Title: Using Animation and Digital Design to Understand Biotechnology and Emerging Pathogens

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Abstract: Dual Enrollment students will be introduced to a unit on Biotechnology and emerging pathogens, will use their experience from lectures and laboratory techniques to develop a unique animation illustrating an aspect encountered, and present their finished product to underclassmen who will undergo a similar process but present to elementary school students. After learning about common zoonotic and plant pathogens, students will perform a variety of common biotechnical experiments. Upon completion of aforementioned activities, students will be assessed by typical formats, but will then pick their favorite topic of interest or job represented and create an animation or short synopsis to enhance comprehension of material and possible careers in this great field of science. They will then be assessed not only on their ability to convey their chosen topic at the appropriate level but responses to surveys from intended audiences.

Rational: Being a visual learner, I LOVE pictures and animations. My high school is also an Arts school with Visual Arts growing rapidly, especially digital design and 3D Max. Last year several students made some amazing computer games and one of the animation teachers asked if there were any science processes that would be good for animations. Festering in the back of my mind has been a way to include that idea into my curriculum and experiencing Mission Biotech brought it to the forefront. Technology is ever present in our society and certainly in our classrooms, so we should embrace it and use it to our advantage. Also, when students can create something, they put a level of creativity and learning into it that cannot be obtained through traditional teaching methods. I am also a believer in peer tutoring and think if monitored properly can be of great benefit especially for this topic. With our economy the way it is now and jobs being increasingly hard to obtain, I would like to encourage students to venture into an area where their interest may be piqued and an exciting career option unfold.

Description of teaching unit or module with expected outcomes: I would like to begin this unit discussing viruses. With many students having been tested for strep throat, I would like to introduce the idea of emerging pathogens using their own experiences with the fairly new "rapid strip" test. Then, the class would complete the Agdia ImmunoStrip test. I would also like to perform an HIV ELISA so students can be aware of HOW the nature of a virus affects our immune system allowing this test to detect something that causes no obvious symptoms. Upon completion of the ELISA and Lab Experiment 1 from the Biotech in the Classroom Laboratory Manual (BCLM), I would then like to lead students through DNA Extraction, PCR and Gel Electrophoresis, Experiments 2-4 from the BCLM, emphasizing genetically modified organisms and their prevalence in agriculture. Being as most students are familiar with CSI and it's one of my own favorite topics, I would like to perform a simulation of PCR analysis of crime

scene evidence after students have completed the seed extraction and have them compare and contrast the use of this technique in two vastly different fields.
After all experiments have been completed, students will understand the purposes of using these techniques in various areas of science. They will also be able to read a DNA fingerprint or Assay test strip and give accurate descriptions of what those results signify. Participation in all activities mentioned above will give students the option of exploring a specific Biotechnical field such as genetic engineering, DNA Technology, cloning, etc. and produce a mini-documentary of the life of a person working in that field. They may also choose to create an animation that visually represents one of the procedures done using Photoshop or 3D animation. (Rubrics attached.)
My preAICE students will extend this unit by participating in Mission Biotech for a two week period. My dual enrollment students will have some time (depending on availability of laptops and reserved computer labs at my school) to peruse the game as well. Both sets of students will utilize the game as a spring board for their own creations.

Data collection techniques/student assessments: As mentioned above, students will be given several paper and pencil standardized tests, keep a lab journal consisting of many tables, graphs, answered questions etc. from the Biotech lab manual and Mission Biotech lab manual. Rubrics will be used to ensure completion of all tasks and inclusion of data.

ICORE summer institute elements specifically included:

- PowerPoint presentations from Drs. Morris, Gabriel, McFadden, etc.
- All materials, perishable and otherwise, needed to perform labs 1-4 of Tomato Spotted Wilt Virus from the Biotech in the Classroom lab manual
- ELISA HIV/AIDS TEST

Literature cited:

1. University of Georgia. "Emerging Infectious Diseases On The Rise: Tropical Countries Predicted As Next Hot Spot." ScienceDaily 21 February 2008. 22 July 2010 <http://www.sciencedaily.com/releases/2008/02/080220132611.htm>.
2. http://education.mit.edu/papers/GamesSimsSocNets_EdArcade.pdf
3. http://wps.aw.com/bc_campbell_biology_8ap/81/20901/5350737.cw/index.html (you may not be able to access this without a password, but it's just an index of material covered for the chapters on viruses and biotech.)
4. http://biotechintheclassroom.webs.com
5. Klosterman, Michelle L. and Troy D. Sadler. Mission Biotech 2010 University of Florida College of Education, School of Teaching and Learning.

Budget and justification:

1. http://www.walmart.com/ip/Digital-Concepts-CR-72-Mini-50-in-1-Card-Reader/13908870 $14.88 X 6 = $89.28
2. http://www.walmart.com/ip/SanDisk-Cruzer-4GB-USB-Flash-Drive-in-7-Colors-Purple-Blue-Red-Aqua-Blue-Lime-Green-Orange-and-Black/14575797 $12.00 X 9 = $108.00

My ultimate goal is to get a mobile lab of computers so my students can access Photoshop, pictures, Word, etc. whenever it fits into my curriculum without having to rely on the computer labs shared by 80 other colleagues. Because that budget well exceeds the amount allotted, I would like to purchase a class set of thumb drives and card readers my students can sign out when necessary. When doing a similar project requiring pictures and visual data collection last year, the most requested items were those devices. Having them would allow students to obviously save information and take it from school to home and not have to worry about finishing everything on campus. Card readers save battery power and can usually fit an SD card from any type of camera, which is most beneficial when students have done something during class time and need to upload more quickly than hooking up their cameras.

Lab Notebook Grading Rubric

Notebooks used by all classes will be graded on a modified scale similar to the one below from LABWRITE (http://labwrite.ncsu.edu/).

Descriptive Labs

The Title of my Lab Report…

describes the specific content of the lab concisely but with enough detail to get the main ideas across to the reader.

The Introduction in my Lab Report…

starts out by stating (in a sentence or two) the scientific concept or lab procedure of the lab and then describes what I know about that scientific concept or lab procedure that is relevant to the lab (typically one or two paragraphs).

sets down in sentence form the main lab objective(s) and then describes what these objectives will help me learn about the scientific concept of the lab (typically one paragraph).

presents interesting or useful questions or issues relevant to the lab.

The Methods in my Lab Report…

provides a concise, easy-to-follow description of how I completed the lab.

describes any materials and specific procedure used so that the experiment could be repeated just as I did it.

The Results in my Lab Report…

begins with a sentence or two describing the main finding(s) of the lab.

contains visuals (drawings, tables, or other figures) that are appropriate to the lab and are arranged in an order that best tells the "story" of the data.

clearly describes each visual and refers to the appropriate visuals in the paragraphs (Table 1, Figure 2, etc.).

reports findings from the experiment only, successfully avoiding any explanations or conclusions about the data.

The Discussion in my Lab Report…

explains how the findings link to the scientific concept or procedure of the lab.

discusses questions or issues raised in the introduction.

addresses other issues that may be appropriate, such as (1) questions from the Introduction that remain unanswered; (2) sources of uncertainty in my lab methods that may have led to unclear answers; (3) how my findings compare to the findings of other students in the lab and an explanation for any differences; (4) what further investigations I would do in order to gather more information; (5) suggestions for improving the lab.

The Conclusion of my lab report…

directly states what I have learned about the scientific concept of the lab from doing the lab.

gives enough details of what I have learned to be convincing.

describes anything else I may have learned from doing the lab and writing the report.

The References for my lab report…

includes all the sources I have used in writing my lab report, such as the lab manual, the textbook, and any reference books or articles I cited.

uses the appropriate documentation style for citations and references (CBE, ACS, etc.).

Overall issues: My lab report…

uses the correct format (titles, captions, etc.) for the tables, graphs, and drawings

is written in a scientific style (tone should be objective; sentences should be clear and to the point).

is clear of spelling errors (use the spell check on your computer).

includes all the necessary headings (each section of the report should have a heading).

Rubric for Animations or Documentaries (may be modified as time nears implementation)

Students are to prepare 3-5 minute documentaries of real people working in the field of biotechnology. Personal interviews are strongly encouraged, but any means to represent the actual jobs these people do on a day to day basis can be acceptable. Students should try to get video, pictures, audio, etc. of "what my job entails" from a worker of their choice. Possibilities will be discussed in class, but will be on a first-come, first-served basis, so if you have an idea that this is the route you'd like to take, you should submit your idea first.

If doing animations, again, first-come, first-served, but all animations MUST be original. IF you chose to "mimic" something you have seen in another locale, you MUST cite the source but incorporate your own unique twist that does NOT allow enough similarity to even be CONSIDERED plagiarism.

You will have some class time to work on your projects, but you will have to manage your time wisely outside of class to have your completed assignments done in a timely manner.

	4	3	2	1
Organization	Project is extremely well organized and easy to follow; no need for direct instruction	Project lacks some organization; slight instruction needed.	Project lacks organization; instruction needed.	Very unorganized; help needed.
Content	Student shows exceptional knowledge of topic and is evidenced in project.	Student shows knowledge of topic and is evidenced in project.	Student lacks knowledge of topic and is evidenced in project.	Attempt was made to create project with relative topic.
References	Research done is cited properly and evidenced in project.	Research done is cited properly but not evidenced in project.	Research not cited properly or not evidenced in project.	Attempt made to cite references.
Peer Reviews	Outstanding	Good	Fair	Poor/Needs much work