

## To Be Or Not To Be...Your Own Star: Dramatic Inquiries into Science

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### **Introduction**

Albert Einstein once said, “One of the strongest motives that lead men to art and science is escape from everyday life, with its painful crudity and hopeless dreariness, from the fetters of one's own ever-shifting desires. A finely tempered nature longs to escape from the personal life into the world of objective perception and thought.”



My goal for this unit is to merge the worlds of art and science, in order to expand students' minds so they are able to escape from their everyday life and become inquisitive, empowered learners. I believe that education can truly empower students and lead them to become active members of their community. However, in the seven years I've been a teacher in an urban school district, I've noticed that some students see school as painful, difficult, and frustrating, while even others see it as boring and useless. Because of this, classroom management has been a reoccurring issue for many teachers

and enthusiasm for teaching has wavered greatly. I want to change the way students think about school, mostly about science, and transform the role of the teacher from “actor” to “director.” I feel confident that my own passion for learning could help students rekindle the joy and satisfaction of exploring and discovering new knowledge on their own.

Many of my students are surprised when I tell them that I have not always wanted to be a teacher. Once upon a time I was a Studio Art major and the Assistant Manager to Denison University’s Theater Box Office. I saw something in those actors and actresses that struck me as amazing. The drama and emotion they elicited from the crowd, not to mention myself, was enthralling. I wanted to do what they did, but bigger, like in the city that it’s known for. But the idea of living by myself in New York City, wanting to star on *Broadway*, (actually it probably wouldn’t even have been *Off-Off Broadway*) scared me. So I returned from college to find a career in another passion I’ve had since childhood... science. I loved art, but I also loved the mysteries of science. It really is not so incongruous that later I became a Paleontologist, then a report writer for an environmental laboratory, and now a science teacher.

“How did you go from art to science?” my students will often ask.

“I see art in everyday life,” I’d reply, “I don’t know that I ever left one for the other.”

I firmly believe all teachers are, in one way or another, performers. Helping to guide students through the process of learning is quite a challenge, however, I’ve realized it’s the most important job in the world. Secretly though, sometimes I wish I were still a student – I love learning! It is this passion for seeking knowledge that I want to share with my students. K. Patricia Cross sums up what I would like to accomplish with this unit when she stated, “The task of the excellent teacher is to stimulate *apparently ordinary* people to unusual effort. The tough problem is not in identifying winners: it is in making winners out of ordinary people.”

Since science is truly defined as a way of thinking, making scientists out of my *ordinary* students seems quite possible. By bringing dramatic scientific literacy, art, and dynamism into the classroom, students who participate in this curriculum unit will take ownership of their learning; they will take the stage. Students will be learning about learning, and transform their way of thinking, with the subject matter as a changeable conduit. As a result, the teacher’s role will become that of the classroom “director,” or facilitator. The Tao of Teaching supportively states, “A good teacher is better than a spectacular teacher. Otherwise the teacher outshines the teachings.”

## Objectives

*To Be or Not to Be... Your Own Star: Dramatic Inquiries into Science* is designed for high school students taking my Earth and Environmental Science course. The main thrust of the curriculum unit will require students to seek knowledge independently through questioning, analyzing, synthesizing, and interacting with peers. These higher-level thinking skills will be applied by utilizing the Paideia Seminar technique throughout different areas of my course in which topics often delve deep into sketchy territory and then become difficult for me to edify. (As a teacher, I want my students to think for themselves, and therefore, I do not want to accidentally force my own opinions onto them.) The areas in which this usually occurs is when I begin teaching the origin of the solar system, the use of chemistry in the modern world, and current environmental issues. These topics often bore students, or as often is the case with my honors students, digress to philosophical issues that end up being debated, but very inadequately and with much injustice.

Not to mention, what my students really want for 90-minutes is some sort of drama. Well, they'll get drama, literally and artistically! The great thing about utilizing the Paideia Seminar technique (or "seminar" as I will refer to it in this unit) is its effectiveness is manifold. "As the later years of a student's education becomes increasingly compartmentalized, the seminar provides a wonderful opportunity to introduce cross-curricular integration."<sup>1</sup> Science teachers, for example, should not feel themselves bound to utilize strictly science texts, but perhaps a poem, painting, or other historical or artful media that may enable students to construct a broader contextual relevance for the concept being explored.

I have chosen excerpts from two plays surrounding historical scientific conflicts: Michael Frayn's *Copenhagen*, which introduces moral and ethical dilemmas surrounding two scientific colleagues during World War II, and Jerome Lawrence and Robert E. Lee's *Inherit The Wind*, which engages concerns of teaching evolution and Darwinism in the classroom. In this unit, students will also use "seminar" to explore environmental racism and justice issues through several pop-culture media and art sources. I believe students who have the opportunity to have their voices heard become truly empowered and therefore become optimistically active in their community. The course will culminate with a group research project in which the students will choose a dramatic media to portray a scientific issue they have been curious about throughout the semester. Similar to the style of *The Pageant of the Masters* in Laguna Beach, California, students will make a statement by performing and or displaying their final projects on stage in the high school auditorium for family and friends of their local community.

## Rationale

Approximately 35 people move to Charlotte every day. The district that I teach in,

Charlotte-Mecklenburg Schools (more commonly known as CMS), grows by approximately 4,000 students per year, and we are one of the largest school districts in the nation! My school is one of 173 in the CMS District that encompasses more than 133,000 students in grades K-12. They come from all different ethnic backgrounds, all different types of families, and are at all different levels of physical and academic ability. Nearly half of the students in the district qualify for free or reduced lunch, which is the federal standard for measuring poverty. We are home to students who are from 151 countries, and speak 120 different languages. According to my district's website, approximately 42% are African-American, 35% are Caucasian/White, 15% are Hispanic/Latino, 4% are Asian-American, and 4% are American Indian/Multiracial.<sup>2</sup> These statistics only reflect the tip of the iceberg when it comes to diversity, as each of those groups contains many socioeconomic, cultural, ethnic, special-needs and religious subgroups.

I teach regular and honors Earth and Environmental Science at East Mecklenburg High School in Charlotte, North Carolina. At East, my classroom is quite diverse not only because of my students' demographics, but also in age and academic ability. Most students follow a block schedule consisting of four 90-minute classes. Even as a seventh-year teacher, at times I struggle to hold my students' attention for that amount of time. This unit is intended to assist me in motivating and empowering my students for that length of time in three areas of science that are often difficult for me to introduce or extend.

Albert Einstein once said, "Education is what remains after one has forgotten everything he learned in school." My high school students might forget the detailed facts about the periodic table or climate change sooner or later. However, it is my hope that as I introduce powerful issues related to them and regarding the community they live in, that they will be able to change their previous stereotypical and often inaccurate ways of thinking. And, that the new knowledge they gained will empower them and, therefore, allow them to be a willing participant, and not a passive follower in the classroom and in life.

## Background Information

Students of today live in a dynamic, global society. They come into my classroom expecting to be entertained for 90-minutes. Not an easy task. In my experience thus far, I have also noticed that classes will form a collective personality. One year, for example, I noticed my fourth-block was very quiet and intellectual, while my second-block was the total opposite; loud, humorous and struggled with their understanding of material. For this reason, it's a good idea to try different techniques and strategies to keep interest among all students. I know I can 'hook' my students with a demonstration, quick-lab,

skit, video clip, or even an artistic view on a topic. Research continues to prove the effectiveness in doing such. According to the journal article, “Women Who Pursue Science Education: The Teachers They Remember, the Insights They Share”, a survey was conducted of 80 women high school science teachers regarding their most memorable science classes and most significant science teachers. One-third of respondents revealed that hands-on instructional techniques are their most memorable experiences in learning science.<sup>3</sup> According to Adam Waxler, classroom management and student achievement are directly related. He states that the key to classroom management is keeping students actively involved in the entire lesson. However, because of the type of students that I teach, these actions only offer a limited amount of ‘proof’ of a topic, temporary excitement if you will, and not necessarily offering any inquiry into knowledge that will last.

Increasing scientific literacy and reflection within my classroom is not only a goal of mine, but also an educational goal of our nation. It is my belief that being literate increases our knowledge base and broadens our experiences in life. By reflecting on our experiences, we construct our own understanding of the world we live in. Each of us, “Generates our own *rules* and *mental models*, which we use to make sense of our experiences. Learning, therefore, is simply the process of adjusting our mental models to accommodate new experiences.”<sup>4</sup> A Chinese proverb states, “I hear and I forget, I see and I remember, I do and I understand.” Although these words may not be the exact translation, they seem to underscore the need for a multidisciplinary approach to science teaching. Without this approach, students must rely on memory and abstract thought, two methods that restrict learning in most students.

The Paideia Seminar is a teaching technique that will address the concerns I have in my science classroom. It is a very powerful form of dialogic instruction and can be used effectively in a wide variety of settings. According to Webster’s Dictionary, the word Paideia (py-dee-a) is from the Greek pais, or paidos, meaning the upbringing of child (related to pedagogy and pediatrics). In an extended sense, it is the equivalent of the Latin humanitas (from which “the humanities” came from), signifying the general learning that should be the possession of all human beings. The Paideia Seminar approach to learning addresses two concerns I have of my students: I want them to think for themselves and respect others’ voices as well. The Paideia philosophy focuses on two important goals, that of intellectual development and social development. The former is evidenced through critical thinking, analysis, synthesis, and evaluation. It addresses the question, how do you teach others to think? The latter, is evidenced through communication skills including listening and speaking. It addresses a second question, how do you teach students social skills?

There are three types of seminars, and this unit will focus on just one, the content-area seminar. The ideas, concepts and values of this seminar address the prioritized curriculum. (See Appendix A for *Ideas and Values* chart in planning a seminar.) Content-

area seminars may occur at the beginning, middle or end of a unit determined by the unit plan's structure and sequence. Because I am looking for assistance in three different topics of science, this type of curriculum-based seminar will work best.

There are four components of seminar. The first is choosing the "text", which can literally be a short, complex and challenging printed piece, or it can also be non-print, such as a science experiment, a painting or drawing, or video. Regardless of the type of "text", (or I'll refer to it as a "source") it must be ambiguous enough so participants can speculate about it and the interpretation of it can prompt a variety of perspectives. A science experiment, for example, would focus on both the content of the text as well as possible problem solving strategies. The second component is preparing the questions for seminar. There are three types of questions that provide structure and direction for the dialogue: Opening Questions, Core Questions and Closing Questions. Opening questions are designed to get participants to identify the main ideas in the "source." Core questions are designed to have participants closely analyze the details of the "source." Closing questions are designed so that participants personalize and apply the ideas. There are follow-up questions that can arise at any point during the dialogue; they are designed to further clarify or investigate an idea or perspective. (See Appendix A for a *General Seminar Format* that can be used for any seminar.) The third component is facilitating the dialogue between the students. During seminar, the role of the teacher is that of a facilitator (or "director", as I'd like to think) to nurture the inclusiveness of all students and broaden the depth of the dialogue. The goal is that students experience increased understanding of not only the "source," but of the self and others. Just like the director of a play, it is the responsibility of the seminar facilitator to map participation, to listen carefully in anticipation of follow-up questions, and to monitor the distribution of talk in order to produce a shared dialogue. (See Appendix A for *Facilitator Map*.) The fourth component of seminar is engaging student participation. The student's role is to engage in the dialogue process. They should be consistently challenged to expand and refine their seminar participation skills. Their responsibilities are to listen, think, speak with each other (NOT the teacher), refer to the "source", and address others respectfully. After seminar is over, students should assess their participation by completing a self-evaluation sheet. (See Appendix A for *Self-Evaluation Form*.)

You may be wondering what happens in a classroom before the seminar even takes place? How are students prepared for a seminar? According to Heather Coffey, in Paideia classrooms, there are three instructional methods that guide activities. They are known as the Three Columns of Instruction and include didactic instruction, coaching and of course, the seminar. The didactic mode represents the acquisition of organized knowledge and is the "delivery of factual information"<sup>5</sup> where students acquire the most important foundations of information. According to the Paideia model, this type of instruction only takes 10-15% of instructional time<sup>1</sup>, and students are generally passive during lecture, demonstration, reading, or video introduction to a topic. This mode of instruction is not intended to talk at students, but instead to demonstrate a concept or

theory prior to engagement with the primary “source.” During this type of instruction, the teacher explains why the information is important to know or justifies why it should be memorized.

Intellectual Coaching is the type of instruction that takes up 60-70% of time in the Paideia classroom.<sup>1</sup> Teachers utilize strategies of modeling and questioning during this phase of instruction, and the goal for students is to “acquire expertise in skills of learning, such as reading, writing, calculating, and observing.”<sup>1</sup> Through the coached section, the teacher essentially compels students to answer hard questions about the material with which they are engaging. For example, instead of conducting a lecture and giving students practice worksheets, the teacher might ask the student to solve their problem/question another way or write an explanation of how it was solved. Instead of taking control when a student does not understand a concept, the instructor encourages the student to discover their own mistakes and how to correct them. This will take some practice and getting used to! The teacher then assesses and evaluates student learning by assigning performance-based tasks, projects, and rubrics.

A couple of techniques that are worth mentioning here, are ones I may use in my classroom prior to a seminar. The first is (what I like to call) Silent Conversations. This dialogue takes place between partners or within a small group. Several large sheets of chart paper with an evocative question at the top are posted around the classroom. Partners, or preferably, small groups are placed at each question and told to begin a silent conversation by writing in response to one another. The key is to remain silent throughout the activity. One or two students start to answer the question by writing on the chart paper, so everyone can see, and the others respond by writing beneath the previous statement. The conversation continues until the given time is up. Students will silently read all the conversations that took place on the paper and given a second round to answer again if necessary. Students then silently rotate to a new question. They must not communicate at all during the transitions. This technique allows for students who normally might be shy to speak up in class to voice their opinion and participate equally with students who tend to overpower a classroom discussion.

The second technique I may use in my classroom prior to a seminar is called, Ink-Think. When students are given a text to read they are allowed to write their immediate reactions onto the text. Post-It Notes are also valuable for texts that will be reused for another class. Connections to text, interesting discoveries, symbolisms, likes/dislikes, questions, and anything else the reader wants to say about what they are reading can be written down onto the text. These notes will assist students in their discussions with peers, conferences with teachers, and as a way of better understanding the topic at hand. This technique can be utilized with non-print material as well. Students can write thoughts down on an index card, sheet of paper, or journal as they view paintings, photographs, sculpture or other non-text media.

And the last column of instruction is the Paideia seminar. Seminar encourages students to develop their understanding of “ideas, concepts, and values about the curriculum,”<sup>5</sup> while participating in whole-class discussions. It comprises about 15-20% of instructional time.<sup>1</sup> Terry Roberts and Laura Billings describe the Paideia seminar as a:

Formal discussion based on a “text” in which the leader asks only open-ended questions. Within the context of the discussion, students are required to read and study the text carefully, listen closely to the comments of others, thinking critically for themselves, and articulate both their own thoughts and their responses to the thoughts of others. This part of instruction takes place after students have engaged with classroom material. Usually, the teacher asks an initial question about a text, and students participate in an open conversation. Instead of controlling the conversation, the teacher acts as a facilitator, leading students to discovery about their perspectives and encouraging them to challenge what others might have to say. For example, if the class is reading a piece of literature, the teacher can use the seminar to challenge students to think of alternative perspectives on the piece or discuss how historical events may have impacted or influenced the work. Exposure to other points of view assists in the development of active listening and discussion skills.<sup>6</sup>

The idea of seminar is to allow students the opportunity to better understand what they are studying by using their peers as a method of research. When used in combination, these elements comprise the Paideia philosophy of education.

## **Strategies**

The areas in which I would like to increase student thinking is when I introduce the following sections of my course: the origin of the solar system, the use of chemistry in modern science and current environmental issues. There are two strategies that I will use in combination with one another in order to accomplish this goal; that of empowering my students through the use of the Paideia Seminar format. This combination emphasizes the importance of the self within a group process and gives students more responsibility for participating with their peers.<sup>4</sup>

Students become empowered when they feel some ownership of the material in which they are learning. Unlike enabling children to do what they want, empowering is the development of knowledge, skills and abilities in the learner to allow them to control and develop their own learning. Patricia and Theodore Panitz state that, “Empowerment produces an environment that fosters maturity and responsibility in students for their learning. The teacher becomes a facilitator instead of an instructor and the student



becomes a willing participant instead of a passive follower.”<sup>7</sup>

Students are also empowered by, “developing their critical thinking, or meta-cognition.”<sup>8</sup> This requires an approach to teaching and learning that goes beyond requiring students to learn a body of knowledge and be able to apply it analytically. Critical thinking is about encouraging students to challenge preconceptions of their own, their peers and their teachers. Burrows and Harvey also state that, “They should be encouraged to question the established orthodoxy rather than swallow it unthinkingly, and to develop their own opinions and be able to justify them.”<sup>8</sup> Empowering students through critical thinking encourages them to think about knowledge as a process they are engaged in. It requires students to self assess, to be able to decide what is good quality work and to be confident when they have achieved it. In short, an approach that encourages critical thinking treats students as intellectual performers rather than as a compliant audience. It transforms teaching and learning into an active process of understanding. It enables students to easily go beyond the narrow confines of the ‘safe’ knowledge base they’ve acquired, to applying themselves to whatever they encounter in the future!

To ensure this active process of understanding occurs in my classroom, I will expose my students to various pop-culture media sources that will allow them to view scientific concepts in new ways. They will be encouraged to think beyond their previous stereotypical and often inaccurate thoughts. Students must also be able to properly voice their ideas; to communicate so that each might be a good citizen. The Paideia Seminar will be the tool for this empowerment to occur. This strategy can be used in all grade levels and subject areas and is intended to “help even the most unmotivated students understand and appreciate the ideas at the core of the topic.”<sup>1</sup>

## **Classroom Activities**

In order to facilitate these strategies in my classroom, I will create activities and seminars that will merge science with an art form to ultimately translate student knowledge into action. Although this particular unit involves only three topics of my course, there will be a final semester project that will incorporate all areas of science that my course covers. Details regarding the final project are at the very end of this section.

The first and second part of the Paideia philosophy involves instruction and coaching. As mentioned earlier, the instruction is the “delivery of factual information” where students acquire the most important foundations of information. According to the Paideia model, this type of instruction only takes 10-15% of time, and students are generally passive during this introduction to the topic. This mode of instruction is not intended to talk at students, but instead to demonstrate a concept or theory prior to engagement with

the primary source. During this type of instruction, the teacher explains why the information is important to know or justifies why it should be memorized. The second part involves coaching which takes 60-70% of the time. As also mentioned earlier, teachers utilize strategies of modeling and questioning during this phase of instruction, and the goal for students is to acquire expertise in skills of learning, such as reading, writing, calculating, and observing. Essentially the teacher compels students to answer hard questions about the material with which they are engaging.

The information that follows describes some activities that students will be completing prior to seminar. Since teachers often have their own style of relaying information to students, the following ideas are vague enough so that they can be altered and extended to fit any teachers' needs.

#### USE OF CHEMISTRY IN THE MODERN WORLD:

My students will be able to voice their interpretations of an excerpt from a well-known scientific play surrounding moral conflict. After reading sections of Michael Frayn's play *Copenhagen*, students will then watch the film and be guided to inquire about the series of moral dilemmas German physicist, Werner Heisenberg, has been forced into by Adolf Hitler. Jewish colleague and father figure to Heisenberg, Neils Bohr, knew his friend wanted to help Germany but did not agree with using physics to develop a weapon that would destroy his homeland. Neither scientist knew how to prevent it from happening and their friendship fell apart due to pride and secrecy.

#### ORIGIN OF THE SOLAR SYSTEM:

As I begin my solar system unit, the first topic I am required to explore is how the solar system originated. I must teach the Big Bang Theory. Those who have strong religious beliefs always question the curiosity surrounding this theory. The controversy surrounding the origin of human life soon finds its way to the forefront of discussion. I have decided, at this time, that students will explore Jerome Lawrence and Robert E. Lee's, *Inherit The Wind*. They will read and view Act II of this play and be guided to inquire about why the play raises such controversy and emotion over teaching evolution in the classroom. Students will get a chance to voice their interpretation about theories concerning thinking versus not thinking as opposed to the Bible versus Darwinism.

#### CURRENT ENVIRONMENTAL ISSUES:

My students will be exposed to several videos found at The Environmental Justice and Climate Change Initiative Web site: <http://www.ejcc.org/> It is an organization highlighting young African American leaders in the climate justice movement. Having my students watch other students who are being active in their community and, who are just like them, will be shocking and powerful. The entire site is representative of how certain communities are underrepresented in the environmental sector of their state and how students are taking action. My students can relate to the young men and women on this site and they can see that their involvement is not only to raise awareness about

environmental justice, but to be a part of a national issue, to feel important and respected (with themselves and within their community). Teachers must preview the site for their preference of material to be shown in class. I will be showing both of Kari Fulton's videos and Illai Kenney's video in particular. Another Web site I will explore with my students is The Goldman Environmental Prize Web site: <http://www.goldmanprize.org/> This site also offers several videos and information pertaining to activists around the globe who have fought environmental injustice within their own communities and won. The video that I will show my class is about Goldman Prize winner, Margie Eugene-Richard, of Norco, Louisiana and her battle with toxic and nuclear contamination in her neighborhood. I will also show will.i.am's (singer from the Black Eyed Peas) recently released music video *Take Our Planet Back* based on Al Gore's 2008 Repower America speech. It is found at: <http://www.wecansolveit.org/page/s/williamvideo>. A first action step for students, found at the end of his video, will be to sign up to Repower America with 100% clean electricity within 10 years. Students will also be inspired by visiting a remarkable Web site for music, arts, action and more called *Take Our Planet Back*, found at: <http://takeourplanetback.dipdive.com/>

The third part of the Paideia philosophy involves the actual seminar. It comprises about 15-20% of instructional time and involves participating in whole-class discussions surrounding open-ended questions. The following information includes the three seminars that students will be participating in.

#### USE OF CHEMISTRY IN THE MODERN WORLD:

TITLE: But Why? Uncertainty in Science?

IDEAS & VALUES: Physics, Principle, Progress, Power, Government, Friendship, Courage, Responsibility

#### PRE-SEMINAR:

*Content:* Prior to seminar, students will have been introduced to basic chemistry: the elements and parts of an atom; introduced to Michael Frayn's play *Copenhagen* (Frayn's characters play through the different interpretations and find that their understandings, like quantum mechanics itself, are rooted in uncertainty. Frayn illuminates the complexities of self-knowledge, memory, and the very possibility of recapturing the past); including basic social studies background of WWII; and having watched the movie version of *Copenhagen*.

*Process:* Review seminar objectives and guidelines. (listen, speak politely and with a respectful tone of voice, use non-verbal communication cues, begin your statement with "I agree with/I disagree with; I like/I dislike; I'd like to add onto; I think that"...)

#### SEMINAR:

*Opening:* The central event in this play is a real one. Heisenberg did go to Copenhagen in 1941, and there was a meeting with Bohr. However there is much ambiguity as to what

actually was said to each other and about what happened. When describing historical events, how much truth/accuracy is there when it involves the recollection of people? How much of this play is fiction and how much of it is history in your opinion?

- Core:*
1. How did you perceive the role of Margrethe throughout the play? Did your views about her or the characters change as the story progressed?
  2. What exactly prompted Heisenberg's trip to Copenhagen? What did he want? How does his behavior before and after the trip illuminate his actions?
  3. Was Heisenberg trying to forestall the development of nuclear weapons? Carrying out atomic espionage? Or just clumsily seeking personal rapprochement (renewal of friendship) across a political chasm (wide difference)?
  4. You are in the position of a judge. This "whodunit" case has been brought to your chambers. The facts, the motives, the clues, the evidence, and the testimony of witnesses have been given to you. What conclusions can be drawn about Bohr and Heisenberg's relationship and this play?

*Closing:* Science tries to answer "why", but what happens when science leaves us with uncertainty? How often does this paradox occur in life?

#### POST SEMINAR:

*Process:* Student Self Evaluation Sheet

*Content:* Have students list other documents, books, or cultures that have relied on or been written based on the recollection/memories/retelling of stories by people we don't really know.

AND

Have students write in detail about a situation in which they were in that involved making moral or ethical decisions that affected themselves and someone else. (You may change names in order to keep confidence.)

OR for those that can't relate to the above situation:

Have students choose a scene to rewrite or add to Frayn's original play. Explain why this scene was chosen or why it evoked the addition to it.

#### ORIGIN OF THE SOLAR SYSTEM:

TITLE: Inherit the Wind = You have worked hard to get something that has no value.

IDEAS & VALUES: Knowledge, Principle, Being, Emotion, Theology, Evolution, Courage, Responsibility, Education

#### PRE-SEMINAR:

*Content:* Prior to seminar, students will have been introduced to the origin of the solar system, particularly the Big Bang Theory. As students begin to debate the origin of life on Earth, they will be introduced to the famous drama based on the true story of a teacher who brought up Darwinism during school, in a town that is very religious and only believes in the Bible and God: They will get a brief verbal review of Act One of Jerome Lawrence and Robert E. Lee's play *Inherit The Wind*. They will have read Act Two and Act Three aloud in class using Ink-Think technique on post-it notes (as to not mark up the books). The premise behind doing this seminar is that teachers attempt to teach thinking vs. not thinking, NOT Darwinism vs. the Bible. (Fictionalized from the real-life 1925 *Scopes vs. The State of Tennessee* Trial - and informally known as the Scopes Monkey Trial, was an American legal case that tested the Butler Act, which made it unlawful, in any Tennessee state-funded school and university, "to teach any theory that denies the story of the Divine Creation of man as taught in the Bible, and to teach instead that man has descended from a lower order of animals)

*Process:* Review seminar objectives and guidelines.

#### SEMINAR:

*Opening:* This play also deals with the symbolism of uncertainty. Why does this play raise such controversy and emotion? (What is the definition of a natural law? Of a theory? Would you say that both Darwinism and the Bible fit into one of these categories?)

*Core:* 1. What is the significance of the playwrights' description of the setting of the play? What does it say about their attitudes toward Southern fundamentalism (strict views)?

2. What purpose does Cates and Rachel's romantic relationship serve in this play?

3. Drummond uses various techniques over the course of the trial to undermine Brady's literal interpretation of the Bible. What do you think his underlying purpose for humiliating his opponent might be?

4. How does this play speak to the struggle of the individual versus larger society? What message does it contain about the power of the individual to change society?

*Closing:* Why do the playwrights imply that the themes of their play are timeless and universal? What relevance do these themes have today?

#### POST SEMINAR:

*Process:* Student Self Evaluation Sheet

*Content:* Have students write a descriptive and argumentative paragraph describing whether they think teachers should be given strict guidelines as to what and how to teach their subject. Students who wish to share, may debate their answers in class.

OR

Have students write about a time in which they “inherited the wind”. Using details, describe when you have worked hard for something, thought you did a great job, but you received no accolades, no credit, no reward.

OR

Have students write a detailed paragraph about whether or not *Inherit the Wind* is a good title for this play. Was the lesson fulfilled in this case? Have students defend their answer.

#### CURRENT ENVIRONMENTAL ISSUES:

TITLE: Can Pop-Culture Change Our Thoughts About Our Planet?

IDEAS & VALUES: Environment, Citizen, Cause, Courage, Responsibility

#### PRE-SEMINAR:

*Content:* Prior to seminar, students will have completed a Promethean Board flipchart and viewed several Web sites and videos related to environmental justice and racism.

*Process:* Review seminar objectives and guidelines.

#### SEMINAR:

*Opening:* In what ways do literature, film, TV shows, pop songs and other cultural forms shape our everyday views of and interactions with our natural-cultural environments?

*Core:* 1. (Specifically after viewing will.i.am’s music video, *Take Our Planet Back*) Do you think this artist could inspire people into at least thinking about the environment or the issues shown and then actually doing something about it?

2. As urban sprawl continues to carry higher-income families into the suburbs, urban areas are increasingly degraded and polluted; housing is devalued and low-income families (with a majority of these made up of people of color) have little recourse. What is the reason for this degradation?

3. What is environmental racism, and do you believe you are a victim where you live? Why or why not?

*Closing:* Share your ideas on what more can be done to actively ensure nondiscrimination in the environment? Especially in the (East Meck high school) community.

#### POST SEMINAR:

*Process:* Student Self Evaluation Sheet

*Content:* Have students list 5 ways they can improve the environment in their community and then have them choose one of these and explain in detail how they would do that.

AND

Make a 3 panel drawing of what they think their community looked like before their school was built, what it might look like in 10 years and then 50 years.

\* \* \*

Before these seminars can take place, students must first learn the process and requirements of a Paideia Seminar. (See Appendix A for *Getting Started Topics for Mini-Seminars*) In these mini-seminars, focus on behavior, non-verbal communication skills and proper social etiquette, not necessarily the content of the “source.”

The following are additional opportunities for students to practice observing, analyzing and practicing the process of seminar. Included are paintings and photography involving various scientific concepts.

Students can view the painting “An Experiment on a Bird in an Air Pump” by Joseph Wright of Derby. (See Figure 1 below)



Figure 1

This painting depicts a traveling scientist demonstrating the formation of a vacuum by withdrawing air from a flask containing a white cockatoo. The artist’s subject is not scientific invention, but a human drama in a nighttime setting. The bird will die if the scientist continues to deprive it of oxygen, and Wright leaves us in doubt as to whether or

not the bird will be set free! A single candle in the foreground dramatically lights the figures in the painting. Students will discuss the wide range of the characters' individual reactions; from the frightened children and the reflective philosopher to the indifferent young lovers seemingly to be concerned only with each other. Students will be informed of Shelagh Stephenson's play, *An Experiment with an Air-Pump*, which was written not only as a possible interpretation of the painting for entertainment, but to serve as a conduit either to perpetuate the readers fears about science or question them. They will then have the opportunity to voice their interpretations of the painting through Silent Conversations. I will have several questions posted around the room on chart paper regarding whether science should be feared or not. Students will be placed in groups and told not to speak, but only to write. One student will start the conversation by writing an answer (their opinion) to the question on the paper. Other students in the group will respond one at a time to each other. Several conversations may be taking place at one time on the chart paper. After a given amount of time, students will stay in the same groups but rotate around the room to a new question. This particular activity is not a seminar, but its purpose is to introduce scientific artwork to students and get them to think beyond their normal parameters.

Artists use their creativity to reveal the world in new and sometimes unexpected ways. The unique artwork from Dawn Csutoros and Marcus Tatton will be viewed and analyzed further through a practice Paideia seminar. (The seminar format can be found at the end of the descriptions of the three artists.) Csutoros tells the intriguing story of the year-long Tree Hugs Project which got Tasmania knitting to help save the old-growth forests of the Styx Valley. Her concept was essentially to create a powerful art installation while simultaneously enabling everyone and anyone in the community to actively participate in the creation of a statement reflecting their love, care and willingness to protect the beauty of the Styx forest from further old growth logging. Students will discuss their preconceptions and stereotypes of a tree-hugger and the common detriments (and possibly advantages) of caring for the community and environment as a high school student at East Mecklenburg High. Csutoros's Web site can be discovered at: <http://www.leatherwoodonline.com/arts/2004/hugs/index.htm> (See Figure 2 below)





Figure 2

Marcus Tatton creates statuary from the debris of the forest floor after a careless man with his indiscriminating chainsaw has ripped down the trees. After discussing renewable and nonrenewable resources, students will analyze Tatton's efforts to take the unseemingly unusable renewable resource of dead wood, and recycling it into beautiful artwork. His Web site can be explored at:

<http://www.leatherwoodonline.com/arts/2004/tatton/index.htm>

(See Figures 3 and 4 below)



Figure 3



Figure 4

Artist Ned Kahn's work focuses on the dynamic physical world to create mesmerizing sculptures. Students will discover the path Kahn took before becoming an artist and learn about how artists are inspired by nature. His story will be explored and heard through the following Web site: <http://www.npr.org/templates/story/story.php?storyId=4524673> (See Figures 5 and 6 below)



Figure 5



Figure 6

TITLE: Unexpected Scientific Art

IDEAS & VALUES: Art, Beauty, Nature, Compassion, Form, Labor, Opinion

PRE-SEMINAR:

*Content:* Prior to seminar, students will have viewed artists, Dawn Csutoros, Marcus Tatton and Ned Kahn's natural artwork in photographs and explored their websites for information regarding their cause for their construction.

*Process:* Review seminar objectives and guidelines.

SEMINAR:

*Opening:* How has art demonstrated new ways that trees add value and quality of life to communities? How might art stimulate a community investment in trees?

*Core:* 1. How does Marcus Tatton take natural devastation and turn it into art?

2. What is a tree-hugger to you? Explain if Dawn Csutoros is a tree-hugger. Why might caring for your community and the environment as a high school student (especially at East Meck) carry negative connotations?

3. Define artist. What does this word mean to you?

*Closing:* How do (these) artists get their inspiration for their artwork? Where might you get yours?

POST SEMINAR:

*Process:* Student Self Evaluation Sheet

*Content:* Have students search the Internet for interesting scientific principles to create a mesmerizing work of art. Students can draw, sketch, sculpt, or paint their piece of art. They must also write one paragraph describing in detail why they chose their media and what it represents (be sure to explain the link to science).

\* \* \*

There will be a culminating, student-driven, project at the end of the semester. Students will have the choice of working alone, with a partner, or with a small group. All classes of my course will be involved and therefore, students may pair with someone from another class. Students will be given several options of types of projects to choose from and an assessment rubric (see Appendix A) upon assignment of the project. All students will present their projects on stage in the auditorium of the school. It will flow in similar style to that of the famous "live art" Laguna Beach, California program, *The Pageant of the Masters*. Each student, pair, or group must introduce their project and their purpose for choosing it. The performances will be kept to a timed minimum of four minutes and will rotate with assistance from students who are performing as stage crew.

Students will create all advertisements for the program such as flyers, banners and playbills. Parents, family, friends from the community and of course school staff will be invited to the performance.

## Appendix A

### Ideas and Values List:

angel	dialectic	history	mechanics	principle	sin
animal	duty	honor	medicine	progress	slavery
			memory and		
aristocracy	education	hypothesis	imagination	prophecy	soul
art	equality	immorality	metaphysics	proportion	space
astronomy	element	induction	mind	prudence	state
beauty	emotion	infinity	monarchy	punishment	strength
being	estimation	judgment	nature	purity	temperance
			necessity and		
cause	eternity	justice	contingency	quality	theology
chance	evolution	knowledge	number	quantity	time
citizen	experience	labor	oligarchy	reasoning	truth
constitution	faith	language	one and many	relation	tyranny
					universal and
courage	family	law	opinion	religion	particular
custom and					
convention	fate	liberty	opposition	respect	virtue and vice
compassion	form	life and death	perseverance	revolution	war and peace
courtesy	God	logic	philosophy	rhetoric	wealth
deduction	good and evil	love	pleasure and pain	same and other	will
definition	government	man	poetry	science	wisdom
democracy	habit	mathematics	power	sense	world
				sign and	
desire	happiness	matter	physics	symbol	

### General Seminar Format:

Title:

Ideas and Values:

PRE-SEMINAR:

*Content:* (Present relevant background information. Prepare participants to discuss selected “source.”)

*Process:* (Review seminar objectives and guidelines. Prepare participants to participate in seminar discussion; self assess and set goals.)

SEMINAR:

*Opening:* (Identify main ideas from the “source.” Usually answered in Round-Robin style.)

*Core:* (Focus/analyze details of “source.”)

*Closing:* (Personalize and apply the ideas from the “source.”)

POST-SEMINAR:

*Process:* (Assess individual and group participation in seminar discussion, refer to recent past as well as future seminar discussion.)

*Content:* (Extend application of “source” and discussion ideas; continuation of pre-seminar.)

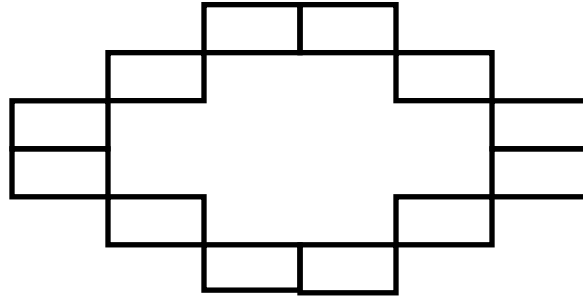
### Facilitator Map:

An experienced seminar facilitator maps a seminar dialogue for two distinct purposes: one, to keep track of which participants are speaking and how much; and two, to record participant thoughts in order to return to them later in framing follow-up questions. There is no right or wrong way to map. Each style is as individual as the facilitator who is mapping!

Text:

Date:

Class:



List names of all participants on map.

List group goal on map to refer to it in post-seminar process.

If asking for a particular line or phrase that is significant, put line # by name.

(N) participant refers to another by name.

(?) participant asks a profound question.

(R) participant makes a direct reference to the "source."

Draw arrows between participants having a good exchange.

Use of tally marks for times spoken.

(P) pass on round robin opening question – come back to participant.

May use one color for opening, another for core, and a third for closing questions.

Address sidebar conversations after seminar, rearrange seating chart for next seminar.

Truly insightful comments are listed at bottom of map with participant(s) name(s).

### Self-Evaluation Sheet:

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Teacher: \_\_\_\_\_ Seminar Title: \_\_\_\_\_

Scale to evaluate your performance in the seminar: 4=Outstanding 3=Very Good 2=Satisfactory 1=Not Yet

1. How well did I listen attentively to others' ideas? \_\_\_\_\_
2. How well did my answers show an understanding of the "source?" \_\_\_\_\_
3. How often did I make original responses or generalizations and big ideas? \_\_\_\_\_
4. How well did I support my answers with evidence from the "source?" \_\_\_\_\_
5. How well did I evaluate others' ideas and information? \_\_\_\_\_
6. How well did I connect the "source" to myself; other "sources"; or the world? \_\_\_\_\_

What did you learn about yourself in this dialogue? \_\_\_\_\_

What did you learn about the "source" in this dialogue? \_\_\_\_\_

What will you try to improve during your next seminar? \_\_\_\_\_

What else do you want to tell me? \_\_\_\_\_

### Getting Started Topics for Mini-Seminars:

- If you were to be granted any one magical power you wanted, what would you pick?
- What do you think your parents worried about when they were your age? What do you think they worry about now?
- If a good friend did something bad and you were asked if you knew anything about it, would you lie to keep your friend from getting in trouble? Why or why not?
- If this Saturday you could do absolutely anything you wanted, what would you do?
- Who are your heroes? Why do you think they are so terrific?
- What are you most proud of having done?
- Imagine that your principal told you he/she wanted to make school better and would change it in any one way you suggested. What would you tell him/her to do?
- If you were allowed to stop going to school, would you? What is the worst thing about school? The best?

Project Assignment & Rubric:

**FINAL SEMESTER PROJECT**

Name: \_\_\_\_\_ Block: \_\_\_\_\_

Partners' names & blocks they're in : (You MAY work independently if you wish)

\_\_\_\_\_ Block: \_\_\_\_\_

\_\_\_\_\_ Block: \_\_\_\_\_

\_\_\_\_\_ Block: \_\_\_\_\_

\_\_\_\_\_ Block: \_\_\_\_\_

(The more people in your group, the more involved your project better be- see rubric!)

CHOICES:

1. Create your own piece of art from plastic items that have been collected throughout the semester from your home. You will explain the meaning and purpose of your piece as it relates to renewability and non-renewability of societal needs. (other ideas: bring in other recyclable items - other than plastic - to build your structure; hot glue will work really well here)
2. Perform a scene from one of the plays we've discussed in class. Or write your own short skit involving any of the scientific topics that were discussed throughout the semester in class. (other ideas: put on a skit depicting class with your teacher - make sure its about something scientific you learned)
3. Create a video (music, informational, dramatic...) about a controversial scientific topic we've discussed in class or one you have found on your own.
4. Create a sculpture or painting depicting your favorite part or topic of science.
5. Write a poem or short story describing a scientific controversy or conflict. Put your emotions in it! (other ideas: think monologue - dark and dramatic poet lounge)

REQUIREMENTS:

1. Give first and second choices to teacher by \_\_\_\_\_. Make sure you AND all of your partners are in agreement. (Their submissions should match yours!)
2. You will have ONE week to work IN-CLASS on this project. It will be 25% of your final grade for this course! If you and your partners cannot handle the freedoms of working during class time, you will be removed from class and put in another room with bookwork to be completed each day. You will no longer have the privilege of in-class time and must complete your project using outside class time only.
3. All successfully finished projects will be performed/displayed on stage in the school auditorium in the fashion of *The Pageant of the Masters* in Laguna Beach, California. Teacher will explain this process... We will be performing this program in the evening on \_\_\_\_\_. Therefore, we must have several dress rehearsals and practice so the flow of the program is just right! Your projects will be due by \_\_\_\_\_ so we can have dress

rehearsals starting on \_\_\_\_\_. Please see the attached calendar for you to schedule meetings with your group and keep track of your due dates.

4. Only projects that are successfully finished will be part of the program. Unsuccessful projects will

CATEGORY	4	3	2	1
Speaks Clearly	Speaks clearly and distinctly all (100-95%) the time, and mispronounces no words.	Speaks clearly and distinctly all (100-95%) the time, but mispronounces one word.	Speaks clearly and distinctly most (94-85%) of the time. Mispronounces no more than one word.	Often mumbles or cannot be understood OR mispronounces more than one word.
Volume	Volume is loud enough to be heard by all	Volume is loud enough to be heard by all audience members at least 90% of the	Volume is loud enough to be heard by all audience members at least 80% of	Volume often too soft to be heard by all audience members.

be graded accordingly.  
**RUBRIC:**



	audience members throughout the presentation.	time.	the time.	
Content	Shows a full understanding of the topic.	Shows a good understanding of the topic.	Shows a good understanding of parts of the topic.	Does not seem to understand the topic very well.
Product	Student uses several props (could include costume) or has a product that shows considerable work/creativity and which makes the presentation better.	Student uses several props or has one large product that shows considerable work/creativity and which makes the presentation better.	Students' product is adequate enough to which makes the presentation better.	The student uses no props OR the product chosen detracts from the presentation.
Collaboration With Peers	Almost always listens to, shares with, and supports the efforts of others in the group. Tries to keep people working well together. OR if alone: always works on project efficiently and puts forth considerable effort in class	Usually listens to, shares with, and supports the efforts of others in the group. Does not cause "waves" in the group. OR if alone: usually works on project in class and puts forth much effort	Often listens to, shares with, and supports the efforts of others in the group but sometimes is not a good team member. OR if alone: often works on project and puts forth some effort in class and needs some reminders to stay on task	Rarely listens to, shares with, and supports the efforts of others in the group. Often is not a good team member. OR if alone: rarely works on project, puts forth little effort and needs constant reminders to stay on task may have been removed from the room to do book work
Please Evaluate Yourself and Your Partners				

In the space below, write any additional comments you would like me to know about (how well did your group work together, any mishaps I should be aware of, was there an equal distribution of work...)

## Reference Notes

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4. Teaching Effectiveness Program. *How Do I Encourage Participation/Facilitate Discussion*. <http://tep.uoregon.edu/resources/newteach/participation.html> (accessed July 12, 2009).

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6. Billings, L. and Roberts, T., "The Paideia classroom: Teaching for Understanding." *Eye on Education*, 1999, 4. Article describing why the Paideia seminar is so valuable in the classroom; describes the intellectual and social development advantages to using such a technique.

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Special thanks to Diane Adams and Wendy Ikoku at Providence Springs Elementary School in Charlotte, North Carolina for allowing me to visit and observe two fantastic Paideia Seminars in action! The knowledge I gained at your school allowed for a better understanding of what seminar is really all about.