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

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. I also want students to appreciate how much science they experience each and every day and that they can certainly make a difference if they desire. I have aspirations of a kind of “pay it forward” mentality where students learn from me and pay the knowledge forward in some fashion that is actually utilized by another person.

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 Pre-AICE 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:**

   [http://www.sciencedaily.com/releases/2008/02/080220132611.htm](http://www.sciencedaily.com/releases/2008/02/080220132611.htm)


3. [http://wps.aw.com/bc_campbell_biology_8ap/81/20901/5350737 cw/index.html](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://biotechinthe classroom.webs.com](http://biotechinthe classroom.webs.com)

**Budget and justification:**


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/).

**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.
My other modification is to take smaller chunks of what I want to establish and build from there. ICORE was so amazing, I wanted my students to experience it all, but with this being a transition year for curriculum flow, it was a bad year to try some many new things on top of an already tremendous load. I wanted to take what I learned from ICORE and implant that quest for learning into my students, but have to realize I cannot just bombard them with information. In that respect, I am still searching for the one factor that will have the biggest impact on my students. Currently, I think I will just have them interview real people (as I mentioned above) whose jobs center on topics affecting the everyday scientific life of my students.

At this time, I unfortunately do not have examples available for processing, but will include them at a later date.
1. How did you accomplish your aims/objectives? My philosophy for teaching is to instill a love of learning, so I try to suggest how truly significant biological knowledge is so when assigned a project or anything, they might actually appreciate it. I think this was accomplished, because my DE students did a fantastic job with their research of current Biotechnology, far surpassing my expectations and teaching ME new things!

2. What approaches (exam, group activity, etc) did you use? I utilized several different labs and tried to provide interesting lecture information about topics pertaining to ICORE such as transformation and genetics.

3. Describe the student population in which the activity was tried (specifically your student demographics- ethnicity, gender, numbers of each). I have about equal numbers of male to female students with the largest ethnicity Caucasian followed by Hispanic and African American which are both very low at my school.

4. What additional activities/outcomes have resulted from your involvement with the Summer Institute? (in-service, site visits, etc) I attended Mini-Med School and have just been invited to attend Bench to Bedside and hope to make a second trip to complete a lab at UF.

5. Have you engaged the community? Unfortunately now, but that is DEFINITELY an aspiration before the year is out or to incorporate next year.

6. Have you shared information gained during the Summer Institute with others? If so, who and how? Oh yes! I immediately shared information to other department chairs in my district as well as multiple colleagues just from speaking with them.

7. How has this helped you personally and professionally? Professionally, ICORE allowed me to gain several professional development hours (IF I will ever complete the necessary paperwork) and meet some AWESOME people in my field and establish a much wanted partnership for site visits and use of lab equipment my students may never have seen otherwise. This seminar also opened many doors for continued professional development that is actually FUN and not a burden to endure. Personally, I met some AMAZING people, gained some exceptional knowledge, am consistently inspired to incorporate ICORE into my classroom (guess that’s professional as well!) and am wanting to learn more!

8. Do you plan to do the three graduate credits? Yes

9. Do you plan to pursue the graduate certificate? Depending on time constraints, yes!