actions or decisions contributed to the concept/event? What details do I notice while observing? Are there any changes during my observation? How clear, accurate, and specific am I in my description? Is it informational or presenting an argument?

3) *Build- How can I organize and interpret the information?*
   - Students will use this strategy to organize and interpret information from class activities to construct evidence for the unit.
   - Critical Thinking Skills: Building explanations and interpretations, identify claims and arguments, make connections, and identifying patterns(Paul & Elder, 2011; Ritchhart et al., 2011)
   - Sample questions: How does this assignment fit with the focus question and essential question? What is the author trying to say? What is the author trying to convince others to believe? What is the evidence? How is this similar to previous situations/content? How are people, decisions, and events related?

4) *Appraise- How do I know the evidence is accurate and reliable?*
   - Students will use this strategy to evaluate the quality, accuracy, reliability, and point of view of the information/evidence collected.
   - *Critical Thinking Skills: evaluating evidence, claims, and arguments, considering perspective, comparing similarities and differences* (Paul & Elder, 2011; Ritchhart et al., 2011)
   - Sample Questions: Is this source providing accurate information? Is there reason to be skeptical of the information? How can I evaluate the accuracy of the information? Are there other sources for this event/concept? Is the account of other sources similar or different? How? What is the source's point of view? Does this create a conflict of interest? Does his/her point of view influence the delivery or interpretation of facts/evidence? Who is the author? Are they an expert/witness/participant?

5) *Utilize- How can I use my evidence to develop my thinking and understanding?*

- Students will use this strategy utilize evidence or skills to create counter-arguments, identify implications, solve problems, make decisions in content-related and real-life application activities.

- *Critical thinking skills: making generalizations, reasoning with evidence, thinking through implications and inferences, generating possibilities and alternatives*(Paul & Elder, 2011; Ritchhart et al., 2011)

- Sample questions: Where does the evidence take my thinking? How does the evidence relate to the EQ/FQ? Am I noticing any common themes? Is there another perspective to consider? What are the consequences? What is the problem? Who are the concerned parties? How are the parties affected by the problem? Occam's razor: what is the simplest, most obvious solution? Why won't it work? Can the problem be broken into smaller parts? What is the goal? What information do I need? What are the options? What are the positive and negative aspects of each option?

6) *Improve- How can I continue to develop and grow as a learner?*

- Students will use this strategy to evaluate, reflect on, and refine their thinking. Also, students will reflect on their role as a student inside and outside the classroom. Thinking about topics like class participation, collaboration, engagement, study habits, commitment, and thinking with a purpose of continuous improvement.

- Critical thinking skill: self-reflection, metacognition

- Sample questions: How well did I listen in class today? Did I ask question when I was confused? How much did I think about the topic/activity? How did I participate? Why did I earn the score on the quiz? What strategies do I use to learn and study? How often do I use these strategies? How much time do I spend outside of class? Am I being clear? Can I give examples or elaborate? Am I being precise? Can I give more detail or be more specific? Am I being accurate? Am I staying on topic? What makes the question complex? Am I considering the complexity of the question? Am I considering other perspectives? Are the other perspectives more reasonable than mine? Is my reasoning logical? Does my

argument follow the evidence?  How do I communicate with my group members?

**Conclusion**

In my experience as an educator, I have observed many inconsistencies in the delivery of instruction.  In many cases, a teachers assumptions and instructional practice have a significant impact of student learning.   I set out to create a curricular framework that could help teachers incorporate critical thinking into secondary classrooms.  Along the way, I believe I found something more valuable and relevant from my personal experience; that being curious and asking good questions are the basis of quality thinking and reflection, something I have steadily developed in the last ten years of my life.  That led me to ask: in what ways can I help students develop a purposeful curiosity to improve their thinking?  Curiosity is grounded in the desire to know and understand.  Educators can create an environment and build curriculum to encourage the development of an active curious engagement.

Approaching the Pedagogy of Curiosity from an Instructional and Learning perspective creates a well-rounded approach that addresses how the students experience and approach learning.  The key is to scaffold the learning process to encourage and cultivate curiosity.  The most significant part of the Curious classroom is the role of questions.  Questions serve as a frame for what the students will learn and how they learn it.  By introducing the learning objective as an essential question it takes the definitive nature away from the content knowledge and provides a sense of wonder.  The idea of one right answer is removed for a thought-provoking question that requires evidence, interpretation, and reasoning.  This is applied in the teacher workshop framing the goal of exploring instructional practice and pedagogy through this structure, as illustrated here and in the appendix.

- EQ:  How can an educators assumptions and instructional practice affect curiosity and learning?
    - FQ: How does questioning frame the instructional and learning expectation of a classroom?
        - Pedagogy of Curiosity Connection:  Question Format

- FQ: How can an educator improve engagement by the manner in which a lesson is implemented?
  - Pedagogy of Curiosity Connection: Scaffolding lesson plans and instructional time
- FQ: How does student interaction change the classroom dynamic and the learning process?
  - Pedagogy of Curiosity Connection: Collaboration
- FQ: How do the teacher and student roles influence the learning expectation and responsibility?
  - Pedagogy of Curiosity Connection: Research and Reflect to learn

The *Reflective Researcher* role and purposeful collaboration allow students to apply the *Questions to learn* provide the foundation for students' to construct knowledge through questioning. The workshop is designed for teachers to collaborate and to think their way through the activities. There is very little direct instruction with the exception of stating my personal background and the descriptions of the Pedagogy of Curiosity.

One area many teachers overlook is the structure of a lesson and instructional time. Scaffolding a lesson into three or four timed mini lessons will create novelty and allow the teacher to differentiate instruction daily. The students will be kept off guard and will continually wonder what is coming next. These components together will create a fast paced environment where learning, wonder, and thinking are the rule not the exception. The workshop is a series of seventeen mini lessons organized with time limits. The participants will be reading, writing, discussing, and reflecting in numerous intervals with frequent changes and transitions. Ideally, this will create a place where students and participants ask questions, listen to each other, believe in themselves, and become more reflective. This concept and goal should apply to schools as a whole.

**Next Steps**

*Professional Development and building a curious community:*

The accompanying training for secondary teachers is a collaborative exploration

into pedagogy, assumptions, implications, and instructional practice. The training is built using the Pedagogy of Curiosity to give the teachers the opportunity to experience the Curious classroom. Ultimately, each activity will build evidence to be used to evaluate and construct a modified instructional practice. In my role as an academic coach spanning two county offices of education and a trainer for the AVID, I have numerous avenues to explore in training teachers. I plan to approach county directors for the county offices of education and my previous school district to offer my services. This serves two goals: first, improving the instruction in secondary classrooms in my area. Second, and more importantly, building a collaborative community of teachers to create curious classrooms. Specifically, I would like to continue to develop this concept and structure to develop and refine the components to better fit with all content areas on a secondary campus. Additionally, I could explore what the curious classroom would look like in the primary and elementary grade levels.

*Refinement and further development*

Reflection and refining is what will bring significant change and improvement. One of the areas I already see that needs to be further developed is the Improvement idea. Initially, it was a focus area, but I decided to focus more on questioning in this project. Incorporating purposeful reflection into daily, weekly, and monthly practice for students is essential to their development. In my experience, students rarely reflect on their learning or decisions. Dweck's *Mindset*(2006) and metacognition research serve as a starting point to purposefully build student and teacher reflection into the curriculum. I am interested in investigating a feedback, grading, and evaluation system that looks at learning as a developmental process instead of a series of points, assignments, and assessments, taking into account how the student's skills, effort, and thinking have continued to progress throughout a unit, a semester, and a school year. If the goal is learning then the grade should reflect the improvement and growth a student experiences throughout the year.

As a part of this improvement evaluation system, there would be a feedback loop for all members of the class, students and teacher, to consistently provide feedback on

their work, collaboration, and thinking(Hattie, 2012 pg. 134).  Initially, feedback will be largely influenced by Paul's Intellectual Standards(Elder & Paul, 2008) and Ennis's Dispositions and critical thinking abilities (Ennis, n.d.) focusing on concepts such as clarity, accuracy, logic, and depth in terms of specific tasks.  This will be a vital component of the Curious classroom that allows the students to begin reevaluate themselves and develop metacognitive strategies to improve.  As an educator, this project and my continued research and reflection will provide an opportunity and environment for students to take steps to become autonomous reflective thinkers.

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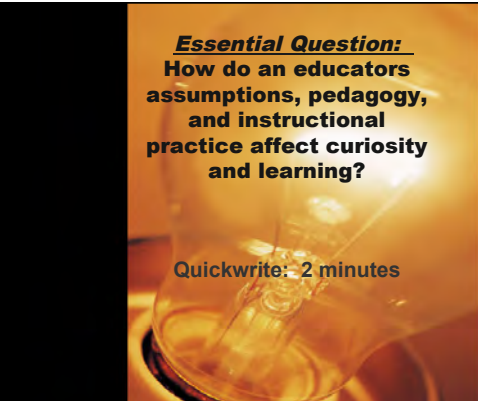## Workshop Presentation
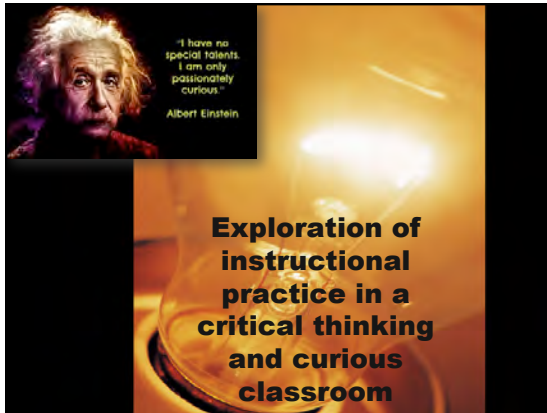
## Introductions

- Round 1:  2 minutes
  – Two people with the same shirt color/
    pattern as you.
  – Use your card as a reference
- Round 2: 4 minutes
  – Three people who have similar
    favorite food as you.
  – Use your card as reference

---

**Essential Question:**
**How do an educators
assumptions, pedagogy,
and instructional
practice affect curiosity
and learning?**

**Quickwrite:  2 minutes**

---

## Gallery Walk:
### Collaborative Exploration

- Count of by 6s
- Move to assigned to poster
- As a group:
  – Only use the top half of the chart
    paper
  –  answer the question
  – write additional questions to better
    address the question
- 2 minutes rotations

## Rotation 1
## 2 minutes

1st Rotation:
- What were the directions?
- How does this relate to the EQ and my quickwrite?
- What do I need to know to answer this question?

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## Rotation 2-6
## 10 minutes

- What were the directions?
- How does this relate to the EQ and my quickwrite?
- What did the previous group/s write?
- What do I need to know to answer this question?

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## Group analysis-
## 3 minutes

- **Using a blue marker**
  - Circle words/phrases that can grouped together
- **Using a green marker**
  - Identify contrasting words/phrases.
- **Using a red marker**
  - Underline the most significant question.

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## Group synthesis-
## 5 minutes

- Bottom half of the chart paper
  - Identify a theme, write a statement that summarizes the
  - Write one question for further investigation to develop a deeper understanding.

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## Walking to think and reflect
## 15 minutes

- Roam around the room and revisit the questions/posters. *8 minutes*
  - Record the ideas and topics that you would like to discuss, further investigate, or could impact your classroom.

---

- Table Reflection: *5 minutes*
  - Reviewing the essential question, what has this activity brought to light? Revisit the EQ and ,ake connections to your assumptions and instructional practice.
- Share out- *1 minutes*
- Individual Reflection- *2 minutes*
  - How engaged was I? How did I participate? How do I communicate with my group members?

## Personal Connection and Purpose

–Education/Teaching
–Autonomous Reflective Thinking
–Collaboration and Community

## Pedagogy of Curiosity

–Active Curious Engagement
–Collaborative Humility
–Reflective Autonomous Thinkers

## Curious Classroom

• Question Format
• Lesson Scaffolding
• Collaboration
• Research and Reflect to Learn

**FQ:  How does questioning frame the instructional and learning expectation of a classroom?**

- Philosophical Chairs
  - Review Philosophical Chairs materials pgs.
  - Central Statements:  Presenting content knowledge as learning objectives is essential to enhance learning.
  - Using pg.___, use the left column for agree and the right column for disagree.  Choose one

**Reminders**

- Five participants must speak on your side before, contribute a second time.
- Address the prompt, be aware of your inferences and implications.
- Paraphrase the previous speaker's point.
- You can change sides at any time.

**Reflection**

- Thinking about the EQ and FQ, how does this activity lead to questions about student learning?

**Break Time**

10:15-10:30

**FQ#1: How does questioning frame the instructional and learning expectation of a classroom?**

- Groups of 6
  – Pair up- Person A and Person B
- Reciprocal Reading
  – Everyone will read the first two paragraphs
    • *Person A:* paraphrase what you have read
    • *Person B: Question or Clarify what you have read*
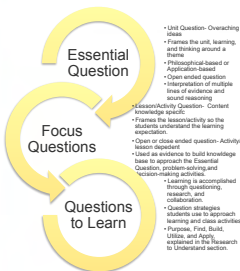  – *For the remaining reading switch roles every five minutes.*

**FQ: How does questioning frame the instructional and learning expectation of a classroom?**

- Table Groups
1. The Power of Essential Questions
2. The Past is a Puzzle #1
3. The Past is a Puzzle #2
4. Learning to love the questions #1
5. Learning to love the questions #2

**FQ: How does questioning frame the instructional and learning expectation of a classroom?**

- As a table group create:
  – 1-2 sentence summary
  – Illustration
  – Question
- Group Synthesis: How can questioning influence a classroom?
- Reflection:
  – Refer to FQ/EQ

**Curious Classroom: Question Format**

Essential Question
Focus Questions
Questions to Learn

Refer to pg.____

- Unit Question- Overarching ideas
- Frames the unit, learning, and thinking around a theme
- Philosophical-based or Application-based
- Open ended question
- Interpretation of multiple lines of evidence and sound reasoning
- Lesson/Activity Question- Content knowledge specific
- Frames the lesson/activity so the students understand the learning expectation.
- Open or close ended question- Activity/ lesson dependent
- Used as evidence to build knowledge base to approach the Essential Question, problem-solving, and decision-making activities.
- Learning is accomplished through questioning, research, and collaboration.
- Question strategies students use to approach learning and class activities
- Purpose, Find, Build, Utilize, and Apply, explained in the Research to Understand section.

**FQ#2: How can student engagement be impacted by the execution of a lesson?**

- Read *A veteran teacher turned coach…* -15 minutes
  – As you read:
    - **Underline** what the teacher did or experienced as a student
    - Circle realizations or how she felt.
  – With an elbow partner discuss: 5 min
    - what you underline and circled.
    - The FQ's relationship to the article

**Lunch Time**

**11:30-12:30**

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**FQ#2: How can student engagement be impacted by the execution of a lesson?**

- 6 Groups: Count off by 6s
- Groups1, 4- Key Take away 1
- Groups 2,5- Key Take Away 2
- Groups 3,6- Key Take Away 3
  - On a piece of Chart paper: 15 Minutes
    - What are the implications for students?
    - What can we infer about student engagement and curiosity?
    - How do the authors reflections influence your perspective and thinking?
    - What would you do?

---

**FQ#2: How can student engagement be impacted by the execution of a lesson?**

- Share out- 10 minutes
- Reflection: 5 minutes
  - Think about your experience as a student, your classroom, and the reading. Refer to EQ and FQ
  - How can you engage students with your class structure and lessons?

## Curious Classroom: Scaffolding Lessons

- Mini Lesson
  - Time limits
  - Differentiate instruction
  - Student motivation
  - Scaffolding academic load

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## FQ: How does student interaction change the classroom dynamic and learning process?

- Video Clip analysis:
  - Using the FQ as a guide, record your observations from the video.
  - Paying close attention to the student-student and student-teacher interactions.
- At your table:
  - Discuss:
    - Academic interactions
    - Where does the responsibility of learning lie? Provide evidence.

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## FQ: How does student interaction change the classroom dynamic and learning process?

- Reading: 15 minutes
  - Collaborative Learning Enhances Critical Thinking
    - Circle key words
    - Underline claims
    - Create three higher level questions you have about collaboration

## Socratic Seminar

- Groups of 20
  - 10 sit inside the circle
  - 10 Co Pilots sit outside the circle
- Socratic Seminar
  - Inside participants read their questions from the article.
  - Choose one to discuss
- Reminders:
  - Inquiry process to explore a topic to develop a deeper understanding

---

## FQ: How does student interaction change the classroom dynamic and learning process?

- Debrief
  - Themes
  - Comments
- Reflection
  - How can collaboration be deliberate and meaningful for students?

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## Curious Classroom: Collaboration

- Collaborative Humility
  - Freedom to learn, explore, and question
  - Group learning and responsibility
    - Task Focus
    - Skill Focus
    - Growth Focus
  - Communication

**FQ: How do the teacher and student roles influence the learning expectation and responsibility?**

- Quickwrite: Answer the FQ. 3 minutes
- Discuss- 2 minutes
- Using the FQ as a guide take notes on the videos: 20 minutes
  - Student Centered Learning
  - Students' can teach themselves
  - Physics Teacher

---

**FQ: How do the teacher and student roles influence the learning expectation and responsibility?**

- 3-2-1 Collaboration: 10 minutes
  - 3 minutes- Share individual thoughts
  - 2 minutes- Discuss thoughts
  - 1 minutes- Written reflection
  1. Discuss your observations from the video/s
  2. Reflect on how you perceive your role as a teacher.

---

**FQ: How do the teacher and student roles influence the learning expectation and responsibility?**

- Group discussion(5 minutes)
  - Learning Expectation
  - Learning Responsibility
- Reflection: 5 minutes
  - What is my goal for my students? Do my instructional choices reflect that goal? What are the implications of my choices?

## Curious Classroom:
### Research and Reflect to Learn

- Reflective Researcher Role
  - Student centered
  - Inquiry, investigation, and exploration
  - Evidence building
- Questions to Learn
  - Questions to guide thinking and inquiry
  - Purpose, Find, Build, Appraise, Utilize, Improve

## Pedagogy of Curiosity

- Pedagogy of Curiosity
  - Active Curious Engagement
  - Collaborative Humility
  - Reflective Autonomous Thinkers

## Active Curious Engagement

- Learning
  - active participation
  - active thinking
  - active questioning
  - focused collaboration
- Ownership and Reflection
- Inquiry and CT
- Coach, facilitator, and model

## Collaborative Humility

- Learning Network, a community of learning and improvement
- Supportive and trust
- Teacher is a part of the class, not in charge of the class.

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## Reflective Autonomous Thinkers

– Questioning

– Evaluating

– Decision making and problem solving

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## Synthesis: Reflective Practice

- Training design: Curious Classroom
- Collaborative Humility
- EQ= FQ + FQ + FQ + FQ
- Reflective Practice:
  – Review your reflections from today.
    - How do your assumptions, pedagogy, and instructional practice affect curiosity and learning?

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## Reflective Construction

- What are your beliefs/assumptions about:
  - Education
  - Learning
  - Student ability
- What do you want your students to:
  - know
  - learn
  - do

## Reflective Construction

- Pedagogical focus:
  - Learning to Learn
  - Curiosity
  - Questioning
  - Critical thinking
  - Reflection
  - Growth/ Improvement
  - Collaborative humility
- Instructional Focus
  - Lesson structure
  - Time management
  - Collaboration
  - Question format
  - Inquiry
  - Problem solving/ decision making

# Workshop Syllabus

Exploration of Instructional Practice in a Critical Thinking and Curious Classroom: Syllabus/script

| Time | Activity | Description and Description | Connections |
|---|---|---|---|
| 8:30-8:40<br>10 minutes<br>Slides 1-4 | ● Introductions<br>● Logistics<br>● Agenda<br>● Table tents | ● Review Agenda- Emphasize Reflection-Collaboration<br>● Presenter- Create Table tent to model the expectation and participate | Collaborative humility |
| 8:40-8:45<br>5 minutes<br>Slide 5 | ● Quickwrite: Essential Question | ● Participants write- 2 minutes<br>● Think-Pair-Share- 3 minutes | Question Format<br>Collaboration |
| 8:45-9:25<br>40 minutes<br>Slides 6-12 | ● Introductory Activity:<br>● Collaborative Exploration<br>● Gallery Walk | ● Collaborative Exploration 14 minutes with directions<br>  ○ Focus: teacher inquiry and exploration<br>  ○ Emphasize purpose<br>    ■ How does curiosity influence learning?<br>    ■ What does it mean to teach?<br>    ■ What does it mean learn?<br>    ■ Why do we ask questions?<br>    ■ **Text** What does it mean to critically think?<br>    ■ How does learning influence curiosity?<br>● Group analysis: 8 minutes<br>  ○ Focus: Summarizing major theme<br>  ○ Emphasize the major connections to teaching and learning<br>● Roaming and reflecting:<br>  ○ Focus: Thinking, reflecting, and connecting to instructional practice<br>  ○ | |
| 9:25-9:45<br>20 Minutes<br>Slides 13-15 | ● Personal Connection<br>● Pedagogy of Curiosity | ● Story- 5 minutes<br>● Purpose/Goals- 5 minutes<br>● Intro to the Pedagogy of Curiosity- 10 Minutes<br>● Emphasis- Collaborative exploration and inquiry to improve instructional practice and student thinking | Collaborative Humility |
| 9:55-10:15<br>30 Minutes | ● Intro FQ: How does questioning frame | ● What is Philosophical Chairs?- 5 minutes | Question Format<br>Collaboration |

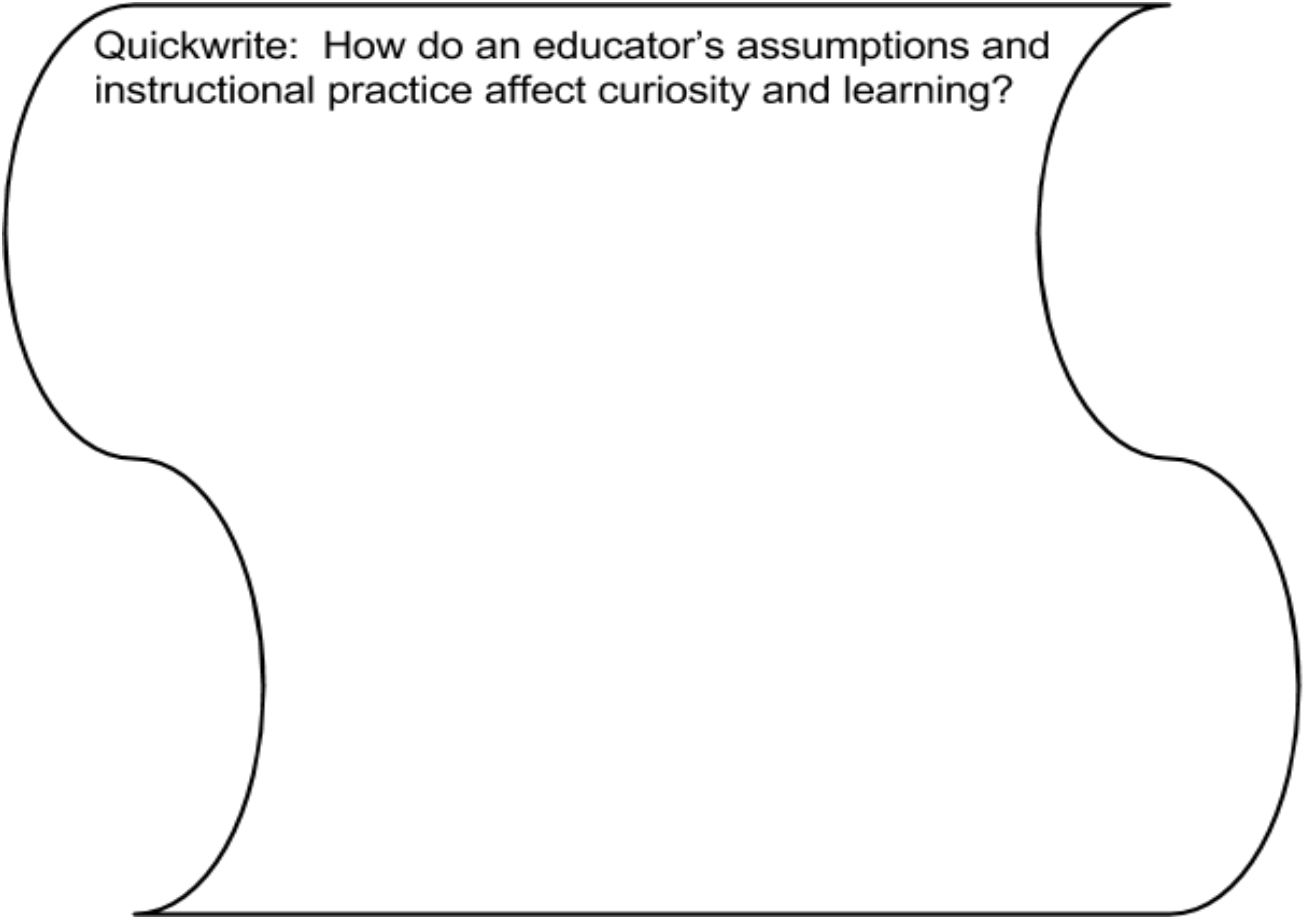| Time / Slides | Activity | Category |
|---|---|---|
| Slides 16-18 | the instructional and learning expectation of a classroom?<br>● Philosophical Chairs<br>○ Teachers review the Phil. Chairs materials and complete the document choosing to agree or disagree with the prompt.<br>● Reminders, move, and participate- 20 minutes<br>○<br>● Discuss and Reflect: 5 minutes | Lesson Scaffolding |
| 10:15-10:30<br>15 minutes | | |
| 10:30-11:00<br>30 minutes<br>Slides 20-22 | EQ Inquiry: Reciprocal Reading<br>● Reciprocal Reading- 15 minutes<br>  ○ Table groups for each reading<br>  ○ Pair up within table groups:<br>    ■ Pause and Connect every few paragraphs or five minutes<br>    ■ Person A: Paraphrase<br>    ■ Person B: Question or Clarify<br>● Table Groups Collaboration 5 minutes<br>  ○ two sentence summary<br>  ○ Illustration<br>  ○ question<br>● Share out and record: 5-10 minutes<br>● Reflection: Direct them to FQ and EQ- 5 minutes<br>● Group Discussion-5 minutes<br>● Summarize the relationship Slide<br>● EQ, FQ, Questions to Learn<br>● Curriculum designed for student to build a base knowledge to answer the EQ, FQ is evidence, and Questions to learn are how the approach activities and FQ | Question Format<br>Collaboration<br>Lesson Scaffolding |
| 10:55-11:05<br>10 minutes<br>Slide 23 | Curious Classroom:<br>Question Format:<br>FQ:--How can an educator improve engagement by how the lesson is implemented? | Collaborative Humility |
| 11:05-11:30<br>25 minutes<br>Slide 24 | Class structure: Reading: Student perspective through the eyes of a teacher<br>● Independently Read: A veteran teacher… 15 min<br>  ○ Underline what the teacher did or what she experience<br>  ○ Circle realizations or how she felt.<br>● Elbow partner discussion 5 minutes<br>  ○ process and revisit FQ(do not discuss what the teacher would do) | |

| Time | Topic | Details | Keywords |
|---|---|---|---|
| 11:30-12:30<br>60 minutes | Lunch | | |
| 12:30-1:00<br>35 minutes<br>Slide 26-27 | Group analysis: A veteran teacher | • Group analysis of Key Take Aways-15 minutes<br>  ○ Focus on the implications for teachers/student and what would you do?<br>• Share out/Discussion-15 minutes<br>• Reflection- 5 minutes | Questions to Learn Collaboration |
| 1:00-1:10<br>10 minutes<br>Slide 28 | Curious Classroom: Lesson Scaffolding | • Mini Lesson<br>  ○ Time limits<br>  ○ Differentiate instruction<br>  ○ Student motivation<br>  ○ Scaffolding academic load | |
| 1:10-1:25<br>Slide 29 | Intro Collaboration | Video Clip analysis (5 min)<br>• Discuss: (10 min)<br>  ○ Academic interactions<br>  ○ Where does the responsibility of learning lie? | |
| 1:25-2:00<br>Slide 30-32 | Collaboration: Socratic Seminar | • Reading: Collaborative Learning Enhances Critical Thinking (15 min)<br>  ○ Circle key terms, Underline claims, create three higher level questions about collaboration,<br>• Socratic Seminar(15 min)<br>  ○ Participant created questions<br>• Reflection<br>  ○ Themes and comments<br>  ○ How can collaboration be deliberate and meaningful for students?<br><br>FQ: —How does student interaction change the classroom dynamic and the learning process? | Collaboration Lesson Scaffolding Question Format |
| 2:00-2:10<br>Slide 33 | Curious Classroom: Collaboration | Collaborative Humility<br>• Freedom to learn, explore, and question<br>• Group learning and responsibility | |

| Time / Slide | Topic | Activities | Focus |
|---|---|---|---|
| 2:10-3:00 Slide 34-36 | Research and Reflect to Learn<br>• How do the teacher and student roles influence the learning expectation and responsibility? | ○ Task Focus<br>○ Skill Focus<br>○ Growth Focus<br>• Academic discussion/Communication<br>• Quickwrite: How do the teacher and student roles influence the learning expectation and responsibility? -5 minutes<br>• Videos- 20 Minutes- take notes using FQ as a guide<br>• 3-2-1 Collaboration(10 minutes)<br>  ○ 3 minutes- Share individual thoughts<br>  ○ 2 minutes- Discuss thoughts<br>  ○ 1 minutes- Written reflection<br>• Group Discussion-(10 minutes)<br>  ○ Learning Expectation<br>  ○ Learning Responsibility<br>• Reflection(5 min) | Question Format Collaboration Questions to Learn |
| 3:00-3:10 Slide 37 | Curious Classroom: Research and Reflect to Learn | Reflective Researcher Role<br>• Student centered<br>• Inquiry, investigation, and exploration<br>• Evidence building<br>Questions to Learn<br>• Questions to guide thinking and inquiry<br>• Purpose, Find, Build, Appraise, Utilize, Improve | Collaborative humility Collaboration Question format |
| 3:10-4:15 Slide 37-44 | Synthesis: Application of PD | • Pedagogy of Curiosity- Overview- 10 minutes<br>• Design: Curious Classroom-describe the training from the perspective of curiosity/Pedagogy of Curiosity. Slide 35- 10 minutes<br>  ○ Teachers discuss and reflect on daily activities and the EQ<br>• Reflective Construction: Slide 36- 10 minutes<br>  ○ Belief and Assumptions | |

| | |
|---|---|
| | ○ Students<br><br>● Collaborate to think through their own practice and what they did today.- 35 minutes |

Quickwrite: How do an educator's assumptions and instructional practice affect curiosity and learning?

Roaming Recording:

Reflection:

# Guidelines for Philosophical Chairs

## Classroom Setup

Chairs/desks are set up facing each other with about half facing one way and half facing the opposite way.

## Directions

1. A statement is presented to the students. This statement might be based on a reading or might be a stand-alone statement. Either way, the statement should be one that will divide the class into those who agree with the statement and those who disagree with the statement. Be sure that the statement is written on the board for reference during the activity. (Note: Allowing for a group of students who are undecided is addressed later in these guidelines.)

2. Those who agree with the central statement sit on one side and those who disagree sit on the other side.

3. A mediator, who will remain neutral and call on sides to speak, is positioned between the two sides. (This role is usually filled by the teacher in the beginning or middle school years. Eventually, students should take on this role.) In addition to facilitating the discussion, the mediator may at times paraphrase the arguments made by each side for clarification. It is important that the mediator always remains neutral.

4. The mediator recognizes someone from the side of the classroom that agrees with the central statement to begin the discussion with an argument in favor of the position stated. Next, the mediator will recognize someone from the other side to respond to the argument. This continues throughout the activity, and part of the job of the mediator is to ensure participation by as many students as possible and to keep just a few students from dominating the discussion. The mediator may also put a time limit on how long each side addresses the issue on each turn.

5. In addition to speaking in the discussion, students may express their opinions by moving from one side to other. Anyone may change seats at any time. Changing seats does not necessarily mean that a person's mind is changed, but rather that the argument made is compelling enough to sway opinions. Students may move back and forth throughout the discussion.

6. The discussion and movement go on for a designated period of time—usually one class period. The mediator may bring the discussion to a close at any time. Each side may be given an opportunity to make a final statement on the issue. If time allows, each participant states his/her final opinion and may also tell which arguments he/she found most convincing.

7. An additional piece to this activity can be to have a few students observe the process and take notes instead of participating. These students will debrief their observations to the class at the end of the activity. You may have students who were absent or unprepared to participate fulfill this role.

## Evaluation

Leave time at the end of the period for students to reflect on the activity. Use one of the activities included in this unit. Students may begin the reflection in class and finish it for homework.

## Modifications

It is recommended that you begin this activity with just two sides. If students have difficulty choosing a side to begin, encourage them to sit on the side that they agree with the most even if they do not completely agree. Once students are accustomed to this format, you may choose to add this additional component: You may add a third section of seats with a few chairs for students who are undecided. This section is placed between the two opposing sides. During the discussion, you may allow students from the undecided section to participate, or you may require that they take a position before participating. Students may move from the sides that agree or disagree with the statement to the undecided section if they wish. Before you end the discussion, require that all students still seated in the undecided zone move to one side or the other depending on which they believe made the most compelling arguments.

# *Philosophical Chairs*
# **Rules of Engagement**

1. Be sure you understand the central statement or topic before the discussion begins. Decide which section you will sit in.

2. Listen carefully when others speak and seek to understand their arguments even if you don't agree.

3. Wait for the mediator to recognize you before you speak; only one person speaks at a time.

4. You must first summarize briefly the previous speaker's argument before you make your response.

5. If you have spoken for your side, you must wait until three other people on your side speak before you speak again.

6. Be sure that when you speak, you address the ideas, not the person stating them.

7. Keep an open mind, and move to the other side or the undecided section if you feel that someone made a good argument or your opinion is swayed.

8. Support the mediator by maintaining order and helping the discussion to progress.

AVID
*Decades of College Dreams*

# Philosophical Chairs Preparation

Central Statement: _____

_____

_____

Reflection: _____

_____

_____

| The Power of Essential Questions | The Past in a Puzzle |
|---|---|
| | |

| Essential Questions | Group Synthesis |
|---|---|
| | |

# Essential Question

- Unit Question- Overaching ideas
- Frames the unit, learning, and thinking around a theme
- Philosophical-based or Application-based
- Open ended question
- Interpretation of multiple lines of evidence and sound reasoning

# Focus Questions

- Lesson/Activity Question- Content knowledge specifc
- Frames the lesson/activity so the students understand the learning expectation.
- Open or close ended question- Activity/lesson depedent
- Used as evidence to build knowldege base to approach the Essential Question, problem-solving,and decision-making activities.

# Questions to Learn

- Learning is accomplished through questioning, research, and collaboration.
- Question strategies students use to approach learning and class activities
- Purpose, Find, Build, Utilize, and Apply, explained in the Research to Understand section.

Reflection Sheet:

| How does questioning frame the instructional and learning expectation of a classroom? |
| :--- |
| |
| How can an educator improve engagement by how the lesson is implemented? |
| |
| How does student interaction change the classroom dynamic and the learning process? |
| |
| How do the teacher and student roles influence the learning expectation and responsibility? |
| |

# Reflective Construction

## Pedagogy of Curiosity

- Pedagogy of Curiosity
  - Active Curious Engagement
  - Collaborative Humility
  - Reflective Autonomous Thinkers

## Active Curious Engagement

- Learning
  - active participation
  - active thinking
  - active questioning
  - focused collaboration
- Ownership and Reflection
- Inquiry and CT
- Coach, facilitator, and model

## Collaborative Humility

- Learning Network, a community of learning and improvement
- Supportive and trust
- Teacher is a part of the class, not in charge of the class.

## Reflective Autonomous Thinkers

- Questioning
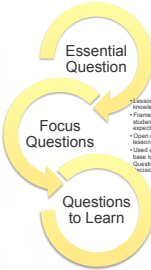- Evaluating
- Decision making and problem solving

## The Curious Classroom

- Question Format
- Lesson Scaffolding
- Collaboration
- Research and Reflect to Learn

## Curious Classroom: Question Format

**Essential Question**
- Unit Question- Overarching ideas
- Frames the unit, learning, and thinking around a theme
- Philosophical-based or Application-based
- Open ended question
- Interpretation of multiple lines of evidence and sound reasoning

**Focus Questions**
- Lesson/Activity Question- Content knowledge specific
- Frames the lesson/activity so the students understand the learning expectation.
- Open or close ended question- Activity/lesson dependent
- Used as evidence to build knowledge base to approach the Essential Question, problem-solving, and decision-making activities.

**Questions to Learn**
- Learning is accomplished through questioning, research, and collaboration.
- Question strategies students use to approach learning and class activities
- Purpose, Find, Build, Utilize, and Apply, explained in the Research to Understand section.

- EQ=FQ+FQ+FQ
- Build evidence through questioning
- Questioning to address activities/ assignments/ learning

## Curious Classroom: Scaffolding Lessons

- Mini Lesson format
  - Time limits
  - Scaffolding academic load
    - Build and practice academic skills
  - Differentiate instruction
  - Student motivation

## Curious Classroom: Collaboration

- Collaborative Humility
- Freedom to learn, make mistakes, explore, and question
- Group learning and responsibility
  - Task Focus, Skill Focus, Growth/ Reflection Focus
- Communication- Academic discussion

## Curious Classroom: Research and Reflect to Learn

- Reflective Researcher Role
  - Student centered
  - Inquiry, investigation, and exploration
  - Evidence building
- Questions to Learn
  - Questions to guide thinking and inquiry
  - Purpose, Find, Build, Appraise, Utilize, Improve

## Introduction:

## The Power of Essential Questions

It is not possible to be a good thinker and a poor questioner.

Questions define tasks, express problems, and delineate issues. They drive thinking forward. Answers, on the other hand, often signal a full stop in thought. Only when an answer generates further questions does thought continue as inquiry. A mind with no questions is a mind that is not intellectually alive. No questions (asked) equals no understanding (achieved). Superficial questions equal superficial understanding, unclear questions equal unclear understanding. If your mind is not actively generating questions, you are not engaged in substantive learning.

Thinking within disciplines is driven, not by answers, but by essential questions. Had no basic questions been asked by those who laid the foundation for a field — for example, physics or biology — the field would not have been developed in the first place. Every intellectual field is born out of a cluster of essential questions that drive the mind to pursue particular facts and understandings. Biology was born when some humans pursued answers to the questions: "What are the characteristics of living systems? What structures exist in them? What functions do these structures serve?" Biochemistry was born when biologists began to ask questions such as: "What chemical processes underlie living things? How and why do chemical processes within living things interact and change?"

Every field stays alive only to the extent that fresh questions are generated and taken seriously as the driving force in thinking. When a field of study is no longer pursuing significant answers to essential questions, it dies as a field. To think through or rethink anything, one must ask the questions necessary to thinking through the logic of that thing, clearly and precisely.

In this miniature guide, we introduce essential questions as indispensable intellectual tools. We focus on principles essential to formulating, analyzing, assessing, and settling primary questions. You will notice that our categories of question types are not exclusive. There is a great deal of overlap between them. Deciding what category of question to ask at any point in thinking is a matter of judgment. Having a range of powerful questions to choose from is a matter of knowledge.

Because we cannot be skilled at thinking unless we are skilled at questioning, we strive for a state of mind in which essential questions become second nature. They are the keys to productive thinking, deep learning, and effective living.

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# The Quality of Our Thinking is Given in the Quality of Our Questions

# The Past as a Puzzle: How Essential Questions Can Piece Together a Meaningful Investigation of History

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This article details a professional development program focused on the use of essential questions in reframing U.S. history learning experiences in elementary, middle, and high schools. Teachers identified four problems in designing and teaching engaging, relevant, and challenging U.S. history lessons. Each problem was addressed through the teachers' use of essential questions.

**Keywords:** essential questions, prfessional development, teaching history

> Names, facts, and dates: that is what history has become for a lot of students. But historians see themselves as detectives searching for clues to a puzzle that can never be completely solved. (Wineburg 2005, xxvi)

Sam Wineburg (2001, 2005) points to a well-known problem in history education. Because teachers often understand their primary job as one of "covering" a vast, prescribed curriculum with a mandated textbook at the helm, much history teaching in K-12 schools consists of teacher-centered content lectures followed by student memorization of facts and dates (Levstik and Barton 2005; Loewen 2010; Parker 2010). Bruce VanSledright (1997) and Suzanne M. Wilson (2001) observe that this focus on breadth rather than depth is overwhelming to both teachers and students. Focusing on the breadth of the history textbook can stifle teachers' abilities to connect history to the lives of their students, often leading to frustration for teachers and students as well as to students' disinterest in studying history. In addition, this teaching approach often leaves students with a single master or metanarrative absent of multiple perspectives, contributing to students' misconceptions of a linear and disconnected history (Burenheide 2007; Crismore 1984; Foster and Padgett 1999; Wineburg 2001). VanSledright (2002, 7) observes, "History education research demonstrates that history presented as the putative story of the past in voluminous textbooks has

little appeal to students and seems to do severe injustices to an otherwise compelling subject matter."

This more traditional practice of history teaching also often reduces student experience to reading textbook chapters, listening to lectures, locating answers to questions at the end of the chapter, and finally, regurgitating facts on exams (Barton and Levstik 2010). In essence, a more traditional method of history neither engages students in historical thinking and interpretation nor allows for students to make broader connections across historical time periods and with current and enduring issues.

Historians describe the study of history as an interpretive, constructive, analytic, and a dialogic process. History is a discipline that is concerned with both knowledge of the past and the acts of constructing the past (Dutt-Doner, Cook-Cottone, and Allen 2007). Over the past few decades, researchers have studied the process of historical inquiry, and the term *historical thinking* has become a central focus of literature in the field of history teaching and learning. Notable scholars in this field of study include Keith Barton, Linda Levstik, Peter Seixas, Bruce VanSledright, and Sam Wineburg. These scholars assert that a larger pedagogical mission of teaching historical understanding and thinking to history teachers must be addressed before positive results will be seen in the classroom with students.

Based on the current scholarship, students who can engage in historical thinking can work through three steps: (1) asking questions about the past, (2) gathering evidence to answer the questions, and (3) drawing conclusions from the evidence to answer the questions. Helping students to think historically can be quite challenging. We have found that framing a curriculum around essential and historical

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questions that guide historical inquiry can facilitate the learning process.

## Purpose

> Essential questions have completely reshaped my teaching and provided relevancy for students. I no longer hear, "Why are we learning this?" (Juliette, high school teacher)

The purpose of this article is to highlight the way in which Juliette and twenty-four of her teaching peers in multiple grade levels used essential questions to reframe their history curriculum with the goal of providing learning experiences less focused on names, dates, and facts and more focused on students making meaningful connections and working to understand the process of historical thinking. With the support of a federally funded Teaching American History grant, our professional development program provided support for teachers to first learn the process of historical thinking for themselves, to explore the use of essential questions to support this process, and then to develop learning experiences for their students. In this article, we (1) describe our understanding of essential and historical questions, (2) discuss how essential questions were used to facilitate the process of vertical curricular alignment in a professional development course for history teachers in grades five through twelve, (3) identify the four main problems facing our teachers in developing historical thinking skills, and (4) detail how framing a curriculum with essential questions helped our teachers to address these problems.

## What Are Essential Questions?

Essential questions (EQs) are open-ended questions that address the big ideas of history and have no predetermined correct answer. In fact, the best EQs allow for multiple interpretations. Well-designed EQs help students to think both broadly and deeply about history rather than focusing on the specific details of seemingly disconnected historical events (Lattimer 2008); that is, EQs encourage students to search broadly for patterns across time as well as to search deeply within an issue for meaning. Further, Grant Wiggins and Jay McTighe (2005) argue that courses should be organized not around answers but around the kinds of questions that are based on substantive dilemmas for students to investigate. EQs also help organize content in ways that promote critical and higher-order thinking. As students construct their own understanding of the past using evidence to answer EQs, they are required to work at the top tiers of Benjamin Bloom's taxonomy (1956): analysis, synthesis, and evaluation. Students can begin to see that history is not a dull and static collection of facts, but a vibrant story that continues to change with new evidence and interpretation.

Questions that are truly essential must highlight the pervasive controversies throughout history as well as those in our current experiences. These questions put students in the position of taking an informed stance using historical and contemporary evidence to construct and support their answer. Taking an informed stance is consistent with the work of Walter Parker (2010) and Diana Hess (2010), who advocate the use of democratic civic discourse, which requires an examination and discussion of questions, problems, and dilemmas, both historical and enduring.

The analysis of multiple historical sources of evidence to answer historical questions is also consistent with the work of VanSledright (2002, 2010). Through historical evidence analysis, students become versed in recognizing multiple perspectives, debatable interpretations, and author purpose. Along with analytical skills, EQs also provide a means of addressing other historical thinking benchmarks (American Historical Association 2008), including the formulation of questions through inquiry, analysis of how historians use evidence to answer questions, and an understanding of the interrelationship among themes, regions, and periodization. Because students are exposed to a large spectrum of history content, they need to construct meaning between different historic eras, events, and themes. EQs can provide the bridge between historical thinking and student understanding of the big picture so students "become responsible for crafting interpretations and arguments about the past that reside alongside those created by others (and where students) are connected directly to what may once have seemed to them a remote and meaningless set of events" (VanSledright 2002, 151).

## Using Essential Questions with Vertical Curricular Alignment

Given our understanding of the potential power of using EQs to frame the professional development in our Teaching American History Grant, we brought together Juliette and twenty-four of her peers, representing elementary, middle, and high school teachers, to form vertical teams with the goals of collaborating to deepen their historical content knowledge, developing historical thinking skills, and establishing connections across grade levels to scaffold content and skills in their curriculum and their instructional practices. These vertical teams were built on the model of professional learning communities with teachers from multiple grade levels who worked together to develop a history curriculum that provides a more seamless transition from grade five to grade eleven (DuFour and Eaker 1998). As facilitators of the Northern Nevada Teaching American History Project, we chose to utilize EQs with these vertical teams as a mechanism to facilitate connections across grade levels and to address the problems our teachers faced in teaching history. During their collaboration, participating history teachers created and utilized four EQs to frame their academic year curriculum.

$$\boxed{\text{EQ + History Standard = HQ}}$$

**Fig. 1.** Our formula for developing historical questions (HQs).

These EQs were aligned with Wiggins and McTighe's (2005, 114) definition of "overarching" EQs that are "valuable for framing courses and programs of study around the truly big ideas. [Teachers'] use of conceptual pillars strengthens a multi-year curriculum making it more coherent and connected." To reinforce this goal of coherence, our teachers developed common EQs that supported the state's social studies content standards that spanned across grade levels and across the historical content. Examples of EQs that we created are: (1) When and how is it appropriate to use power? (2) Should liberty be limited? (3) Why do social, economic, and political inequalities exist? and (4) What relationship should exist between individuals and their government? These types of questions are essential in a vertical curricular alignment approach because they can frame multigrade curricula that connect historical eras and current issues to students' personal experiences through recurring themes.

With a unique and mandated scope and sequence for each grade level, it was necessary to provide a more focused context for historical inquiry for students to make connections between history content in different grade levels. Historical questions (HQs) that were directly related to specific content and to a specific EQ bridged this gap. To help teachers develop HQs, we provided a formula (see figure 1).

In this way, teachers from different grade levels could modify the same EQ to specifically address their units of study. For example, the EQ "Should liberty be limited?" could be framed for many different historical time periods using HQs that include:

- *Elementary school:* Were the British justified in limiting the liberty of colonists who protested new taxes?
- *Middle school:* Was the South at all justified in limiting the liberty of enslaved persons? Was the North justified in limiting the liberties of Southern property owners?
- *High school:* In the Progressive Era, was it appropriate to limit the liberties of corporations? During the Vietnam War, should the liberties of press, speech, and protest have been limited? (Orr 2009)

Additional examples of grade-level or curriculum-specific iterations of HQs that are based on the same EQs, are included in table 1.

**Teachers Identified Some Problems; Essential Questions Provided Some Answers**

During the first year of our three-year project with the vertical teams, we recognized that participating teachers shared many of the same predicaments in successfully teaching history for student engagement and academic success. Our work with these teachers aimed at assuaging four persistent dilemmas of history classrooms: (1) teaching a linear and disconnected history focused on specific historical facts without a sense of the major recurrent themes, (2) teaching without explicit opportunities for students to engage in historical inquiry, (3) missing opportunities to connect enduring historical themes with current issues, and (4) using historical sources devoid of context and connection to historical themes. To address these predicaments, we have worked with guest historians and the twenty-four participating teachers in their vertical team to make use of EQs and related HQs. Initially, we taught the teachers to reframe their curriculum and instructional practices with EQs. The use of EQs provided teachers with a focus on enduring issues that permeate historical and contemporary life. Teachers developed four EQs they would revisit in each unit of study throughout the year, providing guiding foci. They used EQs to construct similarly worded HQs that were specific to each time period under study. In addition, teachers learned how to construct assessments and classroom activities centered around student discussion and historical inquiry related to those EQs and HQs. Below, we describe how EQs addressed and partially alleviated the four teacher-identified problems described above, and highlight this with descriptions of ways in which some of our teachers used these questions in their classrooms.

***Problem 1: Teaching a linear and disconnected history focused on specific historical facts without a sense of the major recurrent themes***

> I was always losing students in the inconsequential details. (Ashlee, high school teacher)

Our teachers observed that focusing on the memorization of facts was detrimental to student engagement and to an understanding of the interrelationship between eras and events in history. They cited the chronological nature of history along with the format of the textbook narrative as contributing to this problem. Without sacrificing the chronological nature of history or the textbook, teachers can provide students with a framework of EQs that promote connections between various events and eras in history. We cannot assume that students will make those connections on their own or categorize historical events according to recurring themes. Instead, the themes must be made explicit. Essential questions used as a guide for unit planning and teaching offer the explicit connection to themes across historical time periods. Marshall (high school teacher) found that EQs prompted more student connection between primary sources from different time periods. He stated, "EQs allowed students to place Washington's Farewell Address and its suggestion of American isolationism next to Woodrow Wilson's efforts to keep the U.S. out of World War I."

**Table 1.** Essential questions shared by grade levels with example iterations of historical questions by grade level.

| Essential questions (EQ + Standard/topic = HQ) | Elementary U.S. history historical questions | Middle school U.S. history historical questions | High school U.S. history historical questions |
|---|---|---|---|
| When and how is it appropriate to use power? | • According to the Founders, what were appropriate ways to limit government power? | • Was the Monroe Doctrine an appropriate use of foreign policy power? | • At what point during World War II would it have been most appropriate for the U.S. government to use its power to intervene in European affairs? |
| | • Was it appropriate for the Sons of Liberty to use their power to protest to destroy property in the Boston Tea Party? | • Was it appropriate for President Lincoln to use his power to suspend the writ of habeas corpus? | • Did President Nixon use his power of executive privilege appropriately? |
| Should liberty by limited? | • Was it appropriate for conquistadors to limit the liberty of Native Americans in missions? | • Was the South at all justified in limiting the liberty of enslaved persons? Was the North justified in limiting the liberties of Southern property owners? | • In the Progressive Era, was it appropriate to limit the liberties of corporations? |
| | • Were the British justified in limiting the liberty of colonists who protested new taxes? | • How was the limiting of women's liberty to vote justified during the eighteenth and early nineteenth centuries? | • After the bombing of Pearl Harbor, was it appropriate for the United States to limit the liberty of Japanese Americans in internment camps? |
| | | | • During the Vietnam War, should the liberties of press, speech, and protest have been limited? |
| Why do social, economic, and political inequalities exist? | • How did white Americans justify social, economic, and political inequality of Blacks? | • How did the theory of social Darwinism promote social, economic, and political inequalities? | • How did Jim Crow laws perpetuate social, economic, and political inequalities? |
| | • What social and economic reasons made it so that women had an unequal stake in government in early America? | • What reasons did muckraker journalists give for social, economic, and political inequalities in America? | • What types of social, economic, and political inequalities exist in the modern era? Why? |
| What type of relationship should exist between individuals and their government? | • What type of relationship should have existed between Native Americans and newly arriving colonists and their governments? | • What type of relationship should exist between states and the national government? That is, do states have a right to secede? | • Do individuals have the right to break laws in order to show dissatisfaction in their relationship with government? |
| | • According to the Founders, what type of relationship should exist between individuals and their governments? | • Should the government have protected individuals from harmful work conditions in the Gilded Age or allowed corporations to set their own standards? | • Should McCarthy, as a government agent, have been able to call individual Americans before Congress to testify about their associations? |

Knowing a lot of historical facts is useless without knowing how they fit together and why the facts might be important. Juliette, a teacher who recently reframed her curriculum with EQs, stated, "Students have shifted focus from trying to memorize and spit out meaningless details to engaging in and wrestling with complex questions across time." Her curricular focus has shifted away from her explaining the most important details to students to providing a framework and appropriate questions for students to explore. As Levstik and Barton (2005, 16) observe, "Good teaching, then, focuses on helping students learn important organizational ideas, rather than simply covering massive amounts of factual information."

For example, when teaching the textbook version of history, the civil rights movement chapter is sandwiched chronologically between the cold war and the Vietnam War chapters. Our teachers reported that students failed to make connections across the chapters. In addition, some of our teachers explained that they, too, had failed to see broader connections across these time periods. In a book club discussion of *Satchmo Blows Up the World: Jazz Ambassadors Play the Cold War* (Von Eschen 2004) we focused on the

EQ "What kinds of relationships should exist between government and individuals?" Several teachers had an "ah ha" moment: the civil rights agenda of the U.S. government was directly related to *proving* to other nations that freedom and equality existed in America during the cold war. As teachers began to make these connections themselves through the framework of the EQ, they became empowered to help students begin to link together periods of historical study.

EQs provide teachers and students with the organizational ideas around which to fill in and categorize the historical details. For instance, we worked with teachers to demonstrate how they could frame each of the above-mentioned chapters (cold war, civil rights, and Vietnam) around the EQ: What relationship should exist between individuals and their government? They could encourage students to examine sources on citizen responses to Mc-Carthyism during the cold war along with acts of civil disobedience by foot soldiers in the civil rights movement. These individual actions could illuminate the later protests over war in Vietnam, including the burning of draft cards and the violence at Kent State University. In addition, if this question framed the year's study, teachers could encourage students to see connections among the signing of the Declaration of Independence, writing *The Liberator* during the abolition movement, and more recently, librarians refusing government access to library records under the Patriot Act.

Our teachers began to internalize the idea of creating important organizational ideas in history rather than covering the facts. Janel (elementary school teacher) reported that she no longer "sweated the small stuff, the little details" in her classroom and instead focused her energy on helping students make connections. Alex added that she and her fellow fifth-grade colleagues "[t]ake out the minutia and try to see historical details in light of the broader historical context. With the EQs to drive the curriculum, there is a lot of data that doesn't easily connect to themes and therefore has little meaning for students." Ashlee (high school teacher) agreed: "I'm not nearly as concerned that students know everything there is to know about history anymore. Instead I can teach my students about big ideas and help them to make connections across history. They are more likely to remember this than just random facts." The learning of facts and specific historical details does continue; however, those facts and details are now contextualized in larger themes, constructed through the use of EQs.

### Problem 2: Teaching without explicit opportunities for students to engage in historical inquiry

> As students make discoveries that relate to our questions, it becomes a "Eureka!" moment. (Alex, elementary school teacher)

While many in the field suggest integrating open-ended questions into the history curriculum, our idea of EQs requires a much larger shift, because it asks teachers to frame their entire history curriculum differently. Rather than focusing on teaching students a historical narrative, teachers can focus on student inquiry, which Levstik and Barton (2005, 19) describe as "the process of asking meaningful questions, finding information, drawing conclusions, and reflecting on possible solutions." VanSledright (2002, 7) also observes the importance of students "doing" history instead of receiving it from their teacher: "Without the capacity to do history, to investigate the past and oneself, learning about history, particularly in school, is reduced largely to rote memorization of dates, events, and people, or in other words, the consumptions of other people's facts (see Holt, 1990)." Using EQs, teachers can begin to declutter their curriculum of trivial tidbits to spotlight student inquiry into enduring and unsettled issues in history. According to Fred Drake and Lynn Nelson (2009, 14), "Themes and ideas serve as screens that help students differentiate between what is important and what is insignificant." EQs require that students see history through an investigative lens and that they analyze multiple sources and interpretations to answer the EQs. Rod (high school teacher) uses the EQ framework and unit-specific HQs as a way to begin historical inquiry at the beginning of a unit by asking students to build hypotheses around the questions. The students then return to their hypotheses as a unit review and must determine (with historical evidence) whether or not their hypotheses were supported by the evidence.

To promote historical inquiry using EQs and HQs, we encouraged teachers to choose source materials for the class that provided opportunities for students to engage in answering these EQs. One of our high school teachers, George, restructured his traditional unit assessment on Reconstruction so that students now research events and characters of the time period in relationship to his EQs (e.g., What type of relationships should exist between government, institutions, and individuals? What does it mean to be an American?). The students are seeking to understand and connect, which is beyond seeking to find a simple answer.

Frequent use of essential, open-ended questions that transcend time and space offer promise for student engagement, because a problematized history is not static and students engage in dialogue about dynamic understandings of history. In this vein, Levstik and Barton (2005, 30) explain their requirements for students to "engage in sustained conversation about history … questions that are worth discussing, questions that do not have simple or single answers, sufficient and appropriate data sources so that students can attempt to answer the questions, and imaginative entry into the past." After our teachers developed EQs that were open-ended and worth discussing, six of our teachers reported that they were better able to choose data sources that could provoke high levels of student analysis. Juliette related, "EQs and HQs have strengthened critical thinking skills (in students) by providing clarity in the object of student inquiry and helping students understand how to 'prove' their answers using historical examples."

# Essential News Stories
## "Read All About It!"

| Essential Question: | Source of the Story: |
|---|---|
| | Date: |

Summary: *(Please write a four to six sentence summary of the news story. Do not forget to include important people, places, and background information.)*

_____

_____

_____

_____

_____

_____

_____

_____

_____

How does this current event relate to the essential question listed above?

_____

_____

Write your personal answer to the essential question (in terms of this news story) in 20-35 words.

_____

_____

_____

Compare this news story to an historical situation in which this same essential question has prompted controversy. Make sure to demonstrate the similarities and differences between the two examples.

_____

_____

_____

**Fig. 2.** A sample of the current event form we created called Essential News Stories.

This is consistent with the work of scholars in the area of historical thinking who cite the importance of questioning source materials and author perspective (Barton 2005). Although EQs do not force students to question specific evidence, the consistent use of questions to guide the curriculum does encourage students to interrogate the material on which they base their answers. VanSledright (2002, 118) suggests, "Peppering students with questions that get at such transformations in thought can help . . . ." We encouraged teachers to require that students use historical evidence to explain their points of view in both formal and informal assessments. In written reflection pieces, teachers reported that using EQs prompted the students themselves to ask both more questions and more thoughtful questions. Natalie (high school teacher) observed, "Students now refer to the EQs on a regular basis and ask more of their own open-ended questions in discussions and writing. When working on a Virtual Museum project, they asked me, 'What EQs and HQs would be best for us to use to evaluate our project?'" Whether through discussions, projects, or assessments, peppering students with questions encourages historical inquiry.

### Problem 3: Missing opportunities to connect enduring historical themes with current issues

> Students are starting to see that EQs are questions that are consistent over time. (Javier, high school teacher)

When used as a guiding framework for historical inquiry along with historical sources, EQs can help students to see a relationship with current issues in a pluralistic society. As Levstik and Barton (2005, 3) suggest, "Focus on enduring human dilemmas. Emphasize that the dilemmas of the present have their roots in the past. Untangling these roots can be both freeing and empowering." For example, teachers can help students come to their own multiple and well-informed answers about the question "Should liberty be limited?" while untangling the controversies surrounding Abraham Lincoln's suspension of the writ of habeas corpus during the Civil War, the Espionage Act of 1917, Prohibition, the Patriot Act of 2001, and whether tobacco or harmful foods should be taxed today. In this way, students see that the same controversies (i.e., limitation of liberty) are pervasive throughout American history. Connecting past to present helps students see that history informs how we interpret the present and recognize the power of human agency in solving dilemmas of the past and of today.

Robert (high school teacher) saw a strong need for students to be able to see connections between current and historical issues. As such, the EQ framework has provided him and his colleagues with a structured avenue through which students connect history to present dilemmas without reverting directly to presentism. When Robert's students studied U.S. Supreme Court cases in the context of EQs, he instituted a classroom requirement

that his students connect current events with EQs and historical topics of study. Because of this, he was able to measure if students could understand the historical and contemporary relevance of constitutional law. Robert, like many of the participating teachers, began to use a current event form we created, called Essential News Stories (see figure 2), which requires that students relate their news analysis to EQs and HQs. He reported that because of this shift in analysis, class discussions of current issues were more grounded and insightful. The kids began to see the "purpose of doing current events." The Essential News Stories current event form appealed to teachers because it required students to approach their analysis of news media outside of school with the perspective that many of today's issues are rooted in the enduring dilemmas of American history. Students came prepared to class to discuss important current issues in relationship to their history studies, and a richer, more insightful dialogue ensued.

During a vertical team discussion, several teachers shared how they used the question "What types of relationships should exist between government, institutions, and individuals?" to connect past economic crises (e.g., the establishment of the National Bank and the Great Depression) to the current controversy over the federal government's involvement in attempting to alleviate the severity of the economic crisis (e.g., bank bailouts). Marshall (high school teacher), related his classroom experience in this way:

> We read a speech by Father Coughlin [one of the FDR's harshest critics] in which he outlined his criticisms of the New Deal. Using this speech, we highlighted and discussed parts of the speech that were similar to criticisms that are currently being leveled at the Obama administration. My students were surprised as how similar the criticisms sounded to modern critiques of President Obama's attempts to address our current economic downturn.

By using well-written EQs, and with Marshall's effective teaching, his students recognized connections between the past and present, moving history from what happened to what is happening.

### Problem 4: Using historical sources devoid of context and connection to historical themes

> The EQs make is easier to place most any primary source into a broader study of history while at the same time providing a more detailed look at specific sources in their historical context. (Marshall, high school teacher)

Early in the professional development experience, it became clear that most of our teachers were excited to integrate historical (primary) sources into their instruction. However, it also became clear that teachers were not helping students contextualize those sources within the time period under study and were not necessarily connecting them to the broader learning experience. Instead, they

# Prove It!

| Essential Question: Why do social, economic, and political inequalities exist? | Standard Benchmark(s): H3 (6-8) 3 Describe key political ideas that influenced the American Revolution and the formation of the U.S. |
|---|---|

Historical Question: Why did social, economic, and political inequalities exist for slaves and free African Americans in the colonies and newly formed states?

My Answer (*THESIS*): Racism towards African Americans was widespread in all of the colonies (and later states), and since Whites thought African Americans were inferior, they enslaved some, and they also restricted their rights to carry guns or receive a fair trial.

| Statements | Evidence or Proof (Quotes) | Primary/Secondary |
|---|---|---|
| *Because...*<br>*Whites thought blacks were inferior because of the color of their skin.* | "In addition, most white colonists convinced themselves that Africans' dark skin was a sign of inferiority, and so had few reservations about subjecting them to a life of servitude." (*The Americans*, p. 75) | Secondary/ Textbook |
| *And...*<br>*Slave owners considered slaves property and not people, so they weren't even accused of murder if they killed a slave.* | "In Virginia, the courts did not consider slave owners guilty of murder for killing their slaves during punishment."   (*The Americans*, p. 77) | Secondary/ Textbook |
| *And...*<br>*Even in the North, there was racism towards free blacks.* | "Slavery did exist in the New England and was extensive in the Middle colonies, as were racial prejudices against blacks – free or enslaved." (*The Americans*, p. 81) | Secondary/ Textbook |
| *And...*<br>*Even if a black was free, because of the color of their skin, they had to carry a certificate to show they were not equal.* | "1793, Chapter 22. Free Negroes or mulattoes shall be registered and numbered by the town clerk, who shall specify age, name, color, status and by whom, and in what court emancipated. A penalty is fixed for employing a Negro without a certificate; the Negro may be committed to jail." | Primary/<br>A Sampling of Virginia Slave Laws |
| *And...*<br>*Because African Americans were treated unfairly and might rebel, Whites took away their rights to guns/* | "1806. Chapter 94. A free Negro is not to carry any firelock of any kind without a license." | Primary/<br>A Sampling of Virginia Slave Laws |

*Prove It! (Orr 2009)*

Just as students can learn to analyze a geometric equation, they can also break down the reasons for a historical hypothesis and learn to justify their reasoning using primary and secondary source material. Unlike a geometric equation, there may be many possible answers to the "Historical Question Proof." This exercise can help students to outline an essay, prepare for a unit project, or organize their thoughts for a class discussion.

**Fig. 3.** A sample of a Prove It graphic organizer that teachers find helpful.

were highlighting a plethora of historical sources in isolation, absent of multiple perspectives (Seixas and Peck 2004; VanSledright 2010). As Barton (2005, 749) suggests, an overuse of primary sources only further fosters the focus on details rather than the larger themes. "It makes little sense to think that knowledge of a subject as vast as history could be built up entirely through piecemeal analysis of primary sources." Rather, historical sources should provide students with evidence to answer the EQ. These sources should be the centerpiece of the history classroom as they lay the foundations for the historical knowledge. In order to connect teachers and students, to the larger themes and enduring issues of history while maintaining the focus on historical thinking skills and analysis of historical sources, we decided to work with teachers to choose primary sources that related directly to the EQs and HQs they had already created. These sources illuminated the themes and controversies found in the EQs. In this way, instruction on ways to interpret sources also provided opportunities for students to take a stance on a historical subject using evidence to support their viewpoints. While primary sources are valuable classroom tools, they are often used only to teach specific factual content, leaving out

the instruction and practice related to the skills of historical thinking (Westhoff 2010). Following best practices in the analysis of primary sources (Barton 2005; Seixas and Peck 2004), we also encouraged teachers to find appropriate secondary sources to provide the larger narrative and context for the historical sources. This is a particularly important component for context but also for the novice in historical thinking who cannot contextualize the raw data of primary sources in the same way as experienced historians. One graphic organizer that teachers found helpful was Prove It (see figure 3). The Prove It exercise required students to work through an HQ much like a geometry proof with the final outcome being a thesis statement that answered the HQ and provided at least four reasons (with citations of primary and secondary sources) for the thesis. For students to be able to ground their inquiry into sources using Prove It, teachers had to supply students with multiple sources that provided possible evidence to use in answering the HQ. Javier (high school teacher) observed, "It helps give students some common ground or framework from which to begin their analysis." The Prove It exercise was based on Peter Seixas and Carla Peck's (2004, 114) assertion that "[s]tudents' ability to work with evidence does not come

naturally: it develops as an outcome of systematic teaching" along with the fact that many of our teachers provided students with primary sources out of context, and that students were unable to connect to these sources to broader themes.

The Prove It exercise was also helpful to middle school teachers who were trying to help students use examples from their reading assignments to back up their assertions in their writing. After we modeled the Prove It exercise with the middle school textbook, *The Americans,* and some primary sources of laws from Virginia (see figure 3), Kristin (middle school teacher) had students work together in heterogeneous groups of four to five to work through a Prove It exercise she created. With the help of their peers, the students were able to come up with a thesis statement in response to the HQ and make assertions based on their reading of the textbook and teacher-selected primary sources. Then, when all students had a common understanding, they individually were able to develop a short essay on the subject.

Whether using EQs to discover patterns, connect across time periods, encourage historical inquiry, or contextualize primary sources, EQs helped our teachers move their history curricula from a seemingly disconnected and dry recitation to an interconnected and lively study of enduring issues.

## Conclusion

In this article, we have shared how a group of teachers facing many of the same issues of teaching history as their peers across the country have utilized EQs to reframe their curriculum to broaden and deepen the history taught in their classroom. The discipline of history is an important part of the school curriculum, and the literature indicates that the learning of history should be an investigation for students so that they have the opportunity to develop multiple perspectives, inquiry skills, and critical thinking habits (Barton and Levstik 2010; VanSledright 2010).

According to Levstik and Barton (2005, 4), "If history helps us think about who we are and to picture possible futures, we cannot afford a history curriculum mired in trivia and limited to a chronological recounting of events. Instead, we need a vibrant history curriculum that engages children in investigating significant themes and questions, with people, their values, and the choices they make as the central focus." We believe that using EQs and HQs are one way of helping teachers and students hone in that focus.

However, our experiences are not without caveats. The development and use of EQs involves a steep learning curve for many teachers and benefits from the opportunity to collaborate and reflect on practice. Even after a full year of sustained professional development (approximately fifty hours across the year) with EQs as the intended focus on teachers' unit and lesson planning, many reported that they needed to provide more extensive instruction on the use of EQs and HQs throughout their curriculum. Change has not proven easy, but for those teachers who have embraced EQs and HQs, their changes in teaching show promise in terms of student learning. Barton and Levstik (2004) suggest that if we are to change the practice of teaching history, we must change the purposes that guide our practices. If teachers do not understand the nature of historical knowledge, then they cannot design meaningful learning experiences for their students. Teachers' pedagogical practices in the history classroom must include implementing inquiry, discussing historical controversies, and locating primary sources.

We believe that EQs provide a starting point to help implement that change in the teaching of history, and the vertical team model provides a foundation for scaffolding the historical thinking and understanding process with students throughout the elementary and secondary grade levels with the intent to provide more than just history facts and dates. History is a way of thinking that encourages student to analyze historical evidence, evaluate it, and then demonstrate their understanding of that evidence. Realizing that teaching and learning history requires repeated practice, we hope to develop a passion and understanding of history for our students.

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# A veteran teacher turned coach shadows 2 students for 2 days – a sobering lesson learned

## $10$ _Friday_ OCT 2014

_The following account comes from a veteran HS teacher who just became a Coach in her building. Because her experience is so vivid and sobering I have kept her identity anonymous. But nothing she describes is any different than my own experience in sitting in HS classes for long periods of time. And this report of course accords fully with the results of our student surveys._

**I have made a terrible mistake.**

I waited fourteen years to do something that I should have done my first year of teaching: shadow a student for a day. It was so eye-opening that I wish I could go back to every class of students I ever had right now and change a minimum of ten things – the layout, the lesson plan, the checks for understanding. Most of it!

This is the first year I am working in a school but not teaching my own classes; I am the High School Learning Coach, a new position for the school this year. My job is to work with teachers and admins. to improve student learning outcomes.

As part of getting my feet wet, my principal suggested I "be" a student for two days: I was to shadow and complete all the work of a 10th grade student on one day and to do the same for a 12th grade student on another day. My task was to do everything the student was supposed to do: if there was lecture or notes on the board, I copied them as fast I could into my notebook. If there was a Chemistry lab, I did it with my host student. If there was a test, I took it (I passed the Spanish one, but I am certain I failed the business one).

**My class schedules for the day**

(Note: we have a block schedule; not all classes meet each day):

The schedule that day for the 10th grade student:
7:45 – 9:15: Geometry

9:30 – 10:55: Spanish II

10:55 – 11:40: Lunch

11:45 – 1:10: World History

1:25 – 2:45: Integrated Science

The schedule that day for the 12th grade student:

7:45 – 9:15: Math

9:30 – 10:55: Chemistry

10:55 – 11:40: Lunch

11:45 – 1:10: English

1:25 – 2:45: Business

**Key Takeaway #1**

*Students sit all day, and sitting is exhausting.*

I could not believe how tired I was after the first day. I literally sat down the entire day, except for walking to and from classes. We forget as teachers, because we are on our feet a lot – in front of the board, pacing as we speak, circling around the room to check on student work, sitting, standing, kneeling down to chat with a student as she works through a difficult problem…we move a lot.

But students move almost never. And never is exhausting. In every class for four long blocks, the expectation was for us to come in, take our seats, and sit down for the duration of the time. By the end of the day, I could not stop yawning and I was desperate to move or stretch. I couldn't believe how alert my host student was, because it took a lot of conscious effort for me not to get up and start doing jumping jacks in the middle of Science just to keep my mind and body from slipping into oblivion after so many hours of sitting passively.

I was drained, and not in a good, long, productive-day kind of way. No, it was that icky, lethargic tired feeling. I had planned to go back to my office and jot down some initial notes on the day, but I was so drained I couldn't do anything that involved mental effort (so instead I watched TV) and I was in bed by 8:30.

If I could go back and change my classes now, I would immediately change the following three things:

- mandatory stretch halfway through the class
- put a Nerf basketball hoop on the back of my door and encourage kids to play in the first and final minutes of class
- build in a hands-on, move-around activity into every single class day. Yes, we would sacrifice some content to do this – that's fine. I was so tired by the end of the day, I wasn't absorbing most of the content, so I am not sure my previous method of making kids sit through hour-long, sit-down discussions of the texts was all that effective.

**Key Takeaway #2**

*High School students are sitting passively and listening during approximately 90% of their classes.*

Obviously I was only shadowing for two days, but in follow-up interviews with both of my host students, they assured me that the classes I experienced were fairly typical.

In eight periods of high school classes, my host students rarely spoke. Sometimes it was because the teacher was lecturing; sometimes it was because another student was presenting; sometimes it was because another student was called to the board to solve a difficult equation; and sometimes it was because the period was spent taking a test. So, I don't mean to imply critically that only the teachers droned on while students just sat and took notes. But still, hand in hand with takeaway #1 is this idea that most of the students' day was spent passively absorbing information.

It was not just the sitting that was draining but that so much of the day was spent absorbing information but not often grappling with it.

I asked my tenth-grade host, Cindy, if she felt like she made important contributions to class or if, when she was absent, the class missed out on the benefit of her knowledge or contributions, and she laughed and said no.

I was struck by this takeaway in particular because it made me realize how little autonomy students have, how little of their learning they are directing or choosing. I felt especially bad about opportunities I had missed in the past in this regard.

If I could go back and change my classes now, I would immediately:

- Offer brief, blitzkrieg-like mini-lessons with engaging, assessment-for-learning-type activities following directly on their heels (e.g. a ten-minute lecture on Whitman's life and poetry, followed by small-group work in which teams scour new poems of his for the very themes and notions expressed in the lecture, and then share out or perform some of them to the whole group while everyone takes notes on the findings.)
- set an egg timer every time I get up to talk and all eyes are on me. When the timer goes off, I am done. End of story. I can go on and on. I love to hear myself talk. I often cannot shut up. This is not really conducive to my students' learning, however much I might enjoy it.
- Ask every class to start with students' Essential Questions or just general questions born of confusion from the previous night's reading or the previous class's discussion. I would ask them to come in to class and write them all on the board, and then, as a group, ask them to choose which one we start with and which ones need to be addressed. This is my biggest regret right now – not starting every class this way. I am imagining all the misunderstandings, the engagement, the enthusiasm, the collaborative skills, and the autonomy we missed out on because I didn't begin every class with fifteen or twenty minutes of this.

**Key takeaway #3**

*You feel a little bit like a nuisance all day long.*

I lost count of how many times we were told be quiet and pay attention. It's normal to do so – teachers have a set amount of time and we need to use it wisely. But in shadowing, throughout the day, you start to feel sorry for the students who are told over and over again to pay attention because you understand part of what they are reacting to is sitting and listening all day. It's really hard to do, and not something we ask adults to do day in and out. Think back to a multi-day conference or long PD day you had and remember that feeling by the end of the day – that need to just disconnect, break free, go for a run, chat with a friend, or surf the web and catch up on emails. That is how students often feel in our classes, not because we are boring *per se* but because they have been sitting and listening most of the day already. They have had enough.

In addition, there was a good deal of sarcasm and snark directed at students and I recognized, uncomfortably, how much I myself have engaged in this kind of communication. I would become near apoplectic last year whenever a very challenging class of mine would take a test, and without fail, several students in a row would ask the same question about the test. Each time I would stop the class and address it so everyone could hear it. Nevertheless, a few minutes later a student who had clearly been working his way through the test and not attentive to my announcement would ask the same question again. A few students would laugh along as I made a big show of rolling my eyes and drily stating, "OK, *once again*, let me explain…"

Of course it feels ridiculous to have to explain the same thing five times, but suddenly, when I was the one taking the tests, I was stressed. I was anxious. I had questions. And if the person teaching answered those questions by rolling their eyes at me, I would never want to ask another question again. I feel a great deal more empathy for students after shadowing, and I realize that sarcasm, impatience, and annoyance are a way of creating a barrier between me and them. They do not help learning.

If I could go back and change my classes now, I would immediately:

- Dig deep into my personal experience as a parent where I found wells of patience and love I never knew I have, and call upon them more often when dealing with students who have questions. Questions are an invitation to know a student better and create a bond with that student. We can open the door wider or shut if forever, and we may not even realize we have shut it.
- I would make my personal goal of "no sarcasm" public and ask the students to hold me accountable for it. I could drop money into a jar for each slip and use it to treat the kids to pizza at the end of the year. In this way, I have both helped create a closer

bond with them and shared a very real and personal example of goal-setting for them to use a model in their own thinking about goals.

▪ I would structure every test or formal activity like the IB exams do – a five-minute reading period in which students can ask all their questions but no one can write until the reading period is finished. This is a simple solution I probably should have tried years ago that would head off a lot (thought, admittedly, not all) of the frustration I felt with constant, repetitive questions.

I have a lot more respect and empathy for students after just one day of being one again. Teachers work hard, but I now think that conscientious students work harder. I worry about the messages we send them as they go to our classes and home to do our assigned work, and my hope is that more teachers who are able will try this shadowing and share their findings with each other and their administrations. This could lead to better "backwards design" from the student experience so that we have more engaged, alert, and balanced students sitting (or standing) in our classes.

# Collaborative Learning Enhances Critical Thinking

Anuradha A. Gokhale

The concept of collaborative learning, the grouping and pairing of students for the purpose of achieving an academic goal, has been widely researched and advocated throughout the professional literature. The term "collaborative learning" refers to an instruction method in which students at various performance levels work together in small groups toward a common goal. The students are responsible for one another's learning as well as their own. Thus, the success of one student helps other students to be successful.

Proponents of collaborative learning claim that the active exchange of ideas within small groups not only increases interest among the participants but also promotes critical thinking. According to Johnson and Johnson (1986), there is persuasive evidence that cooperative teams achieve at higher levels of thought and retain information longer than students who work quietly as individuals. The shared learning gives students an opportunity to engage in discussion, take responsibility for their own learning, and thus become critical thinkers (Totten, Sills, Digby, & Russ, 1991).

In spite of these advantages, most of the research studies on collaborative learning have been done at the primary and secondary levels. As yet, there is little empirical evidence on its effectiveness at the college level. However, the need for noncompetitive, collaborative group work is emphasized in much of the higher education literature. Also, majority of the research in collaborative learning has been done in non-technical disciplines.

The advances in technology and changes in the organizational infrastructure put an increased emphasis on teamwork within the workforce. Workers need to be able to think creatively, solve problems, and make decisions as a team. Therefore, the development and enhancement of critical-thinking skills through collaborative learning is one of the primary goals of technology education. The present research was designed to study the effectiveness of collaborative learning as it relates to learning outcomes at the college level, for students in technology.

## Purpose of Study

This study examined the effectiveness of individual learning versus collaborative learning in enhancing drill-and-practice skills and critical-thinking skills. The subject matter was series and parallel dc circuits.

### Research Questions

The research questions examined in this study were:

1. Will there be a significant difference in achievement on a test comprised of "drill-and practice" items between students learning individually and students learning collaboratively?
2. Will there be a significant difference in achievement on a test comprised of "critical-thinking" items between students learning individually and students learning collaboratively?

## Definition of Terms

*Collaborative Learning:*
    An instruction method in which students work in groups toward a common academic goal.
*Individual Learning*:
    An instruction method in which students work individually at their own level and rate toward an
    academic goal.
*Critical-thinking Items*
:
    Items that involve analysis, synthesis, and evaluation of the concepts.
*Drill-and-Practice Items*
:

Items that pertain to factual knowledge and comprehension of the concepts.

## Methodology

The independent variable in this study was method of instruction, a variable with two categories: individual learning and collaborative learning. The dependent variable was the posttest score. The posttest was made up of "drill-and- practice" items and "critical-thinking" items.

## Subjects

The population for this study consisted of undergraduate students in industrial technology, enrolled at Western Illinois University, Macomb, Illinois. The sample was made up of students enrolled in the 271 Basic Electronics course during Spring 1993. There were two sections of the 271 class. Each section had 24 students in it. Thus, a total of forty-eight students participated in this study.

## Treatment

The treatment comprised of two parts: lecture and worksheet. Initially, the author delivered a common lecture to both treatment groups. The lecture occurred simultaneously to both groups to prevent the effect of any extraneous variables such as time of day, day of week, lighting of room, and others. The lecture was 50 minutes in length. It was based on series dc circuits and parallel dc circuits. Next, one section was randomly assigned to the "individual learning group" while the other section was assigned to the "collaborative learning group". The two sections worked in separate classrooms.

The same worksheet was given to both treatment groups. It was comprised of both drill- and- practice items and critical- thinking items. The full range of cognitive operations were called into play in that single worksheet. It began with factual questions asking for the units of electrical quantities. Next, the questions involved simple applications of Ohm's law and Watt's law or power formula. The factual questions and the simple application questions were analogous to the drill- and- practice items on the posttest. The questions that followed required analysis of the information, synthesis of concepts, and evaluation of the solution. These questions were analogous to the critical- thinking items on the posttest. When designing the critical- thinking items it was ensured that they would require extensive thinking. Both sections had the same treatment time.

## Individual Learning

In individual learning, the academic task was first explained to the students. The students then worked on the worksheet by themselves at their own level and rate. They were given 30 minutes to work on it. At the end of 30 minutes, the students were given a sheet with answers to the questions on the worksheet. In case of problems, the solution sheet showed how the problem was solved. The students were given 15 minutes to compare their own answers with those on the solution sheet and understand how the problems were to be solved. The participants were then given a posttest that comprised of both drill- and- practice items and critical- thinking items.

## Collaborative Learning

When implementing collaborative learning, the first step was to clearly specify the academic task. Next, the collaborative learning structure was explained to the students. An instruction sheet that pointed out the key elements of the collaborative process was distributed. As part of the instructions, students were encouraged to discuss "why" they thought as they did regarding solutions to the problems. They were also instructed to listen carefully to comments of each member of the group and be willing to reconsider their own judgments and opinions. As experience reveals, group decision- making can easily be dominated by the loudest voice or by the student who talks the longest. Hence, it was insisted that every group member must be given an opportunity to contribute his or her ideas. After that the group will arrive at a solution.

## Group Selection and Size

Groups can be formed using self- selection, random assignment, or criterion- based selection. This study used self- selection, where students chose their own group members. The choice of group size involves difficult trade- offs. According to Rau and Heyl (1990), smaller groups (of three) contain less diversity; and may lack

divergent thinking styles and varied expertise that help to animate collective decision making. Conversely, in larger groups it is difficult to ensure that all members participate. This study used a group size of four. There were 24 students in the collaborative learning treatment group. Thus, there were six groups of four students each.

Grading                                                                                                  Procedure
According to Slavin (1989), for effective collaborative learning, there must be "group goals" and "individual accountability". When the group's task is to ensure that every group member has learned something, it is in the interest of every group member to spend time explaining concepts to groupmates. Research has consistently found that students who gain most from cooperative work are those who give and receive elaborated explanations (Webb, 1985). Therefore, this study incorporated both "group goals" and "individual accountability". The posttest grade was made up of two parts. Fifty percent of the test grade was based on how that particular group performed on the test. The test points of all group members were pooled together and fifty percent of each student's individual grade was based on the average score. The remaining fifty percent of each student's grade was individual. This was explained to the students before they started working collaboratively.

After the task was explained, group members pulled chairs into close circles and started working on the worksheet. They were given 30 minutes to discuss the solutions within the group and come to a consensus. At the end of 30 minutes, the solution sheet was distributed. The participants discussed their answers within the respective groups for 15 minutes. Finally, the students were tested over the material they had studied.

Instruments
The instruments used in this study were developed by the author. The pretest and posttest were designed to measure student understanding of series and parallel dc circuits and hence belonged to the cognitive domain. Bloom's taxonomy (1956) was used as a guide to develop a blueprint for the pretest and the posttest. On analyzing the pilot study data, the Cronbach Reliability Coefficients for the pretest and the posttest were found to be 0.91 and 0.87 respectively.

The posttest was a paper- and- pencil test consisting of 15 "drill- and- practice" items and 15 "critical- thinking" items. The items that belonged to the "knowledge," "comprehension," and "application" classifications of Bloom's Taxonomy were categorized as "drill- and- practice" items. These items pertained to units and symbols of electrical quantities, total resistance in series and parallel, and simple applications of Ohm's Law. The items that belonged to "synthesis," "analysis," and "evaluation" classifications of Bloom's Taxonomy were categorized as "critical- thinking" items. These items required students to clarify information, combine the component parts into a coherent whole, and then judge the solution against the laws of electric circuits. The pretest consisted of 12 items, two items belonging to each classification of Bloom's Taxonomy.

## Research Design
A nonequivalent control group design was used in this study. The level of significance (alpha) was set at 0.05. A pretest was administered to all subjects prior to the treatment. The pretest was helpful in assessing students' prior knowledge of dc circuits and also in testing initial equivalence among groups. A posttest was administered to measure treatment effects. The total treatment lasted for 95 minutes. In order to avoid the problem of the students becoming "test- wise", the pretest and posttest were not parallel forms of the same test.

## Findings
A total of 48 subjects participated in this study. A nine item questionnaire was developed to collect descriptive data on the participants. Results of the questionnaire revealed that the average age of the participants was 22.55 years with a range of 19 to 35. The mean grade point average was 2.89 on a 4- point scale, with a range of 2.02 to 3.67.

The questionnaire also revealed that eight participants were females and 40 were males. Nineteen students were currently classified as sophomores and 29 were juniors. Forty- five participants reported that they had no formal

education or work experience in dc circuits either in high school or in college. Three students stated that they had some work experience in electronics but no formal education.

The pretest and posttest were not parallel forms of the same test. Hence, the difference between the pretest and posttest score was not meaningful. The posttest score was used as the criterion variable.

At first, a t- test was conducted on pretest scores for the two treatment groups. The mean of the pretest scores for the participants in the group that studied collaboratively (3.4) was not significantly different than the group that studied individually (3.1). The t- test yielded a value (t=1.62, p>0.05) which was not statistically significant. Hence, it was concluded that pretest differences among treatment groups were not significant.

The posttest scores were then analyzed to determine the treatment effects using the t- test groups procedure which is appropriate for this research design. In addition, an analysis of covariance procedure was used to reduce the error variance by an amount proportional to the correlation between the pre and posttests. The correlation between the pretest and the posttest was significant (r=0.21, p<0.05). In this approach, the pretest was used as a single covariate in a simple ANCOVA analysis.

Research                                             Question                                             I
Will there be a significant difference in achievement on a test comprised of "drill- and- practice" items between students learning individually and students learning collaboratively?

The mean of the posttest scores for the participants in the group that studied collaboratively (13.56) was slightly higher than the group that studied individually (11.89). A t- test on the data did not show a significant difference between the two groups. The result is given in Table 1. An analysis of covariance procedure yielded a F-value that was not statistically significant (F=1.91, p>0.05).

Research                                             Question                                             II
Will there be a significant difference in achievement on a test comprised of "critical- thinking" items between students learning individually and students learning collaboratively?

The mean of the posttest scores for the participants in the group that studied collaboratively (12.21) was higher than the group that studied individually (8.63). A t- test on the data showed that this difference was significant at the 0.001 alpha level. This result is presented in Table 1. An analysis of covariance yielded a F-value that was significant at the same alpha level (F=3.69, p<0.001).

Table                                                                                                     1
*Results of t-Test*

| ItemClassification | Method of Teaching | N | Mean | SD | t | p | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Individual | 24 | 11.89 | 2.62 | | | | | | | | | | | | | | | | |
| Drill-and-Practice | | | | | 1.73 | .09 | Collaborative | 24 | 13.56 | 2.01 | Individual | 24 | 8.63 | Critical-thinking | 3.53 | .001*** | Collaborative | 24 | 12.21 | 2.52 |

**Discussion of the Findings**

After conducting a statistical analysis on the test scores, it was found that students who participated in collaborative learning had performed significantly better on the critical- thinking test than students who studied individually. It was also found that both groups did equally well on the drill- and- practice test. This result is in agreement with the learning theories proposed by proponents of collaborative learning.

According to Vygotsky (1978), students are capable of performing at higher intellectual levels when asked to work in collaborative situations than when asked to work individually. Group diversity in terms of knowledge and experience contributes positively to the learning process. Bruner (1985) contends that cooperative learning methods improve problem- solving strategies because the students are confronted with different interpretations of the given situation. The peer support system makes it possible for the learner to internalize both external knowledge and critical thinking skills and to convert them into tools for intellectual functioning.

In the present study, the collaborative learning medium provided students with opportunities to analyze, synthesize, and evaluate ideas cooperatively. The informal setting facilitated discussion and interaction. This group interaction helped students to learn from each other's scholarship, skills, and experiences. The students had to go beyond mere statements of opinion by giving reasons for their judgments and reflecting upon the criteria employed in making these judgments. Thus, each opinion was subject to careful scrutiny. The ability to admit that one's initial opinion may have been incorrect or partially flawed was valued.

The collaborative learning group participants were asked for written comments on their learning experience. In order to analyze the open- ended informal responses, they were divided into three categories: 1. Benefits focusing on the process of collaborative learning, 2. Benefits focusing on social and emotional aspects, and 3. Negative aspects of collaborative learning. Most of the participants felt that groupwork helped them to better understand the material and stimulated their thinking process. In addition, the shared responsibility reduced the anxiety associated with problem- solving. The participants commented that humor too played a vital role in reducing anxiety. A couple of participants mentioned that they wasted a lot of time explaining the material to other group members. The comments along with the number of participants who made those comments are described in Table 2.

Table                                                                                                                                          2
*Categorical Description of Students' Open-Ended Responses Regarding Collaborative Learning*

A. Benefits Focusing on the Process of Collaborative Learning
    Comments (# of responses):

    Helped understanding (21)
    Pooled knowledge and experience (17)
    Got helpful feedback (14)
    Stimulated thinking (12)
    Got new perspectives (9)

B. Benefits Focusing on Social and Emotional Aspects
    Comments (# of responses)

    More relaxed atmosphere makes problem- solving easy (15)
    It was fun (12)
    Greater responsibility- for myself and the group (4)
    Made new friends (3)

C. Negative Aspects of Collaborative Learning
    Comments (# of responses)

| Wasted time explaining the material to others (2) |
| --- |

## Implications for Instruction

From this research study, it can be concluded that collaborative learning fosters the development of critical thinking through discussion, clarification of ideas, and evaluation of others' ideas. However, both methods of instruction were found to be equally effective in gaining factual knowledge. Therefore, if the purpose of instruction is to enhance critical- thinking and problem- solving skills, then collaborative learning is more beneficial.

For collaborative learning to be effective, the instructor must view teaching as a process of developing and enhancing students' ability to learn. The instructor's role is not to transmit information, but to serve as a facilitator for learning. This involves creating and managing meaningful learning experiences and stimulating students' thinking through real world problems.

Future research studies need to investigate the effect of different variables in the collaborative learning process. Group composition: Heterogeneous versus homogeneous, group selection and size, structure of collaborative

learning, amount of teacher intervention in the group learning process, differences in preference for collaborative learning associated with gender and ethnicity, and differences in preference and possibly effectiveness due to different learning styles, all merit investigation. Also, a psycho- analysis of the group discussions will reveal useful information.

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