Form: "PACT - Science - 1. Context Form v. 2009"

Created with: Taskstream
Author: Stephen Herr
Date submitted: 04/12/2012 0:02 am (PDT)

Context for Learning Form

About the school curriculum and resources

(REQUIRED) 9. Describe any specialized features of your classroom setting, e.g., bilingual, Sheltered English.

The class is composed entirely of honors students. These students are highly motivated and have a history of academic achievement. Consequently, the expectations for this group of students are set exceptionally high.

This honors class is part of the schools Global History of Ideas (GHI) program. The GHI program is built around an English Language Arts (ELA) curriculum based on texts that provide "philosophical, literary, artistic and historical approaches" to understand influences that have shaped our world from ancient times to the present. History and science classes in the GHI program are supposed to compliment these ideas.

I make an effort to teach the students in my honors GHI physics class about notable physicists, their contributions to the field, and how their work has influence science and society. However, most science classes in the GHI program are not differentiated from those in other programs like Humanities/New Media or Science, Technology, Engineering, and Mathematics.

The most notable difference the GHI program is that makes it more likely that students will share multiple classes with each other. This may help some students to interact socially with their classmates and work in a collaborative fashion.

(REQUIRED) 9. If there is a particular textbook or instructional program you primarily use for Science instruction, what is it?

(If a textbook, please provide the name, publisher, and date of publication.)

Students were given digital access to *Principles of Physics* by Kinetic Books at the beginning of the school year. This digital textbook is available at http://www.kineticbooks.com/.

Students without computer access were able to check out a print copy of *Giancoli Physics*, which is published by Prentice Hall (ISBN-13: 978-0130606204).

None of the seven physics teachers at the school incorporate these textbooks into their curriculum in a significant way. They are provided primarily for satisfying Education Code Section 60119, which states "sufficient textbooks or instructional materials" means that each pupil, including English learners, has a standards-aligned textbook or instructional materials, or both, to use in class and to take home." This Educational Code was written in response to the Eliezer Williams, et al., vs. State of California, et al. (Williams) case.

I took over instruction of this class from my cooperating teacher at the beginning of the spring semester, and have had to work under the expectation that textbooks should not be a part of the curriculum (See Context Commentary Question 3 for a more thorough explanation).

(REQUIRED) 10. What other major resources do you use for instruction in this class?

- **Worksheets**
  - The physics department at Granada Charter High School has created a number of worksheets. These files are stored on a shared network drive so all the physics teachers can access these files and continue to revise these them.
- **SMART Board ®**
  - SMART Board 600i interactive whiteboard system
- **Data Projector**
  - An extra data projector is used in conjunction with the SMART Board. This allows students to still see the material if a student or the teacher is standing in front of the SMART board.
- **15 computers**
  - 1 computer per lab group
  - Internet access
  - Logger Pro 3 software
  - Microsoft Excel and Word
- **Vernier® Probeware**
  - (motion detectors, photogates, pressure sensors, thermometers, etc.)
- **Computers simulations**
  - (explorelearning.com, http://phet.colorado.edu, etc.)
- **Materials for Teacher Demonstrations and Student Hands on Activates**
  - The department has a large selection devices and apparatuses for demonstrating physics concepts.
- **Cameras**
  - Slow motion video camera
  - Still camera
- **Whiteboards and Easels**
  - These are generally used for students to work out problems in groups and discuss them with the class

Context Commentary

Please address the following prompts.

(REQUIRED) 1. Briefly describe the following:

- Type of school/program in which you teach, (e.g., middle/high school, themed school or program)

- Kind of class you are teaching (e.g., ninth grade Integrated Science – untracked, Honors Biology) and the organization of the subject in the school (e.g., departmentalized, interdisciplinary teams)

- Degree of ability grouping or tracking, if any

-Type of school / program

Granada Charter High School is the largest independent charter high school in the United States. Over 4,000 students are currently enrolled at the school. It received its charter in 2003.

Students are organized into different programs known as "houses." The physics class discussed in this teaching event is part of the Global History of Ideas (GHI) program. Other programs include the Humanitas /New Media Program (HU/NM), Science, Technology, Engineering and Math Program (STEM),

Global Business and Finance Program (GBF), Virtual Program, and Special program and Education.

The GHI program is built around an English Language Arts (ELA) curriculum based on texts that provide "philosophical, literary, artistic and historical approaches" to understand influences that have shaped our world from ancient times to the present. History and science classes in the GHI program are supposed to compliment these ideas.

I make an effort to teach the students in my honors GHI physics class about notable physicists, their contributions to the field, and how their work has influence science and society. However, most science classes in the GHI program are not differentiated from those in other programs like Humanities/New Media or Science, Technology, Engineering, and Mathematics.

- Kind of class I am teaching

I am teaching a honors physics class in the GHI program for ninth grade students. The curriculum is designed to address the California State Board of Education Science Content Standards for high school physics.

- Organization of the subject in the school

The school is departmentalized. At least once per month, the physics teachers meet with the other science teachers in a department meeting. The physics teachers meet every Tuesday morning to discuss how physics is taught. Topics of discuss usually include pacing, curriculum, and common assessment.

- **Degree of ability grouping or tracking**

This class is an honors class. The students in the class are highly motivated and have a history of academic achievement. This class far outperforms the two "non-honors" classes that I teach which are composed of 10th, 11th, and 12th grade students.

2.

Describe your class with respect to the features listed below. **Focus on key factors that influence your planning and teaching of this learning segment.** Be sure to describe what your students can do as well as what they are still learning to do.

(REQUIRED) 2a. Academic development

Consider students' prior knowledge, key skills, developmental levels, and other special educational needs. (TPE 8)

Prior Knowledge

- Math
  - All students in the class have completed Algebra 2AB and are currently enrolled in Honors Trigonometry.
  - Students understand symbolic reasoning and can do complex calculations with symbols.
  - Students can use a variety of algebraic techniques to solve equations for variables of interest.
  - Students understand exponents and can use scientific notation.
  - Students are still learning to solve systems of linear equations and inequalities substitution, with graphs, or with matrices.
  - Students are still learning to apply trigonometry to a variety of physics problems.
- Physics

    - This is the second semester of physics. Below is some of the prior knowledge that is essential for students to understand prior to this teaching event:
        - Students know how to apply the law F=ma to solve one-dimensional motion problems that involve constant forces (Newton's second law).
        - Students know that when one object exerts a force on a second object, the second object always exerts a force of equal magnitude and in the opposite direction (Newton's third law).
        - Students know the relationship between the universal law of gravitation and the effect of gravity on an object at the surface of Earth.
        - Students know that energy cannot be created or destroyed.
        - Students know that energy can be transferred.

Key Skills

- Computer Skills
    - Students can graph data using Microsoft Excel and Logger Pro 3.
- Measurement
    - Students can use a ruler.
- Collaboration
    - Students can work well with other to accomplish a common goal.

Cognitive Developmental Level

- All of the students in the class have reached Piaget's Formal operation stage of cognitive development. They can think abstractly and are able to deal with hypothetical situations. They can solve complex algebraic expressions and understand the relationships between variables.

Special Education Needs

- No students in the class have been identified as having special education needs.

(REQUIRED) 2b. Language development

Consider aspects of language proficiency in relation to the oral and written English required to participate in classroom learning and assessment tasks. Describe the range in vocabulary and levels of complexity of language use within your entire class. When describing the proficiency of your English learners, describe what your English learners can and cannot yet do in relation to the language demands of tasks in the learning segment. (TPEs 7, 8)

- Below is a sample range of oral and written vocabulary necessary to participate in classroom learning and assessment tasks:
    - interpret, force, newton, joule, equation, plot, graph, calculate, predict, model, initial, final, variables, criteria, report, analyze, state, gravity, units, concept, evaluate, measure, quantify, state, diagram, investigate, interpret, intercept, trend, coefficient, error, restate, describe, domain, range, constant, displacement, and height.
- Required oral language proficiency
    - Students must be able to understand standard oral English grammatical forms, sounds, intonation, pitch, and modulation.
    - Students must be able to speak clearly and comprehensibly by using standard English grammatical forms, sounds, intonation, pitch, and modulation.
- Required written English proficiency
    - Students must be able to read and follow brief instructions.
    - Students must be able to take notes

    - Students must be able to translate algebraic expressions into written English language
    - Students must be able to communicate effectively using standard conventions such as punctuation, capitalization, and spelling.
- Academic Language
    - Students must be able to read and interpret graphs.
    - Students must understand SI unit system and dimensional analysis.
    - Students must be able to create meaningful graphs representing collected data.
    - Students must be able to write lab reports.
    - Students understand the precise vocabulary usage of words like height, length, coefficient, stretch, mass, weight, gravity, force, and work as the words are used in physics.
    - Students can translate algebraic expressions into English language.
    - Students can translate English language into mathematical symbols.
    - Students are still learning to follow standard conventions for scientific writing.
    - Students are still learning to use concise and precise scientific language.
- Proficiency of English Learners
    - None of the students in my class are designated as "English Learners." However, that does not mean that my students have complete mastery of oral and written English. I believe that it is my responsibility to continue to foster the language development of these students through the pedagogical theories, principles, and instructional practices that I implement in my teaching.

(REQUIRED) 2c. Social development

Consider factors such as the students' ability and experience in expressing themselves in constructive ways, negotiating and solving problems, and getting along with others. (TPE 8)

Students vary in social development and have a range of psychosocial identities. Many of the students in the class are in James's Marcia's state of foreclosure. They have established an identity on the basis of the expectations of their parents and teachers. These students seem to be content to try to live up to this identity rather than seek out a different identity on their own. Others students are in Erikson's stage V of Psychosocial development and are actively trying to question and redefine their psychosocial identity.

Most students in the class show evidence of being in Stage 5 of Kohlberg's Moral Reasoning. Students show respect for individual rights and rules that have been agreed upon by society. They understand that rules can be changed to accommodate for the good of the classroom-learning environment.

Students are given ample opportunity to express their own ideas, individuality, and creativity – both within a group and classroom context. For the most part, students are able to express themselves in constructive ways that contribute to the learning environment. Classroom discussions are consistently respectful and civil. The student lab groups have remained the same the entire school year. I have offered to switch groups, but the students unanimously protest each time because they are happy with the way their current groups are working. Students have formed meaningful friendships with their lab groups and have become adept at getting along with those people.

However, there have been several misunderstandings between students. For example, some students enthusiastically flaunt their good grades on assignments to the chagrin of students who were not as successful. In instances like this, I have talked to students individually about how they can better self regulate their social interactions. As the teacher, I feel that it is my responsibility to foster prosocial behavior. In addition to reacting to student behavior, I attempt to model positive expression, negotiation, and problem solving by the interactions that I have with the students in my class.

(REQUIRED) 2d. Family and community contexts

Consider key factors such as cultural context, knowledge acquired outside of school, socio-economic

background, access to technology, and home/community resources.

Cultural Context
The total student body at Granada Charter High School is 36% Hispanic, 32% Caucasian, 26% Asian, 5% African American, <1% Pacific Islander, <1% Native American Indian for the 2011–2012 school year. School wide, over 40 languages are spoken at home
Unfortunately, the school did not have adequate data available regarding the specific students in my class. I was told that the school was still in the process of manually entering information from paper documents to the schools computer system because LAUSD does not share their electronic information about incoming freshman.
The data that was available classified my students as "Hispanic or Latino", "Not Hispanic or Latino," and "two or more races". Based on these categories, 15 students in the class are "not Hispanic or Latino," 4 student are "Hispanic or Latino", and 2 students are classified as "more than two races". Only one student in the entire class is listed as being fluent in a language other than English.
Students in the class come diverse cultural backgrounds. However, most students come from families that are supportive of their academics. The school community similarly has a strong culture of academic excellence and values education, hard work, and achievement.

Knowledge Acquired Outside of School
Students are surrounded by physics in their everyday lives. However, prior to taking physics, most students do not have the correct framework to understand these principles. Because of this, many of the students come into the classroom with a variety of misconceptions.

Many students learn about physics from educated parents and siblings. Several parents in the class are engineers, and one parent is a physics teacher at a different school.

Socio-economic Background
The majority of students in the class come from middle class socioeconomic backgrounds. Their needs for school supplies, clothing, food, shelter, and health are more than adequately met.

Access to Technology
All students in the class have access to computers at home. Assess to computers is also available in the school library. Students can access the school website to check their grades in the class and download worksheet and handouts.

Home / Community Resources
Many students in the class have supportive parents. Parents are in frequent communication with the teacher and help hold students accountable with their studies.

The students have formed a supportive community with other students in the physics class. They work on lab reports together, study, and encourage each other to do well in the class.

The Oviat Library on the nearby campus of California State University Northridge is a community resource that several students in the class regularly use. The library provides students a place where students can meet to study or do homework.

(REQUIRED) 3.
Describe any district, school, or cooperating teacher requirements or expectations that might impact your planning or delivery of instruction, such as required curricula, pacing, use of specific instructional strategies, or standardized tests.

Teacher requirements and Expectations
My cooperating teacher believes that traditional high school physics instruction based on lectures, textbooks, demonstrations, and standard laboratory actives is of limited value because it does not adequately teach scientific reasoning and logic. In many cases, he argues that students leave traditional

physics classrooms with the same misconceptions and naive beliefs that they entered with. He believes that the traditional approach of teaching physics reduces the subject to a tedious and mundane exercise of plugging numbers into equations.

My cooperating teacher is a strong proponent of the Modeling Theory of Physics, which has been developed by Dr. David Hestenes and his colleges at Arizona State University (http://modeling.la.asu.edu/index.html). As such, he requires me to apply this theory to my curriculum design and teaching methodology. The key principle behind modeling is to engage students collaboratively in making using models to describe, explain, predict, design and control physical phenomena. The modeling approach has numerous benefits. It helps students understand scientific claims, evaluate data and evidence, learn how to make sense of physical experiences, articulate coherent opinions, and defend arguments using logic and evidence.

However, modeling has several drawbacks. My cooperating teacher wants as much learning to be discovery based as possible. This constructivist approach diminishes the importance of traditional education tools such as textbooks. My cooperating teacher does not use a textbook for the class, and expects me to do likewise. He believes that textbooks defeat the entire point of modeling exercise because students look up answers instead of seeking them out on their own through modeling activities. This reduces the possibility for meaningful scientific inquiry in the classroom.

However, I believe that textbooks are an important resource and are essential to improve student literacy, academic language, and content understanding. They provide a clear structure for the content material and are an excellent reference for students to study from. Moreover, I think that textbooks are an important tool that students should use to self regulate their learning. Unfortunately, I have to teach with the expectation from my cooperating teacher and the other physics teachers in the department.

Pacing
All of the physics teachers at the school try to stay roughly on the same schedule. We are teaching concepts in the same order they appear on the state standards.

Standardized Tests
My cooperating teacher and I collaborate with writing tests. He gives the same assessment to the honors class that he teaches so we can compare the performance between the two classes. All the honors physics classes at the high school will have a common final assessment at the end of the semester.