Large Synoptic Survey Telescope

www.lsst.org

LSST: Education and Public Outreach

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In this poster, we describe the LSST Education and Public Outreach (EPO) program structure and how it will be used to promote classroom research projects, deliver an ongoing program of Citizen Science, and facilitate unprecedented visualization possibilities. LSST EPO programs are being developed that will actively engage a broad audience in many venues. We are emphasizing Internet-based activities to reach larger numbers of users, with additional face-to-face elements that enhance both classroom learning and informal learning experiences. The LSST project will provide cyber infrastructure and web-based data access tools to enable student and public participation in the process of scientific discovery. In collaboration with the LSST Data Management group, an EPO database is being designed to accommodate anticipated user load and deliver required data products. These tools and products and their use in the prototype project *Light Curve Zoo* will be described.

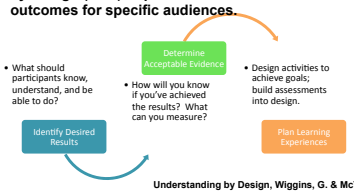
Since 2005, many institutions and programs have contributed ideas to the LSST EPO Plan, acting as a Science Collaboration team for Outreach:

AAVSO, Adler Planetarium, American Museum of Natural History, BNL, SLAC, California Academy of Sciences, Galaxy Zoo, George Mason University, Hands On Universe, National Virtual Observatory, NOAO, QuarkNet, Sloan Digital Sky Survey, and the University of Arizona.

These individuals serve on the Outreach Advisory Board, representing a particular end-user group or area of expertise:

***Tim Spuck**, Oil City High School; **Carol Christian**, STScI; **Kirk Borne**, GMU; **Julia Olsen**, Southern Arizona Science and Math Internship Center, UA; **Martin Radcliffe**, Sky-Skan, Inc. / Wichita State; **Arne Henden**, Director, AAVSO; **Lucy Fortson**, Adler Planetarium; **Jordan Raddick**, SDSS; **Gordon Squires**, IPAC; **Ed Prather / Gina Brissenden**, UA; **Andy Puckett**, University of Alaska; **Scott Bronson**, BNL Education Office.*

During Design & Development, we have adopted the formal process of Understanding by Design (UbD) to plan cohesive educational outcomes for specific audiences.



Understanding by Design, Wiggins, G. & McTighe, J. (2005).

Goals of the EPO Program

Increase public awareness and support of scientific research.
Strengthen STEM education at every level – pre college through lifelong learners.
Contribute to knowledge and skills for the 21st century workforce.
Share the science and discoveries of LSST with a diverse audience.

Techniques: Visualization • Utilization of real data • Active engagement

Primary Components:
A dynamic, immersive public web presence featuring LSST discoveries.
A physical presence in classrooms and science centers.
An emphasis on Citizen Science – participation in the research process

EPO Center (EPOC) database will provide specialized data access and services for outreach applications.

User Group	Access Frequency	Data Products Needed	EPO Deliverables
Power Users at Informal Science Centers	6-12 per week	Annual download of deep sky image; filtered alerts catalog and associated image cutouts.	EPOC, specialized interface for access, Museum Alliance. Kiosks, replicated and extendable.
Research Participants (on-line and classroom)	400 per day	Catalog data and image cutouts. Estimated 10-100 image cutouts per session.	EPOC, web-based instructional materials for participants, on-line professional development course, software tools.
Citizen Scientists	250,000 per project. 8000 clicks/hour	One image cutout or light curve per query. One database read and one write per query to write results back to database.	EPOC, specialized interface for access, software tools. Citizen Science dominates anticipated user load on EPOC.
General Public	10,000,000 just browsing, served elsewhere (e.g., Google or WWT)	LSST@HOME users will access data as described for research participants.	Web-based immersive delivery of dynamic multi-media content related to LSST discoveries.

Public Involvement Adds Value

Public involvement is encouraged and even *required* to maximize science output of LSST database.

By welcoming educators, students, and amateur astronomers to the LSST database, the doors will be opened wide to all. "And why not open the doors wide? It's hard to imagine that this data will ever get used up – that all the good discoveries will one day be wrung out of it – so the more minds working away at it, the better."

Becker, K., 2009, Old Data, Fresh Eyes. www.dailycamera.com 2/13/09

Several Projects are being Prototyped Now

For Undergraduate Students & Faculty:

Faculty and Student Teams (FaST)

Two interfaces for public involvement:

Aggregates and synthesizes information to report What's New in the Universe

Google Sky / WWT with DLS data
► Publicly editable astronomy wiki

For follow-up observers:

iPhone Transient App
In beta-test now with amateur astronomers
Citizen Scientists

Prototype Citizen Science Project "Light Curve Zoo"

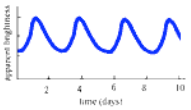
will begin soon

In collaboration with the Galaxy Zoo team at the University of Oxford, the AAVSO, and LSST Science Collaboration Members, LSST EPO will prototype a project involving Citizen Scientists classifying objects that vary in brightness during our Final Design Phase. We will design, build, and deploy a working project for evaluation within the Zooniverse framework.

We plan to work with precursor data such as the (IVOA-compliant) MACHO dataset.

This effort will add a new capability to the Zooniverse suite of projects by opening the time domain. We will apply the UbD methodology to "Light Curve Zoo" and define learning goals for participants, including classroom learners, along with assessment techniques.

Citizen Science is a integral component of the overall LSST EPO program; it dominates the anticipated user load on the EPO database. Citizen Science allows us to actively engage a large and broad community in the excitement of discovery and pathways to lifelong learning.



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