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Process Paper for Capstone 2013

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For the senior year capstone myself as well as two other seniors (Allen Yang and Matthew Ginnetti) decided to teach an astronomy mini-course to the freshmen of Science Leadership Academy at the Franklin Institute. We taught two courses that were divided into three weeks. Each week one of us taught different concepts of astronomy, specifically focusing on the science behind exobiology. The lesson plans were generally developed in the same way, where one of us gave a 20-minute to 30-minute presentation, followed by a video (or the students reading an article) and then finished with an activity. After the activity, students were asked to present any new findings or challenges they came across while doing the activity. For example, in my specific course students were asked to design a probe that would be orbiting a planet in the star system Alpha Centauri. Alpha Centauri is a binary star system, which means two stars orbit each other. One challenge a group of students came across is being able to orbit a planet in the Alpha Centauri star system. Overall the cooperation of the students was great and most students were very engaged.

Allen, Ginnetti, and I all chose to do the capstone for different reasons but we all are apart of a group called, Project S.P.A.C.E at the Franklin Institute. Our mentor and supervisor at the Franklin, Derrick Pitts, suggested we do a topic in astronomy that would get the students excited. Astrobiology was the best way to gain a deep interest rooted with the students. Each lesson was about different topics that were

covered in Astrobiology: Exoplanets, Astronautical Engineering, and Exobiology. At the Franklin Institute we as Project S.P.A.C.E focus on a lot of different topics besides general astronomy, and personally I thought it would be awesome to get other students at Science Leadership Academy (particularly freshmen) excited about Astronomy.

Many different aspects of the Astronomy mini-course capstone address the SLA core values. Inquiry and research are the sole basis of the mini-course because the lesson plans developed required students to think about different problems and use outside resources (mainly the internet) in order to come with new solutions to the problems they thought of. For each lesson the students were split in to two different groups. One group always focused on one distinct problem and the other group focused on a similar problem with a different astronomical topic. The ending activity of each class would be the students collaborating in two different groups to reach the same goal. After the ending activity of each lesson the students would then present their solutions/ideas in two different groups to the entire class. We made an end of the year survey so that we can get a response from the students how much they enjoyed the course.

The main thing that the three of us did in order to complete this capstone was to compile all of the data and facts we were using in order to present to the freshmen. There are many advances that have been made in the field of Astrobiology, which we could use in our lesson plans. For example, several clips of

different documentaries on exoplanets and exobiology were shown in order to visually present to the students some of the scientific concepts they were learning.

The only obstacles we were presented with during the process of making the lesson plans were meeting with our mentor Derrick Pitts, and using our time properly at the Franklin Institute. Dr. Pitts is generally a very busy man and it was hard for us to schedule meetings with him. He was able to attend a few courses however, and provide feedback for each of us teaching the course at the time. History Channel, the Discovery Channel, and Dr. Pitts were great resources of information during the development of our lesson plans.

The proudest aspect of this capstone was the fact that the students actually got something from participating in our course. We tried to stress the fact that education in astronomy can be used not only for space science, but it can also be used to inspire students to pursue many other interest in the STEM fields. Our topics covered ranged from geology to engineering and many students wanted to concentrate in fields other than astronomy. This made me very proud to see that some of the students could see how astronomy can cultivate and help develop their interest and skills in other sciences.

Personally, I learned that is much easier to develop lesson plans centered around one topic instead of trying to make something that covers several topics in one lesson. This is why we taught the classes in the way that we did; one course was comprised of three weeks, each week with a different topic. Astrobiology was much easier to teach over the course of three weeks rather than all in one class. I also

learned how to develop a lesson plan that leads into the next topic. For example, I taught the first lesson, which was on Exoplanets. My activity was essentially to have the students design a probe that would be design two different exoplanets. After the activity the students were aware that their next lesson (which was taught by Matthew Ginnetti) would be on how to get the probe to the exoplanet, through astronautical engineering.

There are not too many things I would do differently with this capstone, as I thought my cohorts and I did a great job. The Franklin Institute is actually thinking about implementing the idea of our capstone as a permanent establishment at the institute. This really signified accomplishment for myself, because I think it would be great to have seniors at Science Leadership Academy teach freshmen and help them explore their interest early. Not many other schools are afforded the opportunity to be able to have collaboration between grades.

I believe that the overall environment of Science Leadership Academy is a better place because of students like Matthew, Allen, and I. We take the opportunities that are offered to us and capitalize on them. We also provide assistance to the other students at Science Leadership Academy who show similar interest in what we want to do. This type of relationship with different students in different classes provides a safer environment in regards to learning and cultivating a student's interest. Overall this capstone has been a definite success with much learning along the way.