January 2015 AAS Conference, Seattle WA

LASSI

Launching Astronomy: Standards and STEM Integration

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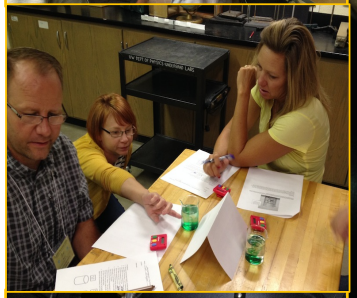
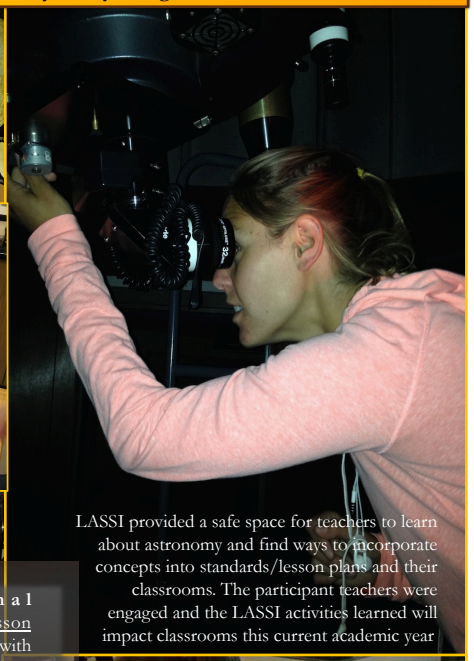
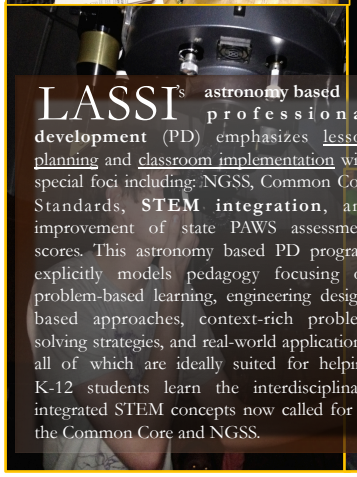






LASSI's **astronomy based professional development** (PD) emphasizes lesson planning and classroom implementation with special foci including: NGSS, Common Core Standards, **STEM integration**, and improvement of state PAWS assessment scores. This astronomy based PD program explicitly models pedagogy focusing on problem-based learning, engineering design-based approaches, context-rich problem solving strategies, and real-world applications, all of which are ideally suited for helping K-12 students learn the interdisciplinary integrated STEM concepts now called for in the Common Core and NGSS.

LASSI provided a safe space for teachers to learn about astronomy and find ways to incorporate concepts into standards/lesson plans and their classrooms. The participant teachers were engaged and the LASSI activities learned will impact classrooms this current academic year

ABSTRACT

While astronomy is prevalent in the Next Generation Science Standards, it is often relegated to the "4th nine-weeks" in middle and high school curricula. I.e., it is taught at the end of the year, if time permits. However, astronomy ties in many core ideas from chemistry, earth science, physics, and even biology (with astrobiology being an up-and-coming specialization) and mathematics. Using astronomy as a vehicle to teach science, technology, engineering, and mathematics (STEM) connects these disciplines in an engaging way. The workshop entitled, "Launching Astronomy: Standards and STEM Integration," (LASSI) is a year-long professional development (PD) opportunity for teachers in grades K-12 to use astronomy as a vehicle to teach STEM and implement science standards through astronomy. We evaluate the effectiveness of the LASSI PD to identify and confront teachers' misconceptions in astronomy, and discuss whether teachers identified topics for which astronomy can be used as a vehicle for standards-based STEM curricula. Participating teachers were surveyed on the quality of the workshop, their astronomy content knowledge before and after listening to talks given by experts in the field, conducting standards-based inquiry activities, developing their own lessons, and their level of engagement throughout the workshop. Two-thirds of teachers planned to incorporate LASSI activities into their classrooms in this school year. Teachers' misconceptions and requests for astronomy-based curriculum were identified in the summer session. These will be addressed during the follow-up session. Ninety percent of teachers reported being highly engaged at least 75% of the time. The majority of teachers also anticipated using activities from LASSI in their classrooms.

ASTRONOMY &

- **S** — Light & Spectra, Thermodynamics, Galaxies, Dark Matter, Expansion Velocity, Cosmology.
- **T** — Zooniverse, Khan Academy/Programming, Algorithms & Optimization & Core Content.
- **E** — Robotics, telescope/camera design.
- **M** — Kepler's Law, Sundials, Scale, Spherical Surface Area Math Manipulatives (C-rods and P-blocks), Ranking Tasks.

DESCRIPTION

In partnership with the University of Wyoming are Albany County and Goshen County schools. The project entitled **"***Launching Astronomy: Standards and STEM Integration***"** or **"***LASSI***"** provides 128 hours (16 days @ 8 hours a day - 10 summer days and 6 academic-year days) of yearly professional development (PD) to the high need Albany County #1 and Goshen County #1. Teachers from public and private schools in the area were invited to participate in the summer of 2014.

PARTICIPANTS

The two week summer session was attended by 8 teachers in Wyoming. Six follow-up sessions are scheduled for the teachers. More teachers are being recruited, and invitations are being extended to other districts and teachers desiring to integrate astronomy STEM concepts into their classrooms.

FINDINGS

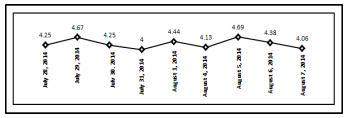
The 2014 summer of professional development workshops met the professional development needs and interests of participating teachers at a high level with mean ratings of the quality of each workshop 4.0 or higher on a scale from 1 to 5 (5 high). Ninety percent of the participants reported being highly engaged in the workshop sessions at least 75% of the time.

The most highly rated events were those that were inquiry-based and that involved participants in hands-on activities. Time spent collaborating on lesson planning was always rated very useful. Teachers wanted to develop lessons in astronomy that they could take back to their classrooms. Workshop activities that included food were popular because teachers reported that their students like these kinds of activities.

Nearly two-thirds (64%) of the teachers reported that they anticipated that what they learned in the workshop sessions would impact their teaching in their own classrooms in 2014-15.

Formative assessment was used to inform future meetings with participating teachers. Teachers had very few astronomy misconceptions after the summer workshops. Six follow-up days are planned for October 2014, February 2015, and March 2015. Misconceptions of the teachers will be addressed.

Workshop Participants' Mean Ratings of Daily Workshop Quality (1= Low to 5= High)



The grant pictures and activities can be viewed on this website
http://physics.uwyo.edu/~aschwortz/LASSI
http://bit.ly/lassiPD2014

UNIVERSITY OF WYOMING

APR ID - #140202

MSP Project Name - **Launching Astronomy: Standards and STEM Integration (LASSI)**
MSP Project Director Name – **Dr. Andrea C. Burrows**

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School Level Addressed – Elementary and Secondary School
Subject Area Addressed - STEM