

Project Summary: Real Girls doing Real Science

The third season of the national PBS series, *SciGirls*, is the first national children's television series and website designed to engage and educate millions of children about citizen science. In each half-hour episode, a female mentor guides a group of ethnically diverse middle school girls as they learn about citizen science protocols and collect and share data for an established citizen science project. In addition to the videos, the *SciGirls* website presents two interactive games that link the video episodes with citizen science field experience.

SciGirls Season Three Episode Projects

Celebrate Urban Birds is a year-round project developed by the Cornell Lab of Ornithology to reach diverse urban audiences who do not already participate in scientific investigations and to collect high-quality data from participants that will provide the lab with valuable knowledge about urban birds.

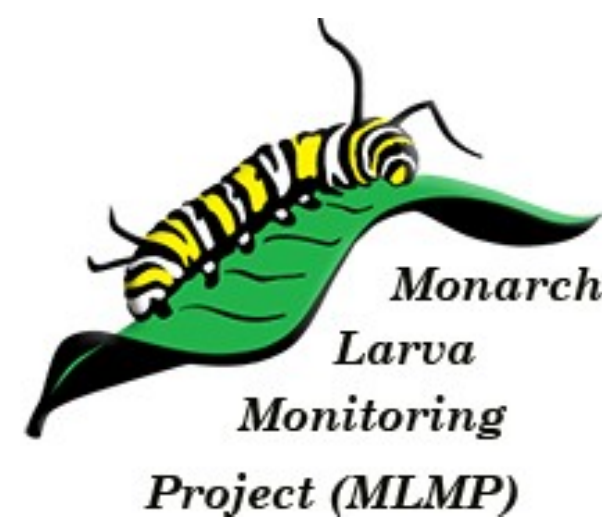


FrogWatch USA is a citizen science program of the Association of Zoos and Aquariums that invites individuals and families to learn about wetlands in their communities and help conserve amphibians by reporting the calls of local frogs and toads.

Nature's Notebook is part of the USA National Phenology Network. At sites across the U.S., participants gather information on plant and animal phenology.



NASA's Student Cloud Observations Online Project (S'COOL) involves students making and reporting observations of clouds to assist in the ground validation of NASA's CERES satellite instruments.



The Monarch Larva Monitoring Project (MLMP), developed by researchers at the University of Minnesota, enlists volunteers to collect long-term data on larval monarch populations and milkweed habitat.



Zooniverse is a collection of web-based citizen science projects.

Seafloor Explorer is a Zooniverse project in which participants identify aquatic animals and ground cover in images of the seafloor to help create a library of life.

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SciGirls

Citizen *SciGirls* Transmedia and Research to Encourage Girls in STEM NSF Award No. DRL-1323713

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Summative Evaluation of SciGirls Season Three Contribution of SciGirls Multimedia to Girls' Experience of Citizen Science

Study Motivation

In a comprehensive review of the field of public participation in scientific research (PPSR), Bonney et al. (2009) recommended designing projects to engage new audiences such as youth and to test outcomes of enhanced PPSR models. The *SciGirls* evaluation, implemented by Multimedia Research, addressed an intersection of these two recommendations by focusing on a model of citizen science engagement and education for preteen girls that combines a *SciGirls* multimedia online experience at home with *FrogWatch USA*, a contributory citizen science experience. To assess hypotheses about the contribution of *SciGirls* to citizen science interest, self-efficacy and learning, the evaluation employed a mixed-methods experimental design with fifth grade girls.

Overview of Mixed-Methods Experimental Study

At five nationally distributed *FrogWatch USA* sites, fifth grade girls (N=98) agreed to participate at the end of the school year in a multimedia enrichment experience in nature and science involving their local *FrogWatch USA* institution and PBSKids.org. Demographic data assessed girls' preexisting interest in nature and science with Girls' Interest in Nature and Science Scale (GINSS), a 5-point Likert scale developed and validated for this study with NASA S'COOL participating students. Stratified by minority status, girls were randomly assigned to a treatment group or a control group. Groups were equivalent in their GINSS ratings. The treatment group (n = 49) viewed 2 hours of *SciGirls* videos and games at home followed by a 2.5 hour *FrogWatch USA* citizen science session at a local wetlands site. The control group (n = 49) experienced the citizen science session without prior exposure to *SciGirls*. After their *FrogWatch USA* session, each girl completed online surveys and structured phone interviews including quantitative scales and open-ended questions on interest, self-efficacy and learning.

Key Findings

The treatment group showed significantly higher levels of interest than the control group in their FrogWatch USA session. Both treatment and control groups rated their quantitative interest in *FrogWatch USA* very high, but prior exposure to *SciGirls* multimedia successfully triggered more interest for the treatment group. Treatment girls felt that their interest increased because the *SciGirls* videos and games prepared them for the *FrogWatch USA* session, showed them that *FrogWatch USA* would be fun, and explained why citizen science data collection is important.

The treatment group demonstrated significantly better understanding of the unique practice of citizen science: that anyone can participate; that participants use the same protocol so data can be combined and be high quality; that citizen science data can help real scientists come to real conclusions; and that citizen science brings together a wide community of scientists and volunteers to work **together** and share data to which the public, as well as scientists, have access.

Both groups were moderately interested in finding out more about other citizen science projects and somewhat likely to look for another citizen science project to do in the future.

Treatment and control groups displayed equal and high self-efficacy ratings with respect to their FrogWatch USA session and other citizen science projects.

Within the treatment group, pre-exposure to SciGirls multimedia produced a significantly stronger impact on minority girls (n = 18) than non-minority girls (n = 31). These findings must be qualified by the small sample size, but minorities, comprising African American, Latina, Asian, and multiple ethnicities, displayed higher interest in their *FrogWatch USA* session, higher interest in finding out more about other citizen science projects, greater likelihood to look for a future citizen science project to do, greater perceived efficacy in doing other citizen science projects, more similarity to the video girls, and stronger interest in their *SciGirls* experience.

I liked SciGirls because the videos helped me learn about interesting things that I wanted to know about. The games were fun and interesting as well. The Frog Whisperers video gave me an idea of what we were going to do in FrogWatch.

Summative Evaluation Conclusion

A mixed-methods experimental study revealed that *SciGirls* multimedia experiences contribute significantly to girls' field experience of citizen science. Exposure to *SciGirls* triggers interest that is carried into a subsequent citizen science session and increases girls' understanding of the unique practice of citizen science, with a special influence on minority girls' interest and self-efficacy. *SciGirls* multimedia shows youth the process and practice of citizen science, demonstrates the fun of citizen science, and presents peers with whom girls can identify.

Produced By:



Made Possible By: Additional Support From:



SciGirls Experience: Treatment Group Only

Treatment girls viewed three videos online at home:

Frog Whisperers

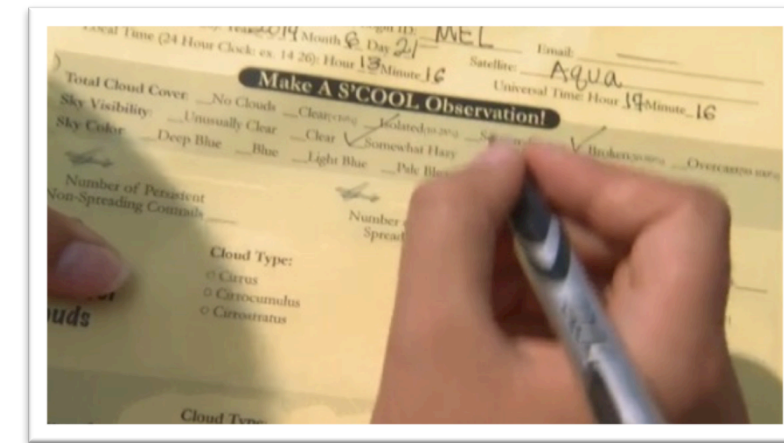


and

Feathered Friends



and either **Sky Girls**

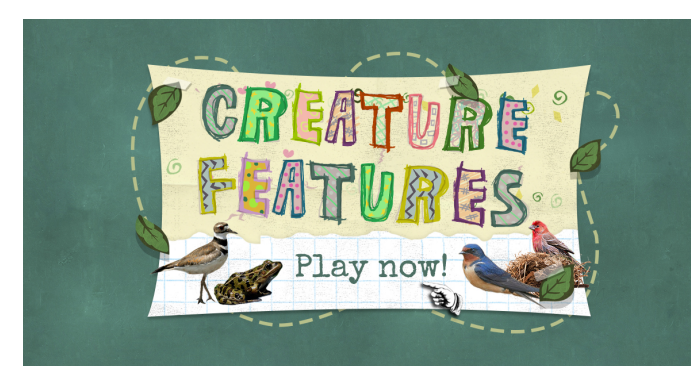


or

Flower Power



Treatment girls also played two online games:



Creature Features - a classic platformer game in which players listen for and locate frogs and birds with particular features.

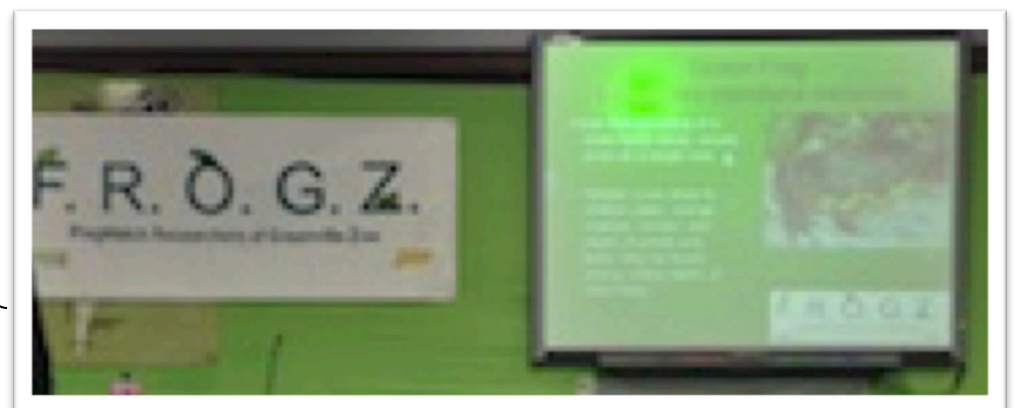
Rule the Roost - a scaffolded citizen science experience in which players join an online team to complete a real-world data collection task that changes monthly.



FrogWatch USA Experience: Both Groups

The *FrogWatch USA* session included presentations about citizen science and frog call monitoring, activities to learn calls and identify call intensity levels of frogs, and real data collection in wetlands, 30 minutes after sunset.

Greenville Zoo presentation



Roger Williams Park Zoo wetlands



Recommendations for Citizen Science Field

- Leaders of citizen science partners should utilize *SciGirls* multimedia prior to their citizen science sessions with preteen girls to increase interest and learning, particularly those projects featured in the videos.
- Informal and formal educators should use *SciGirls* resources - video in particular - to introduce the practice of citizen science generally and to generate interest and participation more broadly in other citizen science projects.
- Researchers should explore the differential impact of *SciGirls* on minority girls' interest and efficacy with larger samples to shed light on how peer-oriented multimedia influences youth outcomes, how minorities might respond differently to contributory model citizen science, and how groups differ in their pathways of science interest and efficacy.

To contribute to potential comparisons across citizen science and science programs more generally, the validated Girls' Interest in Nature and Science Scale (GINSS) is available at tpt.org/science/evaluations and at informal.science.org.

References

Bonney, R., Ballard, H., Jordan, R., McCallie, E., Phillips, T., Shirk, J. and Wilderman, C. C. (2009, July). Public participation in scientific research: Defining the field and assessing its potential for informal science education. A CAISE inquiry group report. Available at informal.science.org.

Twin Cities Public Television. (2013). *SciGirls seven: How to engage girls in STEM*. Available at http://tpt.vo.llnwd.net/o26/scigirls/SciGirlsSeven_Print.pdf