Skynet Junior Scholars - From Idea to Enactment

Tales from the Trenches III: Implementing SJS in Out-of-School Time Settings

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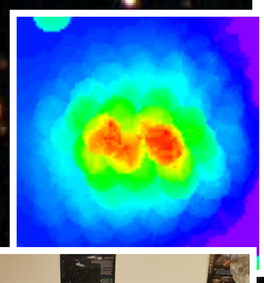
Abstract:
The creators of Skynet Junior Scholars (SJS) were ambitious to say the least when they set out to:

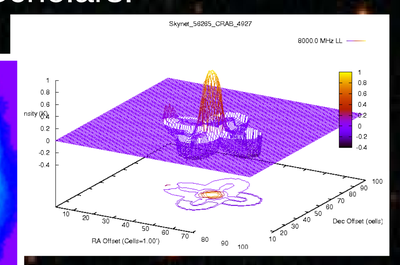
- Develop online tools that enable middle school and high school aged youth to use robotic optical and radio telescopes to do astronomy;
- Create an inquiry-based curriculum that promotes critical thinking and scientific habits of mind;
- Proactively incorporate Principles of Universal Design in all SJS development tasks to ensure access by blind/low vision and deaf/hard of hearing youth;
- Prepare adult youth leaders including 4-H leaders, museum educators, amateur astronomers and teachers to facilitate SJS activities in a variety of settings.

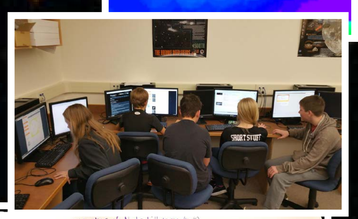
Adult leaders implementing Skynet Junior Scholars with youth believe SJS exemplifies learning opportunities of the future, where remote tools and resources complement project-based inquiry science.

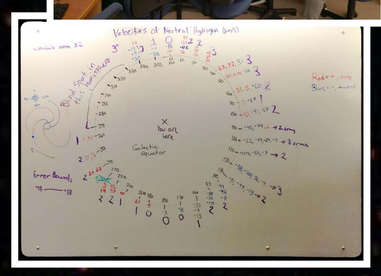
Keys to Implementation:

- Introduce Skynet telescopes and Skynet Junior Scholars web portal.
- Introduce Scholars to the Electromagnetic Spectrum through images and videos.
- Build foundational knowledge using hands-on activities to demonstrate differences in telescopes, filters, field of view, and how CCDs work.
- Develop scientific habits in Scholars through online Explorations.
- Encourage Scholars to work collaboratively and utilize each other's data to learn together.
- Share common issues which all Scholars face, e.g. bad weather at telescope sites, blooming, cosmic rays, ghosting.
- Conduct workshops on image analysis to better understand photometry and aligning images.
- Scaffold independence with observation challenges provided by the leader.
- Emphasize self-guided learning supported by SJS leaders and fellow Scholars.









Success Stories:

- "While most Scholars focused on optical observations, one Scholar learned how to make radio observations on his own. He then shared his *tricks of the trade* with his fellow Scholars, and a collaborative project followed."
- "Radio Spectroscopy of the Milky Way - It was a perfect example of how science is done. Scholars learned the principles of spectroscopy, developed a plan, collected the data, analyzed the data, and drew conclusions based on their results. There were so many cool "a-ha" moments along the way."
- "Hmm… Objects' position angle changed… Why? Scholars explore why they have trouble with an RGB image because images won't align."
- "Scholars engage in a scientific process not commonly available within our communities. Their discoveries are shared with peers, community leaders and organizations. We are at the beginning stages of astronomical knowledge and it is very exciting! We have a whole universe ahead of us!!"

Thoughts about Engagement When Grades Don't Matter:

- Skynet Junior Scholars provides a 21st century platform for enhanced learning by highly motivated students.
- More students can be recruited than may stay engaged. SJS helps Scholars explore and expand their interest in astronomy and space science. Scholars try things and then can choose their own engagement level.
- Leaders' prior content knowledge is not a limiting factor when leaders and Scholars are comfortable learning together.
- Engagement is sustained by questions and challenges presented by leaders.
- Scholars are encouraged to explore other Scholars' work to model the real world of scientific research.
- Middle school students are busy and still learning about time management. Sometimes, they hesitate to commit to free choice learning opportunities.

SJS is a partnership between

THE UNIVERSITY OF CHICAGO · NRAO · ASTRONOMICAL SOCIETY OF THE PACIFIC · THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL · 4-H · NSF

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