Team Final Report on Teacher and Student Learning

Teacher/School: Hannibal High School

SUNY Oswego faculty member: _____

Teacher Participant Names: Carol Burch

Course Name & Academic Year: EDU 505 - Formative Assessment to Meet the Common Core Learning Standards (CCLS)

Please answer the following questions:

Please update us on any changes you made to your team action plan:

Changes to my proposed activities and projects are as follows: I attended the national NSTA conference in Boston April 2-6 and focused heavily on CCLS literacy in the science classroom sessions.

The timeline of getting a classroom hydroponics system built and functional was delayed due to school building issues with multiple code inspections. I worked with our custodial staff to time the project start.

Analysis of Data on Teacher Learning: 6 shifts of CCLS Literacy:

Shift 1	Balancing Informational & Literary Text	Literary texts have not been used in my classes this school year. Informational texts (including textbook), NASA web news and other primary sources, and Science World Magazine have all provided written material for students to read, discuss, and complete a variety of literacy focused activities from. These activities have served as formative assessments.
Shift 2	Knowledge in the Disciplines	Reading Science World Magazine articles has been a very important source of content related information for RSP9 students over the course of the school year. This source is designed for this purpose and engages students in content ideas that cross disciplines. The cross-cutting nature of this magazine aligns with the new Next Generation Science Standards (NGSS) cross-cutting connections that teachers should be engages students with. Physics students use their college-level text as a source of content information as well as web resources for information to construct two multi-media educational projects they have completed during the school year. I have found that web and Science World readings encounter little resistance from RSP9 students. They respond positively, complete activities with focus, and look forward to future issues. Most are reluctant readers, yet this source is readily accepted by the group. In contrast, getting physics students to read from their difficult textbook is very difficult. I have had to repeatedly "train" them to read the text by outlining an approach that introduces them to the important ideas and then helps them read for finer detail. I have them read the summary first at the back of the chapter, then go to the assigned sections focusing in on highlighted areas, bolded headings and text, examine diagrams and example problems and finally reread the summary at the end of the chapter.

Shift 3	Staircase of Complexity	RSP9 students started the year with text sections that were geared for middle school. They later engaged with biology texts for high school levels study. Across the entire school year Science World provided varied levels of reading complexity with articles written at different lexile levels. RSP9 students also read for content information within the ECOMUVE simulations as they completed the activities and learning quests associated with the units. The reading was fairly complex and very dense content-wise. I was able to support students one on one as needed during this unit. Physics students faced the most challenging textbook they have encountered in high school. They still struggle with the level and the density of the text and concepts. I have used a thumbs up- thumbs down assessment of student reading and understanding of text ideas to provide feedback.
Shift 4	Text-based Answers	The entire school year has required RSP9 students to read then use evidence from their texts to support points of view, summarize, or some other directive given. The students use evidence to discuss and to write regularly. These activities have served as formative assessments.
Shift 5	Writing from Sources	Students regularly write journal entries, complete activities, and respond to questions that require evidence (facts) from their reading. These activities serve as formative assessment items.
Shift 6	Academic Vocabulary	RSP9 students encounter content specific vocabulary nearly daily. Other vocabulary is developed as articles are read from Science World and other sources. I use the smart board to highlight a variety of words that students help define from the context clues in the reading. Physics students also encounter vocabulary that is challenging, both technical words and the advanced vocabulary found in a college text and lab assignment.

I have also learned many literacy strategies from PD work with Cheryl Dobbertin, Pre-AP workshops, and numerous sessions at NSTA. I now use a variety of strategies from preloading vocab, T/F statement before & after analyses, graphic organizers, word sorts, and many writing prompts.

I also investigated student engagement/learning using simulations vs. hands-on or traditional strategies. RSP9 students used two simulations developed by Harvard School of Education: ECOMUVE Pond and Forest. Students explored ecosystem relationships, food webs, nutrient cycling, atom pathways through photosynthesis, and human impacts in the pond simulation. More than 75% of the students eagerly engaged in the virtual environment and the associated lessons and activities. The other students who were not as interested were unhappy that they couldn't hunt, drive, or interact in a more traditional video game style experience. That was definitely an unexpected road block as a teacher. They persisted in their desire to hunt the animals and have a higher "action-value" in the computer simulation. Overall, the ECOMUVE Pond was a successful experience and showed very high learning gains for the students in terms of nutrient cycling knowledge, food webs, energy flow, and biotic and abiotic factors in ecosystems. They performed well on the ECOMUVE formal assessment (74%).
Hands-on bio-bottles had students creating ecosystems that had similar structure to the simulated pond game. Students collected data about their closed systems over a period of 6 weeks and discussed and wrote reflections on their bio-bottles.

Physics: Simulations were used as tools to provide interactions between variables that are not easily done with traditional lab materials. The simulations also provided early experiences with a concept that revealed misconceptions as I observed students interacting with the PhETs. I watched pairs testing relationships, responding to prompts requiring prediction diagrams to be drawn, then observations recorded, and explanations made. The PhETs were used over several months interspersed with hands-

on traditional lab activities. Some students really enjoyed testing relationships, others found it tedious. I conducted a survey that included some questions about the use of simulations in learning physics. Most student agreed or strongly agreed that simulations were valuable in learning concepts.

I will probably use fewer PhETs next year as a result of the student feedback, selecting those that seem to have more value than others in revealing student misconceptions.

Analysis of Data on Student Learning:

RSP9: The bulk of the work this year has focused on literacy and engaging students in evidence-based writing. In line with this effort has been collecting, organizing, and analyzing data to support conclusions made in scientific investigations. Student writing assignments/tasks have been evaluated over the school year to anecdotally look for student growth. The level of engagement in writing tasks has grown in nearly all of the RSP9 students. Two remain reluctant and require many redirects to complete a task. My very lowest student has shown the most growth of all. He has moved from a simple fragment of a sentence to recently writing three paragraphs that have several facts, details, or other pieces of evidence included- all without requiring a single redirect or refocus! Spelling remains an issue for nearly all of the RSP9 students, but I have deliberately chosen not to focus on that in terms of grading.

Science World CCLS activities that have been assigned as homework have the highest rate of completion overall with over 50% of the students returning completed assignments the following class. Students who have been absent also complete Science World activities more regularly than other activities that can be made up.

Students have grown in their ability to write testable hypotheses and draw conclusions based on data collected. Student journal entries or summaries from Science World articles have also grown in length and detail over the school year. They have responded positively for different types of writing tasks and seemed quite engaged in a strategy called “Postcard Home” that I learned at NSTA where students place themselves in the text or video as a member of a crew or team and write home to share details, set the scene, and give their emotional impression of the experience.

Physics: This is the first year that I have seen significant growth in the quality of written lab reports across the student group as a whole. I have provided more specific feedback on written lab reports than in past years to help them improve. Couple the feedback with a more intensive experience across all classes as CCLS writing efforts are being required, I feel like the students have really grown as a result of the school-wide effort.

The two multi media projects that require students to storyboard, script, record, edit, and produce educational videos on physics related ideas have also shown improvements from past efforts by students. I have provided clearer rubrics and had multiple firm check-points for progress being made (drafts, evidence, conversations, etc). Peer reviews have been great opportunities to discuss what works and what doesn’t in general terms for planning and producing projects for others. All but one student has made the numerous required deadlines for check-in points which is unexpected. The single student who failed to meet deadlines also did not complete the first video project and is struggling with the second project due next week. The intermediate deadlines indicate that they help keep students on track for completing a project on time, and improvement over past years.

Physics student survey data for PhET simulation use in learning

**the overall scores were determined by multiplying the number of responses per numbered category by the number value of the category and summed across the question.*

Question	Type	Strongly disagree 1	2	disagree 3	agree 4	5	Strongly agree 6	overall
Science is usually one of my strongest classes	self		1		2	5	6	71.0
I am good at math	self			2	5	3	4	65.0
I usually do HW assignments for classes	HW			1	1	6	6	73.0
I like to work with others on projects	group			1	2	5	5	66.0
I prefer to use computers on writing assignments	tech			2	3	5	4	67.0
I have my own computer/tablet at home	data				1		13	82.0
I have used the physics wiki several times this year	HW		2	1	1	3	7	68.0
I like using Vernier probes to collect lab data	tech				2	5	7	75.0
PhET simulations help me learn physics relationships	PhET			1	3	3	7	72.0
Solving physics problems helps me learn concepts	learn					9	5	75.0
Doing experiments is very important to learning physics	learn					3	11	81.0
PhET experiements are better than most labs we do	PhET			4	5	2	3	60.0
I want to major in a STEM area in college	career	1		4		1	8	66.0
I am comfortable using computers to learn with	tech				4	4	6	72.0
I like trying to figure out how things work	self			3	2	5	4	66.0
Memorizing formulas is very important to learning physics	learn			1	2	7	4	70.0
I learn better doing physics than by reading about it	learn			1		3	11	84.0
I would recommend taking physics to others	physics					2	12	82.0
Using simulations helps me learn how variables are related	PhET				1	4	9	78.0
I like solving physics math problems better than math class problems	physics	1		1	1	1	10	73.0

TYPE	#	1	2	3	4	5	6	overall
PhET	3			5	9	9	19	70.0
self	3		1	5	9	13	14	67.3
Tech	3			2	9	14	17	71.3
HW	2		2	2	2	9	13	70.5

Carol Burch **Boston NSTA Summary 2014** **(23 hours PD)**

Thursday April 3

- ☐ 33 Strategies for Integrating Disciplinary Literacy (10:00 AM)
  - Excellent downloadable strategy guides from Lawrence Hall of Science, UC Berkeley with useful graphic organizers at www.scienceandliteracy.org/teachersupport/strategyguides
  - This session used several strategies with the participants that provided insight into the challenges of reading and the value of providing organizational structures. I had many 'lightbulb' moments while particpating that made it very clear that pre-reading and post-reading strategies can really improve the learning experience. Suggested resources for reading materials were: Readworks.org, National Geographic xplorere, Scholastic leveled readers, Reading A-Z, and Science World.
- ☐ Using Web-based GIS to Investigate Rain Forest Conservation Issues in the Brazilian Amazon (12:30 PM)
  - I was a co-presenter for this hands-on tech session where participants used critical thinking skills and GIS tools to locate a wildlife preserve or managed conservation area using many constraints.
- ☐ Closing the Achievement Gap wth Constructed Response (2:00 PM)
  - "PEEL" writing strategy - point, evidence, explain, and link
  - "We did… I learned" exit tickets

- The presenter shared his work with struggling students in Texas where he used a constructed response exercise each class period to help all students solidify their learning and rely only on evidence as the basis for written responses.

- ☐ Ti Nspire "Body of Evidence" Workshop (3:30 PM)
  - The new Ti Nspire CX handheld system was used as the central tool in this workshop. We learned about the free lab sets available, the student data tracking and recording capabilities, and the management system at the heart of the Ti Navigator.
  - We also worked through a sample physical science virtual lab and investigation while learning about the device. I am IMPRESSED!
- ☐ Exhibition Floor – collecting resources from vendors and programs (4:00 PM on)

Friday April 4

- ☐ Science Says: Science and Literacy for Students with Language Based Learning Disabilities (8:00 AM)
  - Model is based on Brockton HS literacy initiative where a 5-8 teachers took a graduate class in metacognition and incorporated strategies across all classrooms.
  - Lots of handouts provided for future use that focus on students recognizing what they are reading, seeing, or hearing and knowing what they understand and do not understand.
- ☐ Maximizing Instructional Time and Student Learning (9:30 AM)
  - Many activities were modeled that incorporate trade books or readings in science. She stressed creating mental models to construct ideas and then symbolize them through writing or other means. She shared many great books and activities that cut across grade levels that go with them to develop student skills in reading comprehnsion and writing using evidence.
- ☐ Ti Navigator "Formative Assessment & Classroom Management" (11:00 AM)
  - Another session that involve participation but focused on strategies for formative assessment using the Ti Nspire handhels with Navigator sofware. This seems like a really great device with a wide variety of science focused virtual labs and lessons.
- ☐ Collaborative Editing of Student Work Online in Science and ELA (12:30 PM)
  - Teachers shared strategy and experiences using Google Docs, Google drive to colaborate, peer review and edit, and revise writing.
  - They use a writing template for consistent organization and manage comment threads. They also always use a rubric to guide students as well as an editing checklist.
  - Popplet (web brainstorming tool), Good Notes, MSWin Drive on Chrome books
  - Student accountability grwatly increased while using Google docs – track work, date stamps all events, very tranparent about effort being made by students.
- ☐ Hands-on Digital in the High School Science Classroom (2:00 PM)
  - Discovery Education Techbooks featured using the 5E model of instruction
  - Sample topics with virtual labs, ELA activities, writing using Claims-Reasoning- Evidence method. The presentation was very informative and really showcased the possibilities of the Techbooks in the classroom.
- ☐ Active Physics A project-based Program – Arthur Eisenkraft (3:30 PM)
  - Engineering design challenge based curriculum
  - We engaged in several activities to illustrate how he teaches this program. I learned some excellent strategies for physics that I will use. Writing for public commuication (podcasting or video casting) is a common strategy for sharing out knowledge or products of the unit.
- ☐ Exhibitors (4:30 PM)

Saturday April 5

- ☐ NASA Newton's Laws of Motion – David Beier (8:00 AM)
  - davidbeiernasaepo@weebly.com
  - 30 hands-on physics stations to engage kids in thinking- VERY COOL and very affordable! I will ue these for end of the year review to help kids reconnect with fall semester's study. AMAZING hour of fun and very applicable to my teaching.
- ☐ Reaching More of Your Learners Where They are at: Differentiation in the HS Classroom (9:30 AM)
  - POGIL examples from chemistry and shared student work samples
  - http://tinyurl.com/mskaxsx They used a very "safe" system of promting reaching higher for kids- had tasks differentiated as MILD, MEDIUM, & SPICEY each taking the next step up in complexity.
  - They also shared the Tomlinson "Equalizer" they useto carefully design activities to balance components to level the playing field. Webkelley.com/DOE/MESPA/curriculum/html/42equal.htm
  - Differentiation by Readiness… a teacher's response to learner's needs
  - Differentiation of content, process, and product
  - A very powerful session! They also have differntiated materials that have different icons on the corners that appear to be the same work, but are actually different and the icon indicates which version each is.
  - For students who are finished with work during a class period they have an "Anchor Station" where 'you are ever done learing' – supplemental activities usually 5 min or less. For slow finishers they are optional 'bonus' work

- ☐ The Stories of Graphs (11:00 AM)
  - http://smartgraphs.org from Concord.org
  - HTML5 coding for free data analysis activities- GREAT STUFF!
  - They have physics and other science and math lesson plans
  - Teachers can create their own activities and students can learn to code activities
  - Multiple representations of data through this tool- very powerful
- ☐ Building a Tapestry of Science Literacy with Digital Resources (12:30 PM)
  - This presenter shared a large assortent of web resources and strategies related to literacy in the classroom.
  - Powtoon, schooltown,Edmodo,Schology, edudemic2013, Camtasia, Jing, Snaggit, airplay, Doseri, Apple education resources, Coaster Frezy app, Moon Globe app, NASA VIZ app, Kids Discover, Insects HD, Science 360, Thing Link
- ☐ Exhibitors (1:45 – 3:15)- collected resources
- ☐ Using a Patterns Approach in Physics (3:30 PM) - Presenter is AAPT's national physics teacher of the year
  - EXCELLENT handouts to use in class! Emphais on relationship understanding through repeated graph patterns of mathematical relationships.
  - Shared a very cool experiment "the paragraph experiment" and how modeling techniques can be used to present data through oral and visual presentation http://sites.google.com/site/patternsapproachphysics/
  - HUGE resource for lab experiences
- ☐ Partnership to Improve Student Achievement in Physical Science (5:00)
  - The session focused on pedagogical content knowledge and science partnerships to develop teaching skils/strategies.

Sunday April 6

- ☐ We are the Greengineers- Newton North HS – (8:00 AM)
  - BIG IDEAS! WOW! They have developed an absolutely amazing set of engineering courses (5) that have approx. 40% IEP student enrollment.
  - MASTERY – AUTONOMY – PURPOSE from Daniel Pink's "Choice Architecture" for learning model. Collaborative classroom ethos!
  - Students are the "solutionaries"- integrated approach to break down the 'silos'
  - Stanford's "Design Thinking" – audience, environment, end user, & artistry
  - Discovery- Interpretation- IDEATION – Experimentation- Evaluation
  - Greengineers1@gmail.com
- ☐ Writing Using claims, Evidence, & Reasoning in Sci & ELA (9:30 AM)
  - Nice sharing of demos that engage science students and serve as prompts for discussion and writing.
  - Science writing colaboration – draft in 3 parts (C-E-R)
  - Group writing using Google drive- peer and self edit
  - Joint grading by sci and ELA teachers for writing pieces
  - Provide writing template to give structure and use edit sheets
- ☐ Addressing the NGSS Nature of Science Standards in Real-World Conservation Biology Contexts (11:00 AM)

I was the lead presenter on this session sharing video and curricular resources and activities related to the Crossing Boundries work I have done with Hobart and Cornell Lab of Ornithol