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Bioengineering Applications of Regenerative Medicine:
Biotechnology Curriculum Development and Career Fields.

Abstract: The Action Proposal will target the curriculum development of Biotechnology I and II course progression at Mandarin High School (MHS). The research objectives focus to broaden Biotechnology II Students background knowledge in respect to Current Good Manufacturing Practices, Biomedical Applications, and Career Fields in preparation for Industry Certification Exam, Biotechnician Assistant Credentialing Exam (B.A.C.E.). Ending the 2015-2016 school year, two seniors will sit for the B.A.C.E. at MHS. The following year, 2016-2017, eight seniors will sit for the B.A.C.E. with projected twenty-five new Biotechnology II Students. In developing and implementing Proposal, Teacher Goals will be measurable based on both traditional and alternative student outcomes. In Beginning the Lesson Plan, students will utilize resources provided by the Biomedical Explorations summer training 2015. Biotechnology II students will be actively engaged with a range of Regenerative Medicine topics including: Translational Science, Protein Suppression/Expression, Organ Transplant-Decellurization, Stem Cells Protocols, and 3-D Printing Applications. Since, the above topics involve many Biotechnology Career Fields and Protocols covered in the Florida Department of Education Biotechnology Curriculum Framework. In addition to, Biotechnology II students will address both Academic and Career Technical Education: Language Arts and Mathematics Curriculum standards including the following:

- Computer Navigation/Software: LAFS.910.W.2.6 pg. 34; MAFS.912.S-ID.1.1, 2,3,4 pg. 34
- Scientific Inquiry/ Reading: MAFKS.K12.MP.2.1, 4.1,5.1,6.1 pg.24
- Web Based and Scholarly Research: LAFS.910.RI.1.1 pg. 26; LAFS.910.W.3.7 pg. 34
- Technical Reporting: LAFS.910.WHST.1.2, 2.4,2.5,2.6 pg.23;
- Experimental Design/Analysis: LAFS.910.RST.1.1, pg.21; LAFS.910.WHST.3.7, 3.8 pg.23
- Legal Science Notebook: LAFS.910.WHST.3.7, 3.8 pg.23
- Comparing Biotechnology Fields/Technology: LAFS.910.RI.1.1 pg. 28; LAFS.910.W.3.7 pg. 28
- Quality Control Procedures/Product Pipeline: LAFS.910.SL.1.1 pg. 28, LAFS.910.RI.1.1 pg. 29

The Action Proposal area of focus will be supported by traditional (Pre/Post Testing) and alternative assessments (First Semester Project). The assessments will assist in collecting data to measure effective Student Learning, Application of Lab Skills, and Academic/Career Technical Standards. Thus, synthesizing the overall student success of incorporating Regenerative Medicine practices and protocols within the Biotechnology Career Fields and Technology.

Rationale: Currently, Mrs. Donely Santiago is developing curriculum for both Industrial Biotechnology I and II Courses offered at Mandarin High School. Biotechnology Courses I, II, and III incorporate a blended content of the following areas: Chemistry, Physical Science, Biology, Genetics, Physics, Marine Science, Technology, English, and Mathematics. The Action Proposal will offer insight into effective teacher practices, as suggested by *Journal of Inquiry & Action in Education*, 4(2), 2011 “Teacher research has been implemented in teacher education programs as a powerful, exploratory tool for teacher candidates to inquire about educational problems and to improve their knowledge of teaching practice.” Teacher intends alignment of new teacher experiences introduced at the two-week summer institute. Establishing a student centered curriculum, thus allowing increased student learning environment based on the following teacher applications: Comprehension Strategies, Vocabulary Development, Teacher Modeling, Hands on Biotechnology Applications, Experimentation Analysis of Excel, Technical Writing, Traditional Quiz / Testing Assessment, and Alternative Assessment, First Semester Project. The teacher inspires for students to become critical thinkers capable of multiple scientific skills linking technology due to hands on experiences. Effective teacher pedagogy is linked to hands on experiences in increasing student learning, as stated in, EDUCAUSEreview, “The analysis showed that students in traditional lecture sections are 1.5 times more likely to fail than students in active learning settings. Moreover, course grades were six percent higher when instructors used an active learning pedagogy.” Therefore, as a First Semester Project, the Action Plan will centralize on ten Biotechnology II students enrolled 2015-2016 school year. The academic goal aligned with the Proposal intends to increase student scores in the

following assessment areas: Student Lab Skill, Career Interest, and Certification Testing, B.A.C.E. Next in the planning process, the Bioengineering concepts from the Biomedical Exploration: Bench to Bedside 2015 Program at the University of Florida. Teacher will correlate learned content with the Biotechnology II Curriculum. The Biotechnology Curriculum is outlined by a Florida Department of Education document labeled, "*Curriculum Framework*" Industrial Biotechnology Secondary Career-Preparatory. Biotechnology II Students will be given a teacher created rubric allowing for continual development of Regenerative Medicine Projects during both First and Second Academic Quarters. Semester Projects will be scheduled for completion in time for the Junior Science Engineering and Humanities Symposium in February 2016. In addition, the Biotechnology Education Advisory Board Members: Florida State College of Jacksonville, Keiser University, and MAYO Clinic will be asked to make a commitment in assisting with developing First Semester Projects based on the summer training at The University of Florida.

Action Research Intervention: Teacher strategies will be aligned to Florida Department of Education Biotechnology I and II Curriculum. Students learning objectives will receive daily teacher feedback of graded assignments along with weekly Progress Report and Data Chats. Prior knowledge of Cellular Biology and Genetics will be established using varied teaching practices including: Content Videos, Biology Animations, Science Web Quests, TBL Activities, and Biotechnology Virtual Labs. In addition to, teacher selection mechanism of heterogeneity student groups will be created based on Grade Point Average (GPA). Using a Real World Connection will motivate student interests by meshing both hook and Essential Questions #1, #2, as indicated on Unit Plan. Teacher will implement short video segments with accompanied Q+A Activity Sheet of the Movie "Extraordinary Measures". Both the Essential Questions and Movie were developed through the connections identified by the teacher during the Biomedical summer institute. Next, teacher fused critical input vocabulary and abbreviation development for effective Web Based Learning, Video Student Reflections, and Lab Extensions. Teacher will model technical writing, computer navigation, excel applications, maintaining legal Science Notebook, cGMPs, and lab skills based on Regenerative Medicine. External resources assisting with Real World Experiences will incorporate Biotechnology Guest Speakers and Extended Learning Labs at either Florida State College of Jacksonville or Keiser University. The Biotechnology Teacher will be mentoring both institutions during the development of the Action Proposal along with assistance form the Bench to Bedside Program Staff and Equipment Locker.

Connections to Bench to Bedside Summer Institute: A range of Regenerative Medicine topics will be incorporated into the Biotechnology II First Semester Project. The teacher believes the exploratory curriculum will allow for increased student learning, supported by Barbara, D.G., and Josey-B. (1993) "Researchers report that students learn best when they are actively involved in the process. Students working in small groups tend to learn more of what is taught and retain it longer...when students feel connected, engaged, and included, they feel more satisfied with their courses. In addition, group work provides students with more "real world" experience, because most of them will indeed be spending much of their working lives developing projects in groups." Science inquiry lesson topics based on Bench to Bedside summer Institute include: Translational Science, Genetic Diseases Affecting Society and Health Care, Bioengineering, Organ Transplant, Stem Cells, and 3-D Printing. In addition to, Biomedical Science each area relies on specific Career Fields allowing teacher to make a real world connection with Benchmarks for curriculum development and skill assessment. Thus, teacher will measure if bridging curriculum leads towards student gains in preparation for the B.A.C.E. and course progression.

Data Collection and Analysis: Teacher selection mechanism of heterogeneity student groups created based on Grade Point Average (GPA) or performance based. Biotechnology student admission is established on student performance records, GPA, Algebra I, and Biology I End of Course Exams. Heterogeneous groups will match the student body due to mixed age groups, as indicated by the author Kruse A. (2011). "*heterogeneous*" groups often take the form of multi-age or multi-grade classrooms.

Biotechnology II students consist of ages from sixteen to eighteen. In addition to, teacher needs to create a realistic work environment in preparing students for possible Intern position for Biotechnology III course. Heterogenous grouping allows for a real work environment to take place, stated by Kruse A. (2011). "Collaboration, as stated in the discussion of heterogeneous grouping, models future work force scenarios for students and reinforces the need for communication skills, organization skills, and individual and team accountability." Then numbers one through five will be assigned to students based on GPA similarities, as indicated by student data on Performance Matters or Guidance Counselor. Following pre-assignment students will be arranged into lab partners based on performance measurement during the First Semester. Teacher compares both Biotechnology I and II student bodies, since some standards correlate. The Biotechnology I labeled control group, thus no wet labs. Biotechnology II labeled experimental group performing all wet labs of same benchmarks. Next, teacher applies same assessment practices to measure student learning gains based on increased or decreased inquiry learning experiences of total Biotechnology student body. Teacher data analysis compiled based on excel applications discussed during the summer institute.

Literature Cited:

1. Hong, Carrie E and Lawrence, Salika A (2011). Action Research in Teacher Education: Classroom Inquiry, Reflection, and Data-Driven Decision Making. *Journal of Inquiry and Action in Education*, 4, pg.1. <http://150.164.100.248/cei/data1/arquivos/HONGLAWRANCEActionResearch.pdf>, 6/24/15.
2. Garret, P.B. (2014, October 13). *The Evolving Classroom: Creating Experimental Learning Spaces*. EDUCAUSEreview, pg.1. <http://www.educause.edu/ero/article/evolving-classroom-creating-experiential-learning-spaces>, 6/25/15.
3. Kruse, A. (2011, July). *The Benefits of Heterogeneous Groupings Over Homogeneous Groupings*, pgs. 1- <http://andrewkruse.efoliomn.com/Uploads/CIED%20500%20Research%20Project.pdf>, 6/25/15.
4. Barbara, Davis.G., & Josey-Bass. (1993). Center for Teaching and Learning: Using groups in classes and encouraging study groups, *Why Use Groups in College Classes?*, pg. 1. <https://teaching.berkeley.edu/using-groups-classes-encouraging-study-groups>, 6/25/15.

Budget and Budget Justification: L = Equipment Locker Lending Program

Manufacture	Catalogue #	Name	Unit cost	Total Cost	Justification
Carolina	228095	Exploring Mammalian Tissue Types Kit Pig Anatomy	395.00/30	\$395.00	Review Activity for Cellular Structure and Function, Macromolecules, Slide Skills, Microscopy, and Organ Systems leading into Regenerative Medicine Unit Lesson.
Science Take-Out Kits	STO-102 STO-118 STO-119 STO-120 STO-129 STO-117s STO-134	Kidney Donor Kidney Problem Enzyme Lactose Stem Cells Animal Med Test Diag. Diabetes Genetic Eng.	15.00*5 13.00*5 14.00*5 12.00*5 14.00*5 13.00*5 11.00*5	75.00 65.00 70.00 60.00 L 70.00 65.00 L 55.00	Inquiry Wet Labs basis of measuring increased student gains of experimental group, Biotechnology II.
Amazon.com	DVD	Extraordinary Measures	6.99	6.99	Realia/Hook for Regenerative Medicine Unit Lesson.

Publix		Chicken Liver	5.99	5.99	Decellurization lab
Bio-Rad	161-0407-MSDS	Triton X-100 500 mL soln	34.00*2	68.00 L	Decellurization Detergent-Cell Membrane
Bio-Rad	161-0301	SDS (sodium-Dodecyl sulfate) 100 g powder	33.00*2	66.00 L	Decellurization Detergent-Proteins, nucleic acids.
Bio-Rad	166-0006EDU	Secrets of the Rainforest	167.00	167.00	Introduction to cloning, protein purification, cancer, and product pipeline.
Bio-Rad	166-0500EDU	Long Wave UV Lamp	43.75*6	262.50	Equipment for Secrets of Rainforest
Bio-Rad	166-0602EDU	Model 16K Microcentrifuge	1938.01	1938.01	Equipment for Secrets of Rainforest
Bio-Rad	166-0620EDU	PCR Tube Adaptor	149.34	149.34	Equipment for Secrets of Rainforest/centrifuge
Bio-Rad	166-0709EDU	Ultrarocker Rocking Platform	799.00*2	1,598.00	Equipment for Secrets of Rainforest
				5,116.83	

Permissions: In the beginning of the school year students, parents, and families, sign off on three permission form documents: FLINN Safety Contract, Syllabus, and Biotechnology Safety/Picture Release Forms.

SINGLE LESSON PLAN

Teacher: Santiago		Content Area/Grade: Biotech II 10-12	Date:
Unit Name:	Regenerative Medicine: Translational Science Driving the Product Pipeline		
Unit Goal What unit goal does this daily lesson address?	Standard(s)/Benchmark(s) What standard(s)/benchmark(s) does this daily lesson address?		
S.W.B.A.T. 1. Identify Vocabulary/Abbreviations related Translational Science and Product Pipeline. 2. Relate personalized medicine and technology applications to Biotechnology Career Fields. 3. Apply computer, web based, and technological writing processes in developing outcomes in Science Notebook. 5. Explore ECMs, Stem Cells, and Decellurization by carrying out lab using cGMPs based on Safety and QC procedures. 6. Synthesize student created assessments both traditional and alternative to indicate mastery of Translational Science segment of Unit Plan.	Academic Knowledge Standards: 35.03 Performance testing conducted using small-scale models, computer simulations to reduce chance of failure. 35.04 Scientific knowledge is used in design and technology to solve practical problems, taking human values and limitations into account. 36.02 Public concern in cause and effect 36.04 Correlation in scientific discovery, product development, based on societal benefit vs financial benefit of a company. CTE: 37.0, 38.0, 39.0, 40.0, 41.0, 42.0.		
Students will understand that... What should the students understand by the end of today's lesson?	Essential Questions What essential question(s) does this lesson address?		
<ol style="list-style-type: none"> Identify Vocabulary and Abbreviations based on the Essential Questions. Define Translational Science and indicated 4 out 5 Biotechnology Abbreviations. List medical advancements due to Biotechnology. Discuss relationship between gDNA and personalized medicine. Relate Biotechnology Applications to Career Fields and PPL. 	<ol style="list-style-type: none"> How will Translational Science influence your Health Care? Based on your gDNA what does Personalized Medicine mean to you and your family? What are ECMs and how has new teachnology revolutionized Stem Cell Therapy? Discuss cGMPs and QC protcols used in Decellurization of Biotechnology companies. How are 3-D Printing, IVF, and Somatic Cells Related? 		
Connecting Concepts How will you review yesterday's content and connect today's lesson to it?	Organizing Students for Learning How will students be organized today for the lessons activities?		
Teacher will recap previous activity beginning with a vocabulary activity, Matching Game or kinesthetic lab skill based on cGMPs and QC.	Students will be arranged in groups of two either based on a nonrandom paring or lab partners that have been matched due to personality testing of "True Colors".		

LEARNING EXPERIENCES, INSTRUCTION AND RESOURCES

What activities or experiences (from your Unit Plan) will students engage in today?

Lesson Sequence		
Activating Prior Knowledge	Teacher will have already covered topics 1 and 2. Therefore using the Learn Genetics Tour the Basics as a review before utilizing KWL teaching strategy. <ol style="list-style-type: none"> Macromolecule Structure/Function Cellular Structure/Function Genetic Disorders 	<input type="checkbox"/> ABC Brainstorming <input checked="" type="checkbox"/> KWL <input type="checkbox"/> Anticipation Guide <input type="checkbox"/> Card Sort <input type="checkbox"/> Think-Pair-Share
Explicit Instruction	Teacher will initiate hook by presenting Essential Question #1, #2 Teacher will implement short video segments with accompanied Q+A Activity Sheet of the Movie "Extraordinary Measures" Along with Guided ppt. notes based on Translational Science	<input checked="" type="checkbox"/> Motivational Hook <input type="checkbox"/> Lecture <input type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Note-taking Guide

Lesson Sequence			Resources and Materials
Group Processing of New Information	TBL Activities will be implemented on W of the M,W,F Week. Based on the assigned Web based learning assignments.	<input type="checkbox"/> Jigsaw <input checked="" type="checkbox"/> Reciprocal Teaching <input type="checkbox"/> Concept Attainment <input type="checkbox"/> Think-Pair-Share	<input type="checkbox"/> Lab / Inquiry Activity <input type="checkbox"/> Computer <input type="checkbox"/> LCD Projector <input type="checkbox"/> Paper <input type="checkbox"/> Pencils <input type="checkbox"/> Whiteboards <input type="checkbox"/> Markers <input type="checkbox"/> Butcher Paper <input type="checkbox"/> Response Cards <input type="checkbox"/> Post-it Notes <input checked="" type="checkbox"/> Video Clip(s): <input type="checkbox"/> Website(s): <input checked="" type="checkbox"/> Lab Materials:
Elaborative Questioning	1. How will cGMPs affect the development of Regenerative Medicine Products used for a sick family member? 2. What Biotechnology Career Field do you believe will impact the overall well being of your family member?	<input type="checkbox"/> Inferential Questions <input checked="" type="checkbox"/> Analytic Questions <input type="checkbox"/> Philosophical Chairs	
Demonstrating Understanding	1. Navigate, Read, and Answers Questions based on scientific Webquest. 2. Utilize a variety of Microsoft Tools: Word, ppt, publisher, and Excel to create reports/data analysis of performed labs, Public Awareness Safety Posters for the Workforce, Flyers on Biotechnology Careers Fields, and Standard Operating Procedures based on cGMPs. 3. Oral Presentations on learned concepts and lab skills through student teaching. 4. Conduct experiments as though working in a Biotechnology Company by following Procedures, Student Responsibilities, and S.L.O.P.	<input type="checkbox"/> Graphic Organizers <input checked="" type="checkbox"/> Picture Notes <input type="checkbox"/> Flow Charts <input type="checkbox"/> Concept Maps <input type="checkbox"/> Mnemonics <input type="checkbox"/> Graffiti	
Reflection	1. Three ring NB to grade in class work, group discussions, TBL, and student reflection/text assignments. 2. Legal Science NB to grade technical writing, reporting, Web based research, Vocabulary/Abbreviations, and Analysis of learned concepts (Conclusion: REE, PE, PA) from each lab conducted to ensure effective student learning.	<input checked="" type="checkbox"/> Reflective Journals <input type="checkbox"/> Think Logs <input checked="" type="checkbox"/> Exit Ticket (Student Learning)	
Daily Progress Monitoring Assessment	Students will earn a 70% or higher on graded Daily Vocabulary/Abbreviation Quizzes, Team Based Learning Unit Quiz/Test, and Traditional/Alternative Assessments	<input type="checkbox"/> Quiz <input type="checkbox"/> Journal <input checked="" type="checkbox"/> Exit Ticket (for Content) <input type="checkbox"/> Response Cards	
Based in the results from your Daily Progress Monitoring Assessment, what concepts need to be revisited in the next lesson?			Homework: Web based assignments correlated with Text.

UNIT PLAN

Unit Title: Regenerative Medicine

Content Area/Grade: Biotech II 10-12

Teacher: Santiago

Implementation Time Frame: 4-6 wks.

STAGE 1: THE DESIRED RESULTS

What are my learning goals?

Unit Goal

Students will understand that...

S.W.B.A.T. 1. Identify Vocabulary/Abbreviations related to Regenerative Medicine Unit. 2. Relate both content and technology applications to Biotechnology Career Fields. 3. Apply computer, web based, and technological writing processes in developing outcomes in Science Notebook. 5. Explore learned concepts by carrying out lab using cGMPs based on Safety and QC procedures. 6. Synthesize student created assessments both traditional and alternative to indicate mastery of Regenerative Medicine Lesson Unit.

Related Misconceptions

What misconceptions are predictable?

1. Biotechnology manufacturing products do not involve health improvements for society. 2. Health care systems work independently of research scientist. 3. Stem Cells are not harvested from adults. 4. cGMPs are only used in theory not in everyday Colleges or Universities.

Essential Questions

What questions will foster inquiry, understanding and transfer of learning?

1. How will cGMPs affect the development of Regenerative Medicine Products used for a sick family member?
2. What Biotechnology Career Field do you believe will impact the overall well being of your family member?

Standard(s)/Benchmark(s)

What standard(s)/benchmark(s) does this daily lesson address?

Academic Knowledge Standards: 27.01 know that investigations are conducted to explore new phenomena to check on previous results, to test how well a theory predicts, and to compare different theories. 29.01 Understand mechanisms of sexual and asexual reproduction..genetic advantages and disadvantages of sexual and asexual reproduction. 30.02 Know the complex interactions among different kinds of molecules ...distinct cycles of activity governed by proteins. 30.03 know cell behavior can be affected ...other parts of the organisms or even from other organisms. 35.03,35.04,36.02, 36.04 CTE: 37.01,37.02,38.01-07, 39.0, 40.0, 41.0, 42.01-05, 43.01-04.

Students will know...

Vocabulary, terminology, definitions

Vocabulary	Biotech Abbreviations
1. Translational Science	1. QC
2. Stem Cells	2. cGMPs
3. Decellurization	3. ECM
4. 3-D Printing	4. SNP
5. Immune Response	5. IVF
6. Somatic Cells	6. BLAST
7. Personalized Medicine	7.bp
8. Differentiation	8. gDNA
9. Xenotransplantation	9. SDS
10. Blastocyst	10. iPSCS

Students will know...

key facts, formulas, critical details, important events, important people, timelines

**Other Essential Knowledge: 1. Bioethics 2. Macromolecule Structure/Function
3. Cellular Structure/Function 4. Genetic Disorders 5. Product Pipeline**

Students will be able to...

Specific skills students will acquire as a result of this unit

- Perform Computer Navigation/Software tasks: LAFS.910.W.2.6 pg. 34; MAFS.912.S-ID.1.1, 2,3,4 pg. 34
- Question Scientific Inquiry/ Reading journals: MAFKS.K12.MP.2.1, 4.1,5.1,6.1 pg.24
- Carry out Web Based and Scholarly Research: LAFS.910.RI.1.1 pg. 26; LAFS.910.W.3.7 pg. 34
- Present Technical Reporting: LAFS.910.WHST.1.2, 2.4,2.5,2.6 pg.23;
- Discuss Experimental Design/Analysis: LAFS.910.RST.1.1, pg.21; LAFS.910.WHST.3.7, 3.8 pg.23
- Maintain Legal Science Notebook: LAFS.910.WHST.3.7, 3.8 pg.23
- Compare/Contrast Biotechnology Fields/Technology: LAFS.910.RI.1.1 pg. 28; LAFS.910.W.3.7 pg. 28
- Apply Quality Control Procedures used in Product Pipeline: LAFS.910.SL.1.1 pg. 28, LAFS.910.RI.1.1 pg. 29

STAGE 2: ASSESSMENT EVIDENCE

What evidence will show that my students have achieved the learning goals?

Performance tasks:

Through what specific "real-world" performance task(s) will students demonstrate their understanding of the learning goals?

S.W.B.A.T:

1. Navigate, Read, and Answers Questions based on scientific Webquest.
2. Utilize a variety of Microsoft Tools: Word, ppt, publisher, and Excel to create reports/data analysis of performed labs, Public Awareness Safety Posters for the Workforce, Flyers on Biotechnology Careers Fields, and Standard Operating Procedures based on cGMPs.
3. Oral Presentations on learned concepts and lab skills through student teaching.
4. Conduct experiments as though working in a Biotechnology Company by following Procedures, Student Responsibilities, and S.L.O.P.
5. Discuss lab applications used in Biotechnology Companies and technologies.

Rubric

By what criteria will "performance of understanding" be judged?

1. First Semester Project Rubric, Submitted on August 6, 2015 with Final Action Research Proposal
2. Daily Lab Performance Tasks.
3. Independent Research and on time task production of Student Work, Lab Write Up, Web Quest, and Student Reflections.

Students will earn a 70% or higher on graded Daily Vocabulary/Abbreviation Quizzes, Team Based Learning Unit Quiz/Test, and Traditional/Alternative Assessments. Quality student work will be based on teacher grading parameters given with individual assignments, labs, guest speaker reflections, and Extended Learning Labs. As stated on expected student performance standards incorporated within the Biotechnology II Syllabus.

Other Evidence:

What other evidence needs to be collected in order to monitor student progress on these concepts and skills along the way?

1. Three ring NB to grade in class work, group discussions, TBL, and student reflection/text assignments.
2. Legal Science NB to grade technical writing, reporting, Web based research, Vocabulary/Abbreviations, and Analysis of learned concepts (Conclusion: REE, PE, PA) from each lab conducted to ensure effective student learning.
3. Student performed Biotechnology cGMPs, S.L.O.P., QC and Lab Practices based on CTE Standards: 37.0, 38.0, 39.0, 40.0 pgs. 28-29, and 43.0 pg. 30-31 of Biotech II FL DOE Curriculum.

Self-Assessment/Reflection

How will students reflect and self-assess their learning?

1. Graded student performed tasks: Labs, Webquest, Quizzes/Tests, and Lab Practical.
2. TBL- Tasks will be performed once EOW due to A/B Schedule, M,W, F week to maintain schedule.
3. Student-to-Student and Student-to-Teacher observed teaching and lab performance.
3. Alternative Assessment Timeline based on Semester Project, teacher created rubric.

Student-to-Student and Student-to-Teacher observed teaching and lab performance.

STAGE 3: LEARNING EXPERIENCES, INSTRUCTION, AND RESOURCES What activities will help my students achieve the learning goals?	
W hat here	<p>What is expected? How will you ensure that students are aware of the learning goals? Where are your students? How will you establish your students' prior knowledge?</p> <p>Students will earn a 70% or higher on graded Daily Vocabulary/Abbreviation Quizzes, Team Based Learning Unit Quiz/Test, and Traditional/Alternative Assessments. Learning goals will be aligned to Objectives in class material. Students will receive daily teacher feedback of graded assignments along with weekly Progress Report and Data Chats. Prior knowledge will be established with Videos/Animations, Web Quest, TBL Activities, and Virtual Labs.</p>
H ook old	<p>How will you hook students at the beginning of the unit? How will you hold their attention throughout the units?</p> <p>Teacher will initiate hook by presenting Essential Question #1, #2 Teacher will implement short video segments with accompanied Q+A Activity Sheet of the Movie "Extraordinary Measures"</p>
E xperience xplore quip	<p>What critical input experience will help students explore the key ideas and essential questions? How will you equip your students with needed skills and knowledge?</p> <p>Critical input experience involves vocabulary and abbreviation development for effective Web Based, Video, and Lab Extension. Teacher will model technical writing, computer navigation, and lab practices along with planning Guest Speakers, Equipment Locker Lending, and Effective Planning of time and resources.</p>
R eflect ethink ehearsing evising efining	<p>How will you encourage students to reflect and rethink? How will you guide students in the process of rehearsing, revising, and refining their work?</p> <p>Teacher will plan in the first week of class writing activities called Student Reflections. During the process, the entire class begins with the same scholarly article with a writing rubric. Next, the class focuses on main aspects: No pronouns, Use of Transition Words, Grammar, Spelling, Unit Vocabulary/Abbreviations, Use of topic sentences, and finalizing conclusion restating main ideas of article. Then students will all be given individual articles with lab partners to complete for Quiz Grade.</p>
E xhibit valuate	<p>How will you help students to exhibit and self-evaluate their developing skills, knowledge and understanding throughout the unit?</p> <ol style="list-style-type: none"> 1. Graded student performed tasks: Labs, Webquest, Quizzes/Tests, and Lab Practical. 2. Student-to-Student and Student-to-Teacher observed teaching and lab performance. 3. Alternative Assessment Timeline based on Semester Project, teacher created rubric.
T ailor	<p>How will you tailor your instruction to meet the different needs, interests and abilities of all learners in your classroom?</p> <ol style="list-style-type: none"> 1. Student-to-Student and Student-to-Teacher observed teaching and lab performance. 2. Alternative Assessment Timeline based on Semester Project, teacher created rubric. 3. Technology and Lab Assessments.
O rganize	<p>How will you organize and sequence the learning activities to maximize the engagement and achievement of all students?</p> <p>During an altering M,W, F week, students will be given 45 minute work segment to collaborate and work one on one with teacher for clarification or re-practice of lab skill. In addition to, Teacher will be available after school for student assistance or project development.</p>

Big Idea:		Standard(s)/Benchmark(s):
Unit:		Sample Activities
Grade:		
Score 4.0	In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.	
Score 3.0	<p>The student:</p> <p>The student exhibits no major errors or omissions</p>	
Score 2.0	<p>There are no major errors or omissions regarding the simpler details and processes as the student:</p> <ul style="list-style-type: none"> • Recognizes or recalls specific terminology • Performs basic processes, such as: <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes</p>	
Score 1.0	With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.	
Score 0.0	Even with help, no understanding or skills demonstrated.	