Carl Snell Nov. 28, 2014

**Preliminary Problem Statement**

Rather than verbally explain & give notes on aviation concepts who struggle with reading, I have my students undertake a problem based learning unit. The NASA [Future Flight Design Challenge](http://futureflight.arc.nasa.gov/design.html) provides tons of visuals in context, allows my students to work hands on as teams, stimulates creative problem solving & reasoning skills while also drawing on artistic, mathematical, history, scientific knowledge & skills previously acquired. It is outlined in the letter below:

 **Learning Plan**

**Part 1: Rationale**

As I had hoped, I am not only gaining insight into presenting STEM as observable behavior thru hands-on, real world problem solving but also just how to best implement the educational technology often required to present, manage, & engage in STEM content. My students are mostly ELLs, many of whom are also special ed. They are multitalented, gifted story tellers who need assistance communicating their ideas via traditional formats using the English language and academic vocabulary.

I have been working Vygotsky’s Zone of Proximal Development and differentiated instruction strategies to introduce students to the scientific method and hands on lab activities. I am hoping to provide organization and structure to new content introducing engineering concepts. Now I need to have them write more in terms of expressing their understanding and problem solving. This unit developed by NASA is designed to do just that while having students work thru the engineering design process in order to design an aircraft to meet a real world need.

My expectation is to initiate a teaching stratagem that will:

* Enhance Latino & African American student motivation to

persist on trajectory toward college

* Develop the problem solving, critical thinking, & creative/

decision making abilities required for Leadership

* Expose, Engage, & Immerse Latino & African American

children in the engineering design process

* Produce STEM Professionals who routinely combine artistry/

storytelling with logical/analytical thinking in order to make

dynamic new concepts/goods

**Part 2: Procedures and Materials**

Future Flight Design is a web-based interactive, problem-based learning environment where students in grades 5–8 learn about forces of fl ight and design air transportation and aircraft systems of the future. Biographies highlight careers in aeronautics and aerospace engineering.

Future Flight Design uses aeronautics and aviation content, problem-based learning, the engineering design process, and critical thinking skills to increase awareness of NASA careers and to educate students in grades 5-8 on the design of capacity solutions for a future air transportation system.

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| **Activation Strategy (10 minutes) – UDL Principle # 2 - Providing Multiple Means of Action / Expression** Future Flight Design is composed of two problems: Air Transportation PBL and Aircraft Design Problem. Students will watch the Introduction Movie and do a KWL chart on aviation basics. It presents the overall problem of increasing airport delays due to a growing demand on the current system. This movie provides the overall purpose and motivation for the two problems. Each problem includes an Educator Guide, Student Log, and online resources. The Air Transportation PBL includes numerous movie clips and online articles to assist students in researching solutions to the problem. The Aircraft Design Problem includes interactive multimedia activities in which students simulate the design and testing of a new aircraft while exploring instructional animations in the online labs to better understand the results of their design choices. Occasional live, online challenges on NASA Quest will allow students the opportunity to connect with and receive feedback from NASA engineers working on the same problems. |
| **Teaching (15 minutes)** Preparation• Prepare a class set of Student Design Logs.• Download and install Flash Player 6 (or higher) plug-ins on computers. Test these at http://futurefl ight.arc.nasa.gov/welcome.html by clicking the link to the Introduction Movie. • Prepare large area for the Aircraft Design Conference on the last day where students can either post their posters or give their presentations. | **Supports – UDL Principle # 1 – Providing Multiple Means of Representation** * If students are having trouble understanding any part of the engineering design process, they will be able to watch an online clip to explain.
* Students will be provided with an electronic copy and a paper copy to complete assignment

**3 – Multiple Means of Engagement*** Students will be provided a color copy of the student log to help them break each situational problem down into smaller, more manageable tasksl.
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| **Summarization Activity (15 minutes) –** In the Aircraft Design Problem, students select roles and a situation, and they follow the engineering design process to design an aircraft that fi ts their situation. This engineering design process is as follows:Step 1: Define The ProblemStep 2: Generate IdeasStep 3: Select a SolutionStep 4: Test and Refine the SolutionStep 5: Present the ResultsFuture Flight Design - MultiMedia Interaction http://futurefl ight.arc.nasa.gov EG-2004-10-302-ARCMultiMedia InteractionAircraft Design ProblemAs they go through this process making use of online interactive multimedia activities, they learn about forces and motion, systems, and engineering concepts such as criteria, constraints, and trade-offs. They also gain an awareness of numerous science, engineering, and technology careers. The problem concludes with students presenting their solutions and summaries of their learning at an Aircraft Design Conference. **(Principle # 1 - Multiple Means of Representation and Principle # 3 – Multiple Means of Engagement**) |
| **Materials -** • A class set of Aircraft Design Problem Student Design Logs• 1 computer per group with Internet connection, Internet browser, and Flash plug-in installed\*• A printer connected to the computers• A computer with Internet connection, Internet browser connected to a projector, or television (optional)• Paper for paper airplane construction (optional)• 5 paperclips per group (optional)• 1 toothpick (broken into halves) for each group (optional)• Poster paper or computers with presentation software for each group |