

Teens As Environmental Change Agents and Teachers: Young People Develop And Implement Innovative Educational Strategies To Address Issues of Plastics and Environmental Sustainability

Anne Stevenson¹, Amie Mondl,² Heidi Wyatt³

¹University of Minnesota Extension, Department of Youth Development, United States

²University of Minnesota Extension, Department of Youth Development, United States

³University of Minnesota Extension, Department of Youth Development, United States

Abstract

The Green Superheroes of Science (GSOS) is a Teens-as-Teachers program model that engages youth ages 12-18 as teachers of science for younger youth. The efficacy of the teens-as-STEM teachers model is highlighted. The program is effective in both virtual (distance education) and in-person formats, in non-formal settings (4-H, afterschool, summer school), and in classroom settings. Research supports engaging teens as volunteers, in both teaching roles and in community action projects, as a key civic engagement strategy ([1] Irby, et.al, 2001; [2] Lerner, R.M., et al. 2008). Authors highlight the Teen Science Change Agents|Transforming Our Relationship with Plastics curriculum [3] for civic engagement and teen teaching. Online access to the no-cost 4-H Sustainable Polymers curriculum (grade bands K-2nd, 3rd-5th, 6-8th, 9-12th and Teen Science Change Agents) is available at <http://.4hpolymers.org>

Keywords: sustainable polymers, teen civic engagement, STEM education, plastics, bioplastics, youth curriculum

Program Model

The Green Superheroes of Science (GSOS) is a Teens-as-Teachers program model that engages youth ages 12-18 as teachers of science for younger youth ages 5-11. We highlight the efficacy of the teens-as-STEM -teachers model in building both STEM knowledge and civic engagement skills in teens and younger youth through the GSOS program model. Science content is built on the research-based 4-H curriculum in the 4-H Sustainable Polymers suite of curriculum Gr. K-12 (<https://4hpolymers.org>), authored in partnership between the National Science Foundation (NSF) Center for Sustainable Polymers and 4-H. The program is effective in both virtual (distance education) and in-person formats, in non-formal settings (4-H, afterschool, summer school), and in classroom settings. Participants will gain online access to the no-cost 4-H Sustainable Polymers curriculum and GSOS website for training and implementation resources. Participants will be equipped to support youth engagement in learning about and addressing the issues surrounding our relationship with plastics, emerging research on bio-based plastics, and methods and models which can be replicated and adapted in a variety of settings with a wide range of audiences.

Programmatic Outcomes

Mixed methods were used for **teen evaluation**. In a retrospective pre-post evaluation, teen teachers rated their growth on eight indicators using a 4-point Likert scale (1=Not at all to 4=To a large extent). Five indicators, noting the change from pre- to post are provided:

I am a role model for younger youth.	Pre:3.0	Post:3.4
I want to be a role model for others.	Pre: 3.28	Post: 3.85
I know how to work with younger youth.	Pre: 3.14	Post:3.85
I am confident in public speaking.	Pre: 2.28	Post:3.0
I want to contribute my skills to help my community.	Pre:3.57	Post: 3.85

Teens indicated they gained skills in leading small group “Zoom” break-out rooms, leading large group sessions virtually, creating “How To” videos, and engaging children in sharing their experiments. Analysis of teen reflections on their learning (small group reflection discussions held after each teaching session) found that teens better understood the issues of plastics on the environment and the personal actions they can take to change behaviors related to plastic use, reuse, refusal, and disposal. Teens reported hearing younger participants talk about personal changes they/their families made as a result of being part of the GSOS program. 100% of teen teachers indicate they have grown in their understanding of the environmental impacts of plastics and increased their commitment to addressing this worldwide issue.

Parents/adult caregivers of youth participants, ages 5-8 in the GSOS programs were surveyed utilizing Qualtrics surveys sent post-session. They indicated: “As a result of the program, my child(ren) are:

- More interested in science 50% Agree/46% Strongly agree
- Learned the science skill of asking questions 58% Agree/38% Strongly agree
- Learned how to use their senses to investigate the world around them 58% Agree/38% Strongly agree

100% of GSOS families indicated the “How To” videos created by the teen teachers for the website were very useful (71%) or useful (29%) to their child’s learning.

Conclusion

We highlight the efficacy of the teens-as-STEM-teachers model in building both STEM knowledge and civic engagement skills in teens and younger youth through the Green Superheroes of Science program model and the national 4-H Sustainable Polymers curriculum. Resources and implementation strategies are effective in both in person, distance, and hybrid educational settings.

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