**Dream IT: A proposal for transformative learning Phase 2 \_9.07.14**

BACKGROUND

The DreamIT is a plan of action addressing an aspect of my STEM content, that involves some pedagogical problem, using technology (although not the overriding focus). This plan started from a big idea in Science and then I worked back to the solutions (a part of which could include technology, arts, and research integration).

This project is a product of a fellowship where we explored a variety of topics and issues related to teaching and learning in the STEM disciplines and the potential of educational technology to transform learning.

Fellows come from different contexts and situations who continually take risks, evolving in our practices, developing and redeveloping lessons, units, and pedagogy for constant growth and innovation.

EDUCATIONAL GOAL

To meet student needs by increasing motivation and making content more accessible

PROFESSIONAL GOALS

To develop my capacity to design transformative, innovative, multimodal learning experiences by building a toolkit of strategies, ideas, products, and practices to enhance the quality of our STrEaM instruction by integrating content, pedagogy, and technology in creative ways

To learn how to create active learning communities of practice for students and for fellow teachers

Frameworks

[Technological Pedagogical Content Knowledge (TPACK)](https://www.youtube.com/watch?v=FagVSQlZELY)

Making all 3 knowledge areas work together

[SAMR model](https://www.youtube.com/watch?v=us0w823KY0g)

Developmental technology integration in STrEaM pedagogy from Replacement to Amplification to Transformation

Innovative use of technology by repurposing existing and available tools to meet student-learning goals

HOW

1. Reflect on past and current STEM content and standards.
2. Identify a key big idea or ideas in a discipline that has enduring value beyond the classroom and also resides at the heart of the discipline. This is the idea that you will seek to uncover through your instruction.

Is there an area that students struggle with or can’t relate to? Or an area in which (despite your best efforts) misconceptions are still strong? An area in which students are unmotivated to learn? Or an area that is commonly thought of as ‘boring’ or dry, in which students are disengaged? Or perhaps there is some other area in which you can identify pedagogical issues, struggles, with content, and/or a teaching problem of practice that needs a plan to address it. Choose a set of key fundamental, powerful, cool ideas that you will represent or the ultimate goal of your teaching.

1. i-Image: Making ideas cool, a visual representation of “Big” idea(s). Take or use photos. Then create a design that includes the image and text in a creative, provocative manner. i-Images are an attempt to capture powerful, cool, big ideas and present them visually. Make school ideas cool. Cool ideas spark the imagination and stir our feelings. They cause us to stop what we’re doing, look more closely, share with our friends, and perhaps, be forever changed.
2. Explain it to me: a 2-3 minute video that explains selected content that a 5th-grader would understand
3. Identify desired results.

Fundamental goal of the DreamIT plan is to develop student understanding (going beyond the facts towards deeper meaning).

*Dewey: To grasp the meaning of a thing, an event, or a situation is to see it in relations to other things: to see how it operates or functions, what consequences follow from it, what causes it, and what uses it can be put to.*

Decide on the big idea that you seek your students to understand. Describe why this big idea has enduring value beyond the classroom, how it is an essential knowledge base of the discipline, why you seek to uncover this idea through your instruction, the methods of developing this knowledge, and the forms of representing this knowledge.

1. Determine acceptable evidence (performances of understanding)

What kinds of performance of understanding (formative and summative assessments) you would use to determine whether or not your students have indeed gained understanding of the big idea (or ideas).

Harvard Teaching for Understanding: *Performances of understanding require students to go beyond the information given to create something new by reshaping, expanding, extrapolating from, applying, and building on what they already know.*

These may include ongoing surveys, interviews, classroom observations, teacher journals, pre- and post-tests, etc.

How would you make these assessments clear, relevant, and public? How often would such performances occur, how they would be evaluated, and how students would receive feedback on their performance.

1. Plan learning experience and instruction.

What is the best way to develop a solution for the problem given the reality of the context within which you practice? Use the TPACK framework as a guiding structure to help you conceptualize and plan it out. Technology is not the focus. It is a means to an end, that end being the teaching goals for the content, and the learning transformation that you dream seeing for your students. Technology is one part of the interaction, but also front and center are pedagogy and content.

Describe the pedagogical approach, the role of technology in the process and manner in which technology, pedagogy and content work together in the project/proposal

Context: The affordances and constraints within which your solution has to work

Content: What I want my students to learn and be able to do. What are the problems different students might have learning some particular area of STEM content? What are some challenging concepts of the content are (BIG IDEAS) that you think students have trouble understanding?

Pedagogy: What pedagogical approach do you think will work best given your choice of content and your goals? How can you develop curiosity and aesthetic understanding? How can you capture some of these aspects within your STEM disciplines and within your teaching? What would you do to achieve these goals?

Here’s a resource that you may find useful as you think about this, an updated version of an infographic created by Candace available at <http://goo.gl/J5AMEg>

Technology: What technology seems best suited for your problem - for your context, content, and pedagogy? Why is this the best as opposed to other options? Outline the specific technology or combination of technologies that you would like to integrate in order to facilitate the transformation in learning that you outline above.

The Total PACKage: The goal is to integrate technology organically and dynamically in your teaching in order not to “cover” the STEM material, but rather to “uncover it”, and help you and your students truly understand the core of the material. Keep in mind the critical barrier that preconceptions, prior knowledge, and beliefs can play; the critical importance of contexts and perspectives; multiple ways of knowing (concepts, theories, stories, schemas, etc). Are all three pieces (C, P, & T) integrated or are they disjointed and separate from each other? See how your use of technology is content specific and that it facilitates deeper understanding and allow students to manipulate information, explore a “network of ideas”, explore the material with curiosity and a sense of wonder, and investigate multiple representations of the material. How does this plan hit the “sweet spot?”

Big Idea: Web of interdependent relationships and systems

What is the BIG idea?

Because we exist, we are, and are a part of, a complex “*web of interdependent relationships and systems”* (internally/externally, directly/indirectly, seen/unseen, known/unknown, historically/futuristically…) Every system is not only a whole with subsystems, but is also a subsystem of larger systems.

Why use this BIG Idea?

This unifying BIG Idea will help students realize that any decision or action they make will always impact something or someone because they are part of this web of interdependent relationships and systems. Unfortunately, we are only somewhat conscious of our part in these myriad of relationships which may exist in a dynamic complexity that we may never fully understand.

Why- Education in general and Science in particular must be transformed to meet workforce and innovation demands of a global and technological future

How- Increase student motivation and make content more accessible to students by providing them with a gamified and technology-enhanced NGSS & CCSS-aligned STrEaM curriculum where they are given opportunities to Explore. Create. Share.

**1. Identify desired results**

For the quarter 1 unit on matter, students will:

Kid Friendly version (1-4 from Mr. McWeeny)

a. become excellent observers using the sixth sense including the basic 5 senses. Why? Observations are the foundations of science.

b. look for and attempt to understand connections/relationships in the world. Everything is influenced by other things (interdependence).

Why? Everything is somehow connected (related).

c. consider and assess how s/he personally connects to the world.

d. record, contemplate, communicate his/her findings to others. Sharing is an essential human trait. Why? Learning is powerful when shared.

e. show their understanding and in-depth learning of ideas by expanding on them and applying them in novel situation in appropriate, flexible, and intelligent ways (L@titu)

The more content-oriented version:

a. in the long term apply what they know and understand of matter and materials (and science and engineering practices) to (new) situations that will make them aware and understand unintended consequences (apparent contradictions) to shed light on issues by weighing competing evidence/information on using materials (such plastic) for society’s current and future (technological) needs

b. develop different models (graphical, mathematical/algebraic, physical) to describe the atomic composition of simple molecules and extended structures. They will also identify and explain the interdependence between the atomic structures and a material’s properties (physical and chemical).

c. develop and use a model (algebraical/mathematical, physical) to describe how the total number of atoms does not change in a chemical reaction and thus the mass is conserved. They will also identify and explain the interdependence between the reactants and the products in a chemical reaction.

d. develop and use a model, that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. They will also be able to identify and explain the interdependence between the amount of thermal energy added or removed and the resulting motion of particles.

e. gather and make sense of information to describe that synthetic materials come from natural resources. They will also identify and explain the interdependence between the life cycle of synthetic materials and its impact on society and the environment.

f. analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. They will also be able to identify and explain the interdependence between the properties of initial reactants and the properties of resulting products in a chemical reaction.

g. undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical or other processes. They will also identify and explain the interdependence between their design and the resulting amount of thermal energy that is released or absorbed.

h. explain and give examples of the interdependence of science, engineering, technology, and society in the study and use of different types of materials.

i. show an improved understanding of the meaning of substances having characteristic properties (e.g. density) that are independent of the amount of the sample.

**2. Determine acceptable evidence (performances of understanding)**

I will use both formative and summative types of assessments as evidence of true student learning and understanding.

**a. Rubrics**

Rubrics design are based on students’ developmental stages and appropriate standards.

NGSS/CCSS-based and developmentally appropriate rubrics for student work will be designed to make their understanding public in a variety of forms. These rubrics will be specific, clearly articulated, written in language that students can understand and will depict various qualities of understanding and have examples of student responses at different levels of understanding. Students will use rubrics for feedback and self-monitoring of their progress to guide revision and improvement as well as for formal self- or peer- assessment.

Student work and performances made public will be opened to constructive critique and so that it can be better. Rubrics will be collaboratively designed with students. What qualities constitute deep understanding of science concepts? Why should students learn about these concepts? What about these ideas should they understand? Can students’ understanding of these ideas inform the way in which they make sense of the present?

Instructional rubrics will be used to guide and assess students’ understandings of the qualities of a good CER or scientific argumentation.

**b. e-Portfolio and Website**

Portfolio or processfolio traces the development of examples of student work through each stage of the creating process as they tackle open-ended problems similar to those undertaken by practicing scientists/mathematicians. Portfolios will allow me to use a variety of media to capture different aspects of student performance for later review and assessment. For example, student contributions to a science project could be documented in different ways: with photos; journal entries explaining how the work was initiated, developed, and completed; and video or audio tapes of a student presentation, group discussion, critique session, or peer collaboration. These artifacts will produce highly informative insights into student self-assessment, peer assessment, reflection, and process. Students will learn how to achieve learning objective, assess their own work and how to improve through revisions.

**c. Pre- and Post-tests**

To uncover prior knowledge and possible misconceptions and resulting change in thinking and understanding, I will give targeted pre- and post tests. Some tests might be a combination of application, open-ended, and close-ended questions.

d. Quick End of activity or End of the Unit **Reflections**

e. Interactive Science/Mathematics **Notebooks** with corresponding rubrics

**3. Plan learning experience and instruction**

I plan to harness the power of research and the arts to enrich high-level cognition across school subjects, thus STrEaM instead of STEM. To do this, I need to develop an environment in which students and teachers’ creativity, understanding, and thinking can flourish. The focus is not on the fun and novelty of individual lessons but on the nurturing of a deep engagement in the learning process that requires students to invest and extend themselves. In other words, I need to apply different methods to make my classroom a more engaging place of learning. I plan to integrate works of visual art and music, imaginative writing in the STrEaM curriculum in ways that strengthen student thinking and learning like rapping science understanding, telling stories using infographic, stop-motion animation, or a poem that can be set to music

How I plan to help students develop science competencies

a. Students will work both as individuals and in collaborative groups

b. I will try to approach or present topics in a number of ways; provide different entry points (reading related stories, watch a video, use current events, careful analysis of data,, debate a question (e.g. Which type of material is best for a drinking cup). I will invite students to think about important problems in multiple ways (works in math too) to develop mental agility.

c. I will develop performances of understanding that invite students to think with science knowledge in multiple novel situations. These will show whether students actually make use of classroom material once they step outside the door (Tweet real-world applications, design a product, create works of art (visual, musical, infographic)

d. I will provide students the opportunity to explicitly experience and reflect upon the 8 science, engineering, and mathematics practices. Students will understand that science embodies distinct ways of thinking about the world. Scientists hold theories about the natural world that guide their observations. They make hypotheses, design experiments to test them, revise their views in light of their findings and make fresh observations.

e. I will provide students the opportunity to experience how scientists communicate in preferred forms/symbol systems and genres. Scientist (typically) opt for data-heavy research reports, testing of empirical evidence, scientific claim. Students will learn how to write (and recognize) a well-crafted scientific report with clear and testable hypotheses, methodology, results whether in small investigations or full blown scientific experimentation.

f. Finally, discussions, thinking, and student work are to be made public for readers or audience to weigh and evaluate and allow for peer- and self-assessments, reflections, metacognition, growth and learning.

**3B Content:**

What I want my students to learn:

Unit 1 - Matter

Big idea: All materials, including life (and you) are made up of matter; matter has properties, structure, and function

Do not trust atoms. They make up everything!!

Lessons so far

1. Types of hazardous materials
2. Evaluating materials for new drink container
3. Life cycle of materials
4. Physical & chemical properties of materials
5. Families of elements

Upcoming lessons

1. Elements & the periodic table
2. Modeling molecules

End of Unit Project - Song, Rap, video on Matter

Unit 2 - Matter and Energy

Big idea: All tasks require energy; energy comes in different types and can move through matter in different ways depending on a variety of factors

Energy and matter are mind-boggling, both are neither created nor destroyed, how is that?

End of Unit Project - Rube Goldberg machine

Unit 3 - Matter, Energy, Force and Motion

Big idea: Different types of force interaction between objects; force requires energy and can affect motion in predictable ways

We are all an energy force, our being at the cellular level is moving energy, channel it wisely - Kathy Sammons <http://www.scribd.com/doc/524135/Brownian-motion-and-diffusion>

Force, motion, and energy <https://suite.io/harvey-craft/624s2a6>

End of Unit Project - Solar -powered cars

Unit 4 - Waves

Big idea: Waves are created when energy interacts with matter. Waves can be helpful or harmful to society

“In 1905, the magnitude of Einstein's departure from the sanctioned belief about light (as a wave) was so unsettling that his particle theory of light was not accepted for two decades “ Richard Harris from <http://www.npr.org/2005/03/17/4538324/albert-einsteins-year-of-miracles-light-theory>

End of Unit Project - Song, rap, video about waves

I believe it’s not so much what our students are not able to do but more of what I, as an educator fail to provide them with enough time and different ways and opportunities to show understanding of concepts that are being presented. For the past two years that I have taught, my training had been to cover as much content, expose students to many science ideas and not to uncover and teach for deeper understanding.

**3C Pedagogy:**

Given my content and goals I believe the “C-SUCCESS” (Create, Simple, Unexpected, Concrete, Credible, Emotional, Stories, Stick) framework will work best.

To introduce the BIG Idea I will have students watch and reflect upon Sir Martin Rees’ TedTalk “Is this our final century?”

Seven-minute version with transcript:

<http://www.ted.com/talks/martin_rees_can_we_prevent_the_end_of_the_world?utm_source=newsletter_weekly_2014-08-30&utm_campaign=newsletter_weekly&utm_medium=email&utm_content=talk_of_the_week_button#t-4419>

Seventeen-minute version (Can be given as homework) <https://www.ted.com/talks/martin_rees_asks_is_this_our_final_century#t-15744>

I’ll use this video to challenge students to think of the idea of being part of a web of interdependent relationships and systems as presented by Rees. Also to think of what their active role might be in the future of our world. Thus the Call of Duty has sounded for both me as an educator and my students, our future citizens and leaders to Urban STrEaMists. (See my Gamification draft)

To be an Urban STrEaMist we need to transform how we teach and learn. Then I will launch the BIG Idea “Web of interdependent relationship” as part of the introduction to the Next Generation Science Standards’ eight (8) Science, Engineering, and Mathematics Practices.

I’ll use the NGSS 101 From S to STEM to STEaM to STrEaM -powerpoint presentation (or if I have time make it into a movie)

https://docs.google.com/a/cps.edu/presentation/d/1lx4lg9i5m8WxKKNw0UFRHhhY\_-Dy9MIv2snJqUXwca4/edit

I opted to STrEaMify our current SEPUP-based Science curriculum because I want my students to use art as one of the ways by which they can showcase their learning and understanding. Research is one of the CCSS writing standards and connects well with students who need to access or has access to, to process, evaluate, and to create new knowledge hopefully as part of their way of expanding their understanding and applying to new situations. STEM education—and particularly research—are so critical to student development of science literacy - Darci Harland. Also, the information revolution and the ubiquity of search engines have rendered having information much less valuable than knowing how to think with information in novel situations (Mansilla and Gardner, 2008).

CCSS Writing Standard: Research to Build and Present Knowledge

W7 - Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration, research, and investigation

W8 - Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation

W9 - Draw *evidence* from literary or informational texts to support analysis, reflection, and research (Apply appropriate CCSS Reading standards to literature and literary nonfiction)

The shift from S to STEM to STrEaM will be presented through [NGSS 101](https://docs.google.com/a/cps.edu/presentation/d/1lx4lg9i5m8WxKKNw0UFRHhhY_-Dy9MIv2snJqUXwca4/edit#slide=id.g3a85417b2_019). This presentation has the embedded Marshmallow “transmitter” challenge which will be used to introduce the 8 science, engineering, and mathematics practices.

I modified the Marshmallow Challenge to the “Marshmallow Transmitter Challenge.” Each team has only the given materials to design and build a free-standing marshmallow communication transmitter. This transmitter will restore their communication outside the region not devastated by the recent “8.0 magnitude” earthquake resulting from the shifting of the infamous San Andreas fault in the west coast. But they only have 10 minutes to transmit signals to the orbiting satellite.

We can also watch and discuss the Marshmallow Challenge TedTalk to help build our class community and strengthen our understanding of our BIG idea.

<http://marshmallowchallenge.com/TED_Talk.html>

We will talk about the webbed CoD: Haines Urban STrEaMists bulletin board outside our classroom (I also plan to add a “Welcome to the Urban STrEaMists Headquarters” to the door). 

As a class in a circle we will create a web made out of white yarn (transparent fishing line would be best but it was too slippery). Each student will throw the yarn to another in the circle as they make connections among each other.

We can watch the [Explain It To Me video](https://vimeo.com/101506816) and a spider spinning a web and waiting for its prey. I can tell a story about how spiders spin webs (like world of wonder) they can tell every time something touched any part of this web or watch Spider Web construction in Slow Motion and normal speed by Michael Bukay at <http://www.youtube.com/watch?v=4Y9K1H6Yn6o>. At another time, we can also watch the more professionally made and mathematically precise changes in perspective by Powers of 10 from the atomic to the universal level (Charles and Ray Eames).

https://www.youtube.com/watch?v=0fKBhvDjuy0

I just saw this video of a Polish pranskter who dressed his dog as a giant tarantula and strategically suspended ‘dismembered limbs of ‘people’ entangled in ‘webs.’ In one scene, the prankster was sprawled on the floor of an elevator with his ‘tarantula’. Two girls were terrified when the elevator door opened to see the ‘body’ and the ‘tarantula’ running towards them. This could be an ‘E’ for emotional and unexpected. I’m not sure if I’ll start with serious or this hilarious/scary video.

<https://www.youtube.com/watch?v=YoB8t0B4jx4>

C- create (a web of fishing line like a spider, maybe before or after watching video)

S- simple yet (connect to the string game with making cat’s cradle)

U- unexpected, (why would my homeroom teacher ask us to make a model of a web, later in the day or the week they will again spin this time their own individual “web”site)

C- concrete and (though not as sticky as a real spider’s web, our web will be concrete)

C- credible (I hope the web works the way I intend it to so I become credible)

E- emotional (I know many people have arachnophobia so making this web and talking about spiders will definitely be emotional for some anyway)

S- stories (I can suspensefully and dramatically tell the story of a(n orb) spider with silk coming from its abdomen to spin a sticky web everyday to lay in wait for the unfortunate soul that touches any part of the web. A spider, with spidey tingly senses like spiderman, who could scamper to its stucked clueless ‘meal’ gift wrap it quickly with more silky thread then bring it over to its home base, a curled leaf, to feast and dine leisurely. Or we can watch another video by ‘Screenshot” that shows the same thing but not as spooky <http://www.youtube.com/watch?v=uf4Ke7Dexgw>.

S- stick (I do hope that the sticky spider web metaphor will help the BIG idea of “Web of interdependent relationships” stick or be sticky because we will revisit it whenever appropriate throughout the school year in whatever context curricular or otherwise.

Throughout the school year, for each concept, I will take time to uncover prior knowledge and/or misconceptions. I already purchased the NSTA set of books on “Uncovering Student Ideas in Science, Physical Science, and Astronomy formative assessments.”

I will also use the “Brain-powered science: Teaching and learning with discrepant events” series to find appropriate discrepant events that will pique students’ curiosity and challenge and engage them in the upcoming lesson. Current events and other world of wonder phenomena will be used to engage students and make them see interdependent relationships ‘everywhere.’

How to make student thinking public is something I would plan for consciously. Students will also maintain an interactive science notebook just like real scientists.

To start the unit on matter, I will take the students outside to the playground and present a Quick fire challenge to identify, name, list as many different types of matter they can observe in 3-minutes. This will also be a pre-assessment or a form of uncovering their current ideas about matter. There’s also a list of items that students need to decide whether it’s matter or not.

**3D Technology:**

I need to collaborate with our Technology teacher in using the computer to set-up and support student portfolios. These portfolios can hold student digital multi-media work (text, videos, podcast, pictures, presentations and other projects), with voice or written annotations, and can be used to share and self-evaluate own work. Students will choose the work that will be published in their own website. I’m hoping my technology teacher will help students in creating their own website.

Computers will also be used for research. I will solicit the help of the technology and library teachers to help students become efficient and wise consumers of information accessed through the internet. Each student will identify their own wondering or questions about any topic that they are interested in.

I will use appropriate iPad apps as well as the Google Productivity Suite especially Google Drive and it’s sharing and comment functions.

The “game” [CoD: Haines Urban STrEaMists](https://docs.google.com/a/cps.edu/document/d/1Xfkx34b2dj_0-Qv5Qx2B9bUdBE3kWsukRCm4NsPG3oY/edit) will also be introduced and applied. See how the online charts and leaderboard (http://igniteducation.com/2014/04/12/xp-calculator-and-leaderboard/) at my [STrEaM site.](https://sites.google.com/site/jchscience/cod-streamists)

<https://sites.google.com/site/jchscience/cod-streamists>

Computers can help access the kind of information and expertise usually acquired through years of experience. They could help novice students learn how to compose a song, set a poem or a limerick to music, make sense of documents or write a computer program. I will try to use computers and appropriate softwares and apps as tools for solving a problem or designing/developing a product..

RESOURCES

At Indiana U., a class on game design has students playing to win

Jill Laster March 23, 2010 <http://chronicle.com/blogs/wiredcampus/at-indiana-u-a-class-on-game-design-has-students-playing-to-win/21981>

The class incorporates other elements found in video games., roll dice to decide presentation schedules or who will answer quiz questions, to add an element of chance to the class. Students “farmed” for errors in their textbooks, similar to the way that some players ‘farm’ for valuable items in games.

DICE 2010: “Design outside the box” Presentation - Jesse Schell February 18, 2010

<http://www.g4tv.com/videos/44277/DICE-2010-Design-Outside-the-Box-Presentation/>

(Predicts our technological future)

Next Generation: Five ways science education will change - Michael Dhar, LiveScience Contributor | October 09, 2013 09:02am ET <http://www.livescience.com/40283-ngss-science-standards-change-education.html>

GAMIFICATION Learn about gamification-Kevin Werback April 5, 2013

<http://gamification21.wordpress.com/>

Gaming can make a better world - Jane McGonigal TED2010.Feb 2010 <http://www.ted.com/talks/jane_mcgonigal_gaming_can_make_a_better_world>

Gaming the Classroom Syllabus - Lee Sheldon Spring 2010

<http://gamingtheclassroom.wordpress.com/syllabus/>

(Multiplayer Game Design Course MMO-massively-multiplayer online games and virtual worlds - description, format, grading procedure, etc.)

Why we play games: Four keys to more emotion without story - Nicole Lazzaro March 8, 2004 <http://xeodesign.com/xeodesign_whyweplaygames.pdf>

(Could be a source for a science fair project on gaming)

MDA: A formal approach to game design and game research - Robin Hunicke, Marc LeBlanc, Robert Zubek

<http://www.cs.northwestern.edu/~hunicke/pubs/MDA.pdf>

Foldit - Solve puzzles for science

<http://fold.it/portal/>

Gamer rewards could boost employee engagement - Liz Tay March 18, 2010

<http://www.itnews.com.au/News/169862,employers-look-to-gaming-to-motivate-staff.aspx> 8.22.2014 (Lee Sheldon replaced traditional grading system with XP (experience points) system used to track progress in role-playing games. Start with avatars at level one (corresponds to zero XP and a grade of ‘F’). Students gain XP by completing ‘quests’, fighting monsters and crafting - giving presentations, quizzes and exams and handing in projects. This lets students feel like they’re earning points instead of losing them for incorrect answers. Like in World of Warcraft, students are grouped into ‘guilds’ and had to complete quests solo, as guilds, or as ‘pick up groups’ with members of other guilds.

Class time is spent completing quests (presentation of games or research), fighting monsters (taking tests or quizzes), and ‘crafting’ writing game-analysis papers and a video-game concept document. The 40-person class is divided into six zones, named after influential game designers, in which students complete group tasks. The gamer generation students were more engaged. They are the social-networking generation, so the class is couched in the terms they understand.

Game design specifics - clearly defining goals for students, providing incremental rewards; and balancing effort and reward

**3A Context:**

I teach at Haines Elementary School in Chinatown Chicago. It has a total enrollment of around 700 students. Our demographics include 85.8% Asian of mostly Chinese Cantonese descent, 10.5% Black, and some Hispanic and Pacific Islander. The English learners are at 28% and those with disabilities at 7%. Low income students are 93% of our school population, while truancy is at 3.8%.

This year I am an 8th-grade homeroom teacher. I will teach science and math to my homeroom of 21 students and to one 6th-grade class of 25 students (each subject for a block of 90 minutes twice a week and 45 minutes on Fridays). The Web of interdependent relationships, a cohesive theme throughout the year, will be STrEaMified, initially during the math and science lessons and eventually during our weekly 45 minutes of RIT/blended learning/special projects on self-selected, teacher-facilitated topics related to real-world problems or issues. I am also in charge of daily 30-minutes of PE in the Classroom, 30 minutes of Advisory, and once a week of 45 minutes of RIT/blended learning/special projects, in addition to listening, speaking, and research.

Our former science lab was converted to a technology lab satellite typically dedicated to Compass learning for the primary to intermediate students. Thus science labs and activities are mostly happening inside my third-floor classroom which does not have a sink. Additionally, we have a technology lab where students go to once a week. Students also have weekly arts, music, library, and gym. We are likewise anticipating 1:1 chromebooks in the very near future in connection with our school’s blended learning grant. Due to an earlier grant, I get to house 8 iPads in my room, one desktop computer, and a cart of old laptops that is shared among other teachers.

Haines had been a Math and Science and then Technology school using CMSI-prescribed curriculum materials.

#### **Program Overview:**

As a MSU-Wipro STEM & Leadership Teaching Fellow, you will set new directions for STEM learning in Chicago by advancing your expertise as a teacher-leader in STEM (Science, Technology, Engineering & Mathematics).

#### **PROGRAM OBJECTIVES**

This program’s goal is to help you grow your leadership skills to facilitate innovative STEM instruction both within classrooms and school-wide. At the end of the year, we hope you will have a toolkit of strategies, ideas, products and practices to enhance the quality of your schools’ STEM instruction by integrating content, pedagogy, and technology in creative ways.

Through integrated face-to-face and online learning experiences, you will develop the capacity to design transformative, innovative, multimodal learning experiences. You will also learn how to create active learning communities of practice – for students as well as for your fellow teachers.

#### **PROGRAM COURSE TOPICS**

The MSU-Wipro STEM & Leadership Teaching Fellowship Program integrates three courses (9 credits):

**CEP 805: Learning Mathematics with Technology (3 credits)**

* This course introduces psychological and disciplinary perspectives on teaching and learning mathematics, with a focus on teacher education and professional development. Teaching and learning mathematics for understanding – with a special focus on urban contexts – will be explored, as well as the role of technology in allowing for multiple representations of mathematical ideas, modeling, and authentic learning environments.

**CEP 806: Learning Science with Technology (3 credits)**

* This course introduces contemporary conceptual perspectives from educational psychology and teacher education on important issues of learning science. It explores possibilities, ideas, and issues associated with teaching science within the urban context, as well as how K-12 teachers use Internet resources (e.g. simulations, databases, communities) to facilitate science learning.

**CEP 815: Technology and Leadership (3 credits)**

* This course introduces professional development strategies for teaching STEM in urban contexts. Project management, planning, and evaluation are explored, as well as relationship building and developing leadership in urban schools and school districts.

This three-course, integrated seminar brings together a study of technology, teaching, learning, and leadership. While the three courses are explained separately, in reality they will be one year-long experience.

That said, we see the emphasis of the summer and fall to be on STEM while the spring will have a greater focus on issues related to leadership, specifically ways to manage your own learning and development in a world of rapid technological change as well as fulfiling the role of technology leaders in your school/district.

Note: There is no set level of technological proficiency that all students are expected to reach by the end of the fellowship. Instead, each of you is expected to take the initiative to seek out opportunities to develop your technology knowledge and skills in ways that allow you to experience significant growth throughout the fellowship program.

#### **OUR PEDAGOGICAL APPROACH**

* **Learning by Design.** Our instructional approach involves real world, hands-on engagement with tools, pedagogies and their relationship to core constructs in the STEM disciplines. In this we are driven by our cutting-edge research on the internationally recognized TPACK (Technology Pedagogical Content Knowledge) framework.
* **Deeply connected to classroom practice and standards.** Our approach is driven by the needs of real teachers as they wrestle with problems of practice. In this we focus both on powerful big ideas even while keeping state and national standards (such as Common Core standards) in focus.
* **Multiple levels of conceptual integration across modes of delivery.** We have extensive experience in designing both face-to-face, hybrid and online courses. We seek to find the appropriate balance between these different modes of interaction for maximal support for the broader pedagogical goals of teacher professional development.
* **Innovative use of technology.** Our program is not about the latest and greatest tools but rather aims to help teachers thoughtfully repurpose existing tools at their disposal to meet student-learning goals. We seek technology integration in STEM pedagogy as being a developmental trajectory that goes from Replacement to Amplification to Transformation.
* **Development of learning communities.** Our teacher learning professional communities extend well beyond the time spent in specific programs or courses. These affinity groups span across the world and all participants in our programs automatically become part of this larger community and can avail of the collective expertise of the group.

#### **MAJOR ASSIGNMENTS**

There are 5 major assignments this summer which are explained on separate pages on this website.

* Roots of STEM e-book
* iImages
* zFrank video for a 5th grader
* DreamIT project
* Reflection paper

#### **EVALUATION PHILOSOPHY**

Students who enter the MSU-Wipro STEM & Leadership Teaching Fellowship Program bring a vast and powerful array of expertise to our learning community. Each of you is expert in many things. However, we know that many students enroll in these courses because they don’t feel especially expert in technology integration just yet. You may be taking this course because you want to develop foundational technology skills. Rest assured — this is the program for you. Alternatively, you may already feel quite proficient with a wide range of technologies, but are involved in this program to develop your tech skills even further. Rest assured, this is also the course for you. ***As adult learners, we are most interested in your growth — and you will be evaluated on the basis of how far you go, not on the basis of where you started.*** This doesn’t mean that different standards apply to different students. On the contrary. We hold each MSU-Wipro STEM & Leadership Teaching Fellow to a very high standard of academic and professional excellence. We expect each of you to push your limits — whatever those limits are — and to contribute your own, unique learning experiences and perspectives to our learning community. We expect each of you to write well, and in accordance with the elements of style outlined in the APA manual. We expect each of you to meet deadlines. We expect each of you to ask good questions. We expect each of you to seek out answers by leveraging all of the resources at your disposal. We expect each of you to adhere to professional standards of academic integrity, to respect the work of your peers and to offer thoughtful, constructive suggestions that sharpen our collective understanding and focus.

#### **GRADING STANDARDS**

Assigning grades is not an easy task and we want to be fair to each and every one of you (both individually and collectively) in our grading. We understand that each of you came into the program with different skill levels with respect to technology and that we cannot expect the same kind of work from each of you. We factor in where each of you have started from and where you are today in our grading. Important details to remember for all assignment submissions:

* All work should be spell-checked, grammar-checked, proofread for clarity, organization and adherence to the elements of style outlined in the APA manual (see Chapters 3 and 4, pp. 61-124) BEFORE submission.
* Meeting the minimum requirements outlined by a rubric will not guarantee full points on any assignment. Full points are earned by those who go above and beyond the minimum requirements.
* Allowing for the resubmission of assignments for improvement of evaluation grade is at the instructor’s discretion.
* Grades and feedback on assignments will be provided in your MePage and Feedback Notebook. You may use the comment function in Google Docs, as this notebook will be an ongoing conversation.
* ALL online assignments are due on the date specified by 11:59 PM Central Standard Time UNLESS otherwise specified in the assignment directions.

#### **Social Media Presence/Publicly Sharing Work**

Social Media Requirements

* Online web portfolio
* Facebook Account and participation in the private Facebook created for the MSU-Urban STEM & Leadership Program
* Twitter Account
* Account to create and access Google Drive files
* YouTube or Vimeo Account

MSU-Wipro STEM & Leadership Teaching Fellowship Program requires students to create work and share work publicly on the web. Sometimes, this work will be in draft form. Sometimes this work will be openly reviewed by peers who will provide thoughtful and respectful feedback. Usually, work will be hosted on students’ blogs. Often, we ask students to share links to their work with their professional learning network via Twitter.

We ask students to engage in this type of public activity for several reasons germane to our philosophy. Sharing work in draft form with others instills a design mindset; showcasing professional learning on the web highlights skill development for multiple stakeholders in the student’s professional learning network; using multiple technologies to explore, create, and share work helps students to develop advanced skills and dispositions for technology integration in learning contexts. Participation in these activities is essential. Managing your online presence and identity, however, is an important part of this process.

As an MSU-Wipro STEM & Leadership Teaching Fellow it is important to consider the online identity that you create for yourself. To participate in our learning community, your work has to be publicly visible. However, you are encouraged to think carefully about the degree to which you want your work to be identifiable as your own. Many students create Twitter handles and URLs for their blogs that include their real names. [e.g., @canmarcotte or canmarcotte.com] Others choose to create an online persona for their work because it makes more sense for them [e.g., @techsavvyteacher or techsavvyteacher.wordpress.com]. This option is a way to remain anonymous to the world, but to also participate actively in your courses. Many students create accounts for third-party tech tools using an email address that is separate from their work email address. Many students keep personal information out of their blog posts. If you teach students, please think about the extent to which you make their identities public through your own choices around online identity too.

All fellows should think critically about the personal/private boundaries that they need to establish, and make choices accordingly. You can choose anonymity.

Should you opt for a more private option for your online identity, the only place where your identity and online addresses will be linked is on the program website, where all of your projects will be linked to you. We expect all students to be respectful of one another.

Importantly, all instructor feedback is given to students privately. Constructive suggestions, grades, and all other communications are conducted in a private Feedback Notebook, via Email and in Desire2Learn’s grade book.

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