11.125 Introduction to Education: Understanding and Evaluating Education
Spring 2009

Assignment 1 - MIT Observation

Attend a class that you have taken at MIT. Sit in the class and do "an observation." Take notes on what is going on during class. Focus on certain aspects of the class, or certain people in the class. What are they doing? What are your indications that they are or are not paying attention or comprehending what is going on in class?

Analyze what you think the sources of the behavior are (on both the part of students and teachers) in a paper of five pages. You will also be responsible for reviewing other people's work.

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Assignment 2 - Misconceptions

Think of your own field of study. What misconceptions do high school/middle school students have in this field? Pick one or two specific misconceptions that have been discussed in the literature and in a paper of five pages write about:

- Why these misconceptions persist.
- Why they should be remediated.
- Suggest possible strategies for remediation.

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Assignment 3: Reflection of Formative Assessment

Delving Deeper into Differentiated Instruction

This paper provides an opportunity for you to delve deeper into some of the practical and theoretical considerations around differentiated instruction. You will need to take a position on one perspective in differentiated instruction and back up that position with good arguments, some (limited) research and experience (from your observations and experience). There are two options for the paper that we will discuss in class.

1) Pick a particular method for developing and implementing differentiated instruction. This method can be used to address any particular heterogeneity that you would like, and is likely to be drawn from the in-class jigsaw that we conducted. Thinking about that method take a position on the benefits of this method and what its pros and cons are. Back up that position with information from the reading, as well as additional information that you can find either from practice or research. Really think through your argument and take a clear position.

2) Pick a particular student population (e.g., dyslexic, deaf, new immigrants, drop-outs, autistic, etc), identify an area of contention (e.g., bilingual education vs immersion; cost of special education) and take a position on the issue. Similar to the previous option, you will need to do some research (likely a bit more in this case) and develop a clear concise argument.

The paper should be 5 pages in length.

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Assignment 4: Comparison of Media

You are an educational consultant that has been hired by a school board to design the new "ramp and cart" lab for a school district. Given what you have learned through conducting the experiments in class you must write a letter in which you specify and defend how teachers in the school should perform this experiment. You might want to include information about

- How the media would apply to different types of learners
- How the media helped build understanding about physical concepts and experimental design
- How it addresses core FITness concepts
- Time taken to perform experiments
- Ease of conducting the experiments and training teachers
- Cost of purchasing material

The letter should be five pages in length.

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Final Assignment

You are a first year teacher. Your principal is going to observe your class for a day. You need to prepare a lesson for that day of class, and set it in a context so that your principal can understand how it fits in.

As a part of this assignment you must do the following:

- Design and teach a lesson to the class drawing upon class themes
- Submit a detailed written description of your lesson plan, along with the context in which it is set (target class, the place this falls in the unit, other activities and lessons that would be done before and after this lesson, etc.)
- Write a reflection on the lesson.

The lesson should be approximately 35-40 minutes long.

For our class you will be working on these projects in pairs. You will be teaching the lessons the last two to three weeks of classes. You should set your lesson in one of the schools that you have been observing in this semester. But you should define the school, class, and subject that you are teaching and use this to justify your lesson plans. The primary criteria for these lessons is how you reflect the educational themes that we discussed in class (and in your other practice teaching) this year. This is best accomplished by focusing on one or two themes and specifically pointing those out in a brief introduction to your lesson.

The written part may be integrated into the final portfolio or submitted separately.

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Final Portfolio

It is late spring of your senior year (as it very well may be for some of you), and you have decided to apply for a teaching job. As part of the application process the school requests that you define your teaching philosophy and back up your statement with previous work and experiences. Your job is to define your philosophy (describing how you would teach and assess students, run your classroom, etc.) citing work done from the class this semester. The statement should be of a format of a piece of work that you would send along to a potential employer, only this piece of work is presented online and has hyperlinks to previous work from this class that supports your statement. You will need to choose a small number (4-6) pieces of work from this semester that support your statement. This should include at least two class related pieces of work and two observations related pieces of work. *You may also choose to integrate your reflections and preparation for the final lesson into this portfolio*. Things you might want to consider include:

- things that you have learned that would prepare you to teach or work with students in a K-12 classroom
- evidence of development of or changes in your understanding of teaching and learning (especially modes of teaching)
- activities which support your preferences for modes of teaching and assessment
- classroom experiences that providence evidence supporting your statement

Since we have have done a number of hands-on activities in class during the semester, you should include some mention of these in your portoflio.

You should create a document in your blog (or linked to from your blog) for this assignment that discusses these issues and points to other documents (assignments, in class work, observations) in your blog. You are welcome to add additional documents to your blog that reference readings from class (strongly recommended), your experiences in the schools, or your reflections on class work. This should be a combination of new writing plus the links and references to your previous work.

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Activity 1

Break up into groups of 8-10 students. Within those groups break up into pairs. Each pair will rotate through the role of teacher, while the rest of the group is students. Teachers should pick an academic topic to teach such as:

- Multiplication of Fractions
- Probability
- Velocity and Acceleration
- Simple Genetic Crosses
- Mitosis
- Optics

Each pair of teachers should prepare to teach the topic for 10-15 minutes. The catch is that you aren't allowed to use any words, either written or oral (with one exception - you are allowed to very briefly explain the context for the activity, i.e. what grade level and where in the unit this falls).

As you are teaching and learning, consider what methods of communication people are using, how effective you find the methods of communication, and how you can tell whether your students or classmates are understanding.

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Standards Town Hall

The City of Cambridge is considering abandoning the Massachusetts defined standards in favor of locally controlled standards and assessment. You will form six groups (government/community, parents/students, teachers/administrators all both for and against) to debate this issue in Town Hall style.
Each group will have 5 minutes to present their case, followed by 5 minutes of Q&A from the town representatives and audience. At the end will be an additional 10 minutes of discussion. You should come to the debate equipped with evidence and reasons for your position. Reading some of the linked articles from the syllabus page will be a good place to start.

10 points for oral presentation and participation.

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Technologies for Learning - Velocity and Acceleration

The goal of this unit is to understand how different technologies and approaches can contribute to the understanding of velocity and acceleration. You will be using several different versions of the same experiment to learn first hand how these media affect the learning process. As you conduct your experiments you should also be considering implementation and curricular issues such as:

- how the different media could be combined to enhance student learning, and in what order you might present them
- what time and material constraints might dictate your choice of one medium over another
- which media you would choose for different types of learners
- what your particular learning goals are for your students.

The experiment that you will be doing is a classic physics experiment in which you roll a cart down an inclined plane. In this experiment you will investigate how the angle of the inclined plane affects the velocity and acceleration of the cart. Specifically, you will be answering the following questions:

- How does the angle of the inclined plane affect the distance that the cart travels once it leaves the plane?
- What happens to the velocity and acceleration of the cart as it proceeds down the plane and then onto the floor?
- How does friction affect the outcome of the experiment?
- Where does the cart hit maximum velocity and acceleration? What factors influence the velocity and acceleration?

At the end of each experiment you should be able to describe a theory that explains the velocity and acceleration of the cart as it proceeds down the ramp, how these are affected by the angle of inclination and predicts the distance that the cart travels after it leaves the ramp.

The four approaches that we will be using are:

1. Rolling a cart down an inclined plane. You will measure velocity and acceleration using a stopwatch and a ruler.
2. Rolling a cart down an inclined plane. You will measure velocity and acceleration using the sonic ranger that continuously outputs data to the computer.
3. Using the Explore Learning simulations to simulate rolling a cart down an inclined plane.
4. Designing your own experiment based on Matchbox cars and track.

Instructions for using the sonic ranger, the Interactive Physics program and the Stella modules are provided here.

Sonic Ranger

Follow the instructions for the Motion Sensor. You can find the instructions here for the Motion Sensor and here for the USB Link.

Explore Learning Simulations

There are three simulations at the Explore Learning site that deal with velocity and acceleration that have been selected for this activity (requires Shockwave). They are:

- Roller Coaster Physics
- Inclined Plane
- Ants on a Slant

These, along with instructions can be found on the class Explore Learning Page.

You may also try these two free simulations (require Java):

- Jersey Cow
- Inclined Plane

Non-Electronic Labs

In addition to the two electronic labs (simulation and probes) there are two versions of the lab that are to be conducted without technology. The first is simply timing a cart rolling down the inclined plane at different angles to compute velocity and acceleration. The second provides you with track and matchbox cars and asks you to design your own experiment with these same learning goals.