Title of project: The Scope of the Solar System

Courses and/or discipline related to your project: PHS 107, Introduction to Astronomy

In which semester do you plan to implement the project? Fall 2018

Tickets from Student Activities @ $7.00 per student ticket X 96 students, (24 students per section, 2 sections per Fall 2018 semester and Spring 2019 semester). $672.00

Tickets from Student Activities @ $12.00 per ticket for the Instructor to view all possible shows beforehand, (6 visits for both Fall 2018 semester and Spring 2019 semester). $72.00

Students  672.00
Instructor   72.00

Total           $ 744.00

1) What is the learning gap? What evidence did you collect to identify the learning gap in the classroom? How did you collect the initial data – was it formative or summative? Direct or indirect? (Direct is preferred.)

Introductory Astronomy often presents students with material that is novel and complicated. The material is on a large scale and presents macroscopic details about our world. There are no prerequisites for this class and it is the first science class for many of the students. Some of the complex ideas to comprehend are the movement, the enormous size, and the spatial relationships of the of the Solar System and the Universe. In the Learning Outcomes, the student will be able to “Explain phenomena that can be observed in day and night sky such as solar eclipses, the phases of the moon, the rising/setting of stars.” Students struggle with many of these concepts. My evidence to identify the learning gap is Formative Data Assessment tutorial lessons done in the classroom after a lecture and homework questions about the lectures. The students struggle with the tutorials and applying the concepts to the questions. Many of the students do not complete all the homework questions because they have difficulties with the concepts and analyzing the material. This applies to the general education goal, Scientific and Quantitative Reasoning, “Apply appropriate scientific or mathematical reasoning concepts and theories to interpret data and solve problems based on verifiable evidence”. The second general educational goal this will help students meet is the Information Literacy goal. “Acquire, analyze, organize, and evaluate information through technological and traditional means”.

Rubric - One point for each component in answer:
- Learning gap is compelling (important topic or significant numbers).
- Learning gap is clearly tied to course outcomes, program objectives, and/or general education goals.
- Answer uses assessment language (formative/summative, direct and indirect) correctly.
- Multiple measures are collected.
- Initial data appears validated, rigorous, and quantitative.
2) How do you propose to address the learning gap? Describe your innovation and planned activities.

To address the learning gap, I propose that each student visits the Carnegie Science Center once during the 16 week semester. The Carnegie Science Center has the Henry J. Buhl Planetarium and is located nearby the campus. The planetarium is a large, dome shaped theater built specifically to allow the realistic movement of celestial objects. The planetarium has a very generous schedule of astronomy-based planetarium shows. Some of the titles of the lectures are, “Beginners Guide to the Universe, Solar Quest Live, Cosmic Collisions”. The students will have a variety of shows to choose from with subjects that address the Learning Outcomes. These subjects include celestial patterns, gravity, the Solar System, and Stars and Galaxies. The student will also have access to the exhibits in the center that include a real, huge meteor, a space craft mock-up and other science related subjects. The students can choose one lecture that will fit into their schedule. The instructor will go to each one of these lecture/shows available and make up a packet of questions that need to be answered before the semester begins. The students will have until the thirteenth week of the semester to complete the assignment.

Another resource at the Carnegie Science Center are the Sky Watch Programs. Visitors are invited to come to Sky Watch at the Henry Buhl, Jr. Planetarium & Observatory and get up-close and personal with amazing celestial objects. Sky Watch happens rain or shine. The evening begins with a virtual tour of the night sky in Buhl Planetarium. Afterward, visitors are welcome to enjoy additional planetarium programs, and if the skies are clear, head up to our observatory! Spot Saturn's rings or details on the lunar surface through our 16-inch Meade LX200 Schmidt-Cassegrain telescope, and chat with our team of expert stargazers. On evenings that SkyWatch is presented, we offer the program twice. Come early, or come late, as your schedule permits. If you are you an astronomy expert? Bring your own (fully assembled) telescope to share with others and visit SkyWatch for free! The cost is $4 for non-members / $2 for members and as an add-on to general admission.

This is a valuable astronomy resource that I feel would enhance the learning of this class. I feel it will add a kinesthetic element to the classroom learning.

Rubric - One point for each component in answer:
- Proposal is innovative
- Proposal is well defended
- Proposal shows promise
- Activities are feasible
- Activities are compelling

3) How many and which students would be impacted by your proposed change?

The students in all the sections that are taught on the Allegheny Campus would be eligible for this enhancement.

Rubric - Evaluators will award points from 1-5 where 1 affects students in one class, 3 affects all sections on one campus and 5 affects all students College-wide.
4) How will you determine student learning was improved? Describe the ways you will collect data, decide whether the results are valid, and measure success.

Direct and Summative Measures: Student learning will be evaluated by embedded questions in the planetarium packet designed by the instructor. These questions will be in all the packets regardless of the planetarium show the student has chosen. The same questions will be given during lecture tutorial worksheets done in class. The same questions will then be included in the end of topic test. The amount of correct answers will be evaluated from each method of learning. The target success rate is 90% in correct answers on the planetarium worksheets, tutorials, and test questions. I will collect the data from all three answer sets and compare them. I would evaluate if there were a higher percentage of correct answers after the planetarium visits.

Indirect Measures: I will conduct an end of semester survey that will ask the students about the effectiveness of the visit to the Carnegie Science Center. I will use both semesters data and the student opinion of the assignment to make the decision to continue this assignment for the Introductory Astronomy class.

Rubric - One point for each component in answer:
- Student learning data will be collected in a timely and/or efficient way.
- Data will be collected in at least one direct, quantitative way.
- Data will be collected in multiple ways, which can be direct, indirect, quantitative, qualitative, formative, or summative.
- Data will be analyzed or reflected upon.
- A target success rate is identified (such as “5% improvement in success” or “80% or more students will achieve a passing grade.”)

5) How do you plan to report back your findings, regardless of whether the innovation worked? (This can be through department/discipline meetings, professional development presentations and conferences, writing it up for newsletters, program reviews, and/or presenting to the Assessment and Research Subcommittee – describe at least two ways you will communicate your findings.)

This data can be reported to several different bodies. It can be presented at department/discipline meetings, annual/program reviews, and to the Assessment and Research Subcommittee. I feel this can become part of the Resource Material listed on the course syllabus for the Allegheny Campus.

1 point for putting results in Improve
1 point for presenting at department/discipline meetings
1 point for writing it up in a newsletter
2 points for teaching a professional development or at a conference
2 points for putting it in annual/program reviews
2 points for presenting to the Assessment and Research Subcommittee