Analysis of Student Learning
CI 3400: Policies and Practices in Educational Assessment

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Summer 2020

Accompanying Files: Grading Table and Comments ([Google Doc](#)); Classroom Assessment Data and Graphs ([MS Excel](#)).

Part 1: Analyzing Student Learning

I.   Overview of the Assessment Task

Task and Context: Six 11th grade honors biology students will compose a persuasive letter regarding adult and embryonic stem cell properties, differences between embryonic and adult stem cells, potential uses, and global opinions which support one of the following stances: Students will either write to the President arguing for funding and availability of embryonic stem cells for further research, or students will write a letter to Congress reflecting their view that Embryonic Stem Cells are an unnecessary loss of life and, therefore, should not be used in the scientific research community, calling for only the use of adult stem cells for funded scientific research.

Student Learning: The students are supposed to learn about the application and use of Stem Cell research in specific regard to DNA Technology. Students should be able to demonstrate this knowledge through a written assessment, providing details regarding biology knowledge, as well as reasoning for ethical choices reflecting on cultural and societal knowledge and understanding.

NC Essential Standards: Biology

| Bio.3.3	**Understand the Application of DNA Technology.**	Bio.3.3.1	Interpret how DNA is used for comparison and identification of organisms.
		Bio.3.3.2	Summarize how transgenic organisms are engineered to benefit society.
		Bio.3.3.3	Evaluate some of the ethical issues surrounding the use of DNA technology (including cloning, genetically modified organisms, stem cell research, and Human Genome Project).

Learning Targets and Grading Criteria:
- ❏ I can identify at least three unique properties of all stem cells. (18pt)
- ❏ I can explain at least three differences between adult and embryonic stem cells. (18pt)
- ❏ I can explain at least three potential uses of human embryonic/adult stem cells. (18pt)

- ❏ I can evaluate some of the ethical issues surrounding the use of stem cell research by analyzing three global opinions that support my use of ault/embryonic stem cells. (18pt)
- ❏ I can explain three examples of evidence or examples that support my opinion/stance on adult/embryonic stem cell use. (18pt)
- ❏ I can assess my letter to ensure I write clearly, concisely, and persuasively in a professional format, including good spelling and grammar. (10 pt)

II.   Visual Representation of Classroom Assessment Data

Graph of Assessment Data:
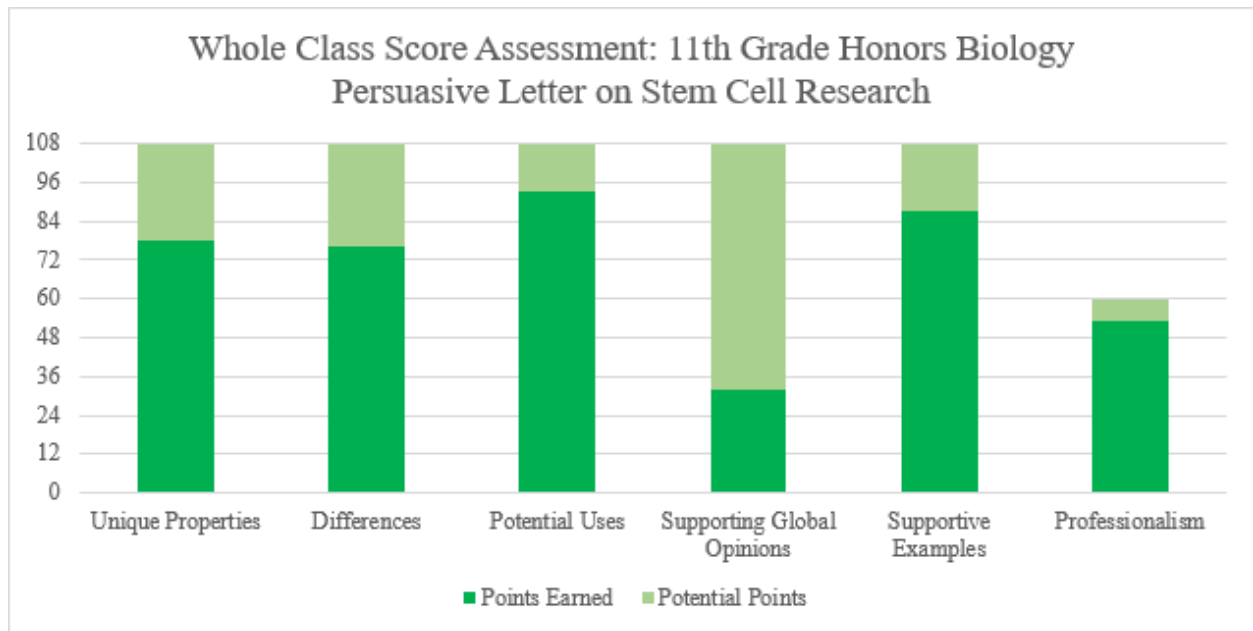
Graph Explanation: The graph above represents the overall summed scores per each grading criteria: At least three unique properties of stem cells (108 pt), at least three differences between adult and embryonic stem cells (108 pt), at least three potential uses of adult or embryonic stem cells (108 pt), at least three examples of global opinions that support adult or embryonic stem cell research and use (108 pt), at least three examples that support the position of the chosen argument (108 pt), and overall professionalism including writing format, clarity, spelling, and grammar (60). By using a stacked bar graph we are easily able to see the potential points (light green) compared to the points earned (green) per each grading criteria/category. There are six students, total. As a whole class the total sum of potential points is 600.

Part 2: Patterns of Learning

III.   Whole Group Patterns of Learning: Originally the teacher had slightly different grading criteria in seven categories, rather than six. Also, originally the category of professional letter format was separate from being clear and concise with good spelling

and grammar. I decided to combine these because I feel that professionally formatted letters should always have good spelling and grammar, and should always be clearly structured and precise. The original grading criteria did not specifically address all of the standards. I had slightly rewritten the criteria after listing more specific learning targets, and re-graded the papers.

- **Student Understanding:** When reviewing the bar graph we can see that, overall, many students did well on each criteria, except for providing examples of global opinions that would support their argument. Below is a specific table of how many students scored what amount of points per each criteria.

  Upon review we can see that of the six students that participated in the assignment half of them scored zero points regarding the global opinions criteria, two students scored five points, and one student scored six points out of a potential of eighteen points. Many students scored nine to eighteen points per each criterion with exception of the following: one student scored six of eighteen points in unique properties, and one student scored three of eighteen points in differences. Overall, all students scored between seven and ten points out of ten potential points for professional format, grammar, etc.

Score:	How Many Students made this Score																		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Unique Properties (18 pt)							1						3						2
Differences (18 pt)				1									2	1					2
Potential Uses (18 pt)										1						2			3
Global Opinions (18 pt)	3					2	1												
Supporting Evidence (18 pt)										1			2						3
Professional Format (10 pt)								2		1	3								

- **Common Errors:** All students had common punctuation errors in their writing. After noticing this trend I decided to not grade as harshly and redeemed each student one point back for this criteria. Two of six students received seven points for this criteria due to greatly lacking clarity and detail in their writing. Two of the six students did not write double-spaced, but singled-spaced, reducing their points, as well.
- **Confusions:** Many of the students seemed confused on keeping the grading criteria distinct. When grading I noticed this trend and decided to be lenient. One great example of this is mixing differences and properties, as well as mixing potential uses with properties, and supporting evidence with potential uses. According to the original assignment each of these categories should have been independently written about, perhaps in separate paragraphs for easier grading and better organization of thoughts. This is where many students lost a few points in various categories.

- **Need for greater challenges:** All students should have enrichment regarding global opinions in the scientific community as it pertains to use of DNA technology, including stem cell research. While almost all students did not even mention it, those who did neglected to even name a source of information or the specific country that took that stance. According to the state essential standards, students should be able to "*Evaluate some of the ethical issues surrounding the use of DNA technology (including cloning, genetically modified organisms, stem cell research, and Human Genome Project) (BIO.3.3.3)*." These students need more assessment to master this standard.

IV. **Patterns of Learning for Focus Students**
1. BIO 1 (high) 88%
   a. <u>Student Understanding</u>: This letter was very well written and organized. BIO 1 has a great understanding of the properties of all stem cells, the differences between adult and embryonic stem cells, the potential uses of human embryonic stem cells, and has many thoughtful supporting examples and evidence to strengthen their chosen viewpoint.
   b. <u>Common Errors</u>: This student has very few common errors, though there are some minor grammatical errors. They are very clear and concise with their thoughts.
   c. <u>Confusions</u>: This student understands all criterium and shows little-to-no confusion.
   d. <u>Need for Greater Challenge</u>: This student did explain one pro-life opinion, but did not lable it as a specific global opinion that would support their chosen stance. Enrichment on global opinion on ethical issues surrounding the use of stem cell research would benefit this student.
2. BIO 2 (mid) 73%
   a. <u>Student Understanding</u>:This letter was very well written and organized. BIO 2 has a great understanding of the differences between adult and embryonic stem cells, and of the potential uses of human embryonic stem cells. Regarding the criteria of providing supporting examples and evidence, BIO 2 made a good statement about the top four diseases, but did not source that information. BIO 2 also only listed two of the three required properties of all stem cells.
   b. <u>Common Errors</u>: This student has very few common errors, though there are some minor grammatical errors. They are very clear and concise with their thoughts.
   c. <u>Confusions</u>: This student understands all criterium and shows little-to-no confusion.
   d. <u>Need for Greater Challenge</u>: BIO 2 did not provide any examples of global opinions that would have supported their chosen stance. Enrichment on global opinion on ethical issues surrounding the use of stem cell research would benefit this student.
3. BIO 5 (low) 39%
   a. <u>Student Understanding</u>: BIO 5 had mid-range understanding of the potential use of stem cells, scoring nine of eighteen points.
   b. <u>Common Errors</u>: BIO 5 made minor grammatical errors, and commonly lacked clarity (evidence and supportive information) in *every* criteria/category.

c. <u>Confusions</u>: BIO 5 seems to confuse and not differentiate between the criteria of potential use of stem cells and the criteria of providing supporting examples or evidence. Bio 5 also seems confused about the overall requirements of this assignment, as they rarely gave three examples of anything and did not elaborate on anything.

d. <u>Need for Greater Challenge</u>: BIO 5 listed one global opinion, but it was not in support of their chosen stance, as directed. The identity of the country or community holding that opinion was never disclosed. Enrichment on global opinion on ethical issues surrounding the use of stem cell research would benefit this student. BIO 5 would also benefit from enrichment activities regarding making their ideas stronger with supportive evidence and examples, as well as activities in writing organization and planning.

Part 3: Feedback & Next Steps

V.   Feedback to Guide Learning

1. BIO 1 (link to image folder coming shortly): You did a very good job with this assignment. Your formatting and thought organization is done well and was very professional. One thing you may need to work on is reading up on more cases of global opinions on stem cell research that could strengthen and support your argument. I believe this statement from your letter had a lot of strength in supporting your case and calming most who might share an opposing position: "*Most embryonic stem cells are taken from an embryo in an egg that has been fertilized in a vitro fertilization clinic. We do not take embryonic stem cells from eggs fertilized within a woman's body* [...]". Very well said! I appreciate all of the examples and detail you included, as well as the creativity you used with your wording in being very persuasive. Overall, very well done.

2. BIO 2 (link to image folder coming shortly): Overall, good work on this letter. Your organization of thoughts were easy to follow, and the facts and examples you provided were very helpful in strengthening your argument and persuasiveness. I thought it was very smart to list "*the top three diseases that adult stem cells have help*[ed] *and worked on*," but it would have been a stronger statement if you added your source of information. One thing I feel would strengthen your letter and argument would be more sources of supportive evidence and examples. One requirement of this letter was to provide at least three examples of global opinions regarding stem cell research that would support your argument. While your letter was wonderfully written, if you were to research more supportive global opinions to back-up your views it would have been even more successful in being persuasive in such an often sensitive topic. Overall, very nice work.

3. BIO 5 (link to image folder coming shortly): Great effort on your letter. I appreciate your professionalism and some of the great questions you ask throughout your letter to get the reader to think. This makes for pretty good persuasion. Some areas we may need to work on are using more supportive information and sources, including examples and specific clarification and distinctions. One requirement was to name at least three specific examples of global opinions that would support your argument. While you did list one

global opinion, was actually against your argument. You repeat multiple times that "*the possibilities with the embryonic stem cells are endless,*" which is very exciting, but further explanation of how they have endless possibilities would be very helpful and a stronger argument. Overall your letter is exciting to read. We should find a time to talk about ways we can expand on your ideas.

VI.   Using Assessment to Inform Instruction

Regarding the next steps for the whole class, I feel that I should give examples of professional letter formatting expectations, work on enrichment activities regarding global opinion stances for or against embryonic stem cell research, and provide more clear instruction for each grading criteria and learning targets. There should also be a discussion on how to better organize our thoughts in small groups as well as in our personal writing.

Regarding the next steps for each of the three focus students: I believe that group discussion with the three of them would be beneficial. Although I understand one was chosen because of a high score, one for their mid-score, and one for their low score, I believe that if I lead a small discussion with them together on how we can organize ideas, provide more examples, and how we can make a letter look and read most professionally the thoughts of themselves as peers and classmates might be more comfortable and less intimidating than if the suggestions were coming directly from their teacher.