

## **Addressing Scientific Literacy in Oklahoma: The STEMist Program**

### **Abstract**

Scientific literacy is essential for success of youth and adults in the 21st century. In 2017, Oklahoma 4-H Youth Development initiated a fellowship program to address scientific literacy throughout Oklahoma: the STEMist program. Through this program, college students with a background or interest in science are recruited, trained, and sent to teach science workshops to youths at various educational events during the summer months. In its inaugural year, the program reached over 2,000 youths. The program addresses scientific literacy, aids in career readiness, and promotes 4-H to audiences previously unaware of the positive impact it can have on today's young people.

**Keywords:** [scientific literacy](#), [science](#), [STEM](#), [peer learning](#), [outreach](#)

**Hannah Branscum**  
4-H STEM Coordinator  
[hnbranscum@gmail.com](mailto:hnbranscum@gmail.com)

**Jeff Sallee**  
Associate Professor  
[jeff.sallee@okstate.edu](mailto:jeff.sallee@okstate.edu)

Oklahoma State  
University  
Stillwater, Oklahoma

## **Introduction**

To succeed in the 21st century, individuals must be prepared through education and training to fill careers in the science, technology, engineering, and mathematics (STEM) pipeline (National Science Board, 2018). It is also imperative that youth, and society in general, become scientifically literate, as science holds a vital role in the health and sustainability of our country (Rice, Rugg, & Davis, 2016). To address the need for scientific literacy, fulfill the 4-H science mission mandate, and aid in preparing youths for STEM careers, Oklahoma 4-H Youth Development initiated a grant-funded summer fellowship: the STEMist program.

## **Program Description**

STEMists are college students with backgrounds or interest in science who teach workshops at 4-H summer programs or other educational events. Our team, which comprised Oklahoma 4-H Youth Development faculty and staff, initiated the STEMist program in the summer of 2017. We selected five collegiate 4-H members to serve as STEMists. Trained through peer-to-peer learning and interactive instruction, the STEMists facilitated a variety of STEM curricula at events throughout Oklahoma. The STEMists taught existing curricula addressing biomedical science, small unmanned aerial systems drones, food science, photography, physical science, and rocketry.

The STEMists dedicated 100 hr of time to planning, programming, and traveling over the course of the summer. Oklahoma Cooperative Extension Service (OCES) county offices requested the STEMists' services, at no expense to the county. We assigned STEMists to activities on the basis of relevant experience, location, and availability. We expected each individual to identify and schedule additional locations to present workshops to fulfill the time

requirement. At the end of the fellowship, each STEMist received a \$1,000 scholarship for his or her service and a \$500 travel stipend.

## Impact

STEMists directly affected 2,039 youths at 4-H camps, club meetings, festivals, day care centers, day camps, YMCAs, public schools, and libraries with STEM educational programs. In total, the five STEMists taught 88 workshops at 49 events throughout the state over a 39-day period. The program reached 42% of Oklahoma's counties. Program impacts were reported to university administration, legislators, and other stakeholders.

## Evaluation and Results

Our team conducted a summative assessment of the STEMist program through a questionnaire distributed to OCES educators and through reflection papers provided by the STEMists at the conclusion of the program.

We distributed questionnaires to OCES educators in participating counties after STEMist programming had occurred. The questionnaires quantified the perceived preparedness, knowledge, teaching ability, and social skills of STEMists at the respective events. The majority of educators surveyed rated the STEMists as "very good" or "excellent" on the competencies of interest (see Table 1). We asked OCES educators whether they would use the STEMist program in the future. Of the 13 educators who responded to the survey, 12 stated that they would have a STEMist return, with the remaining educator indicating an interest in possibly having a STEMist back in the future. When asked to assign an overall rating to the workshop(s) presented, all educators rated them as "good" to "excellent."

**Table 1.**

Extension Educators' Ratings of STEMists' Competencies (*n* = 13)

Competency	Poor		Fair		Good		Very good		Excellent		Total
	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	
Preparedness for workshop(s)	0.00	0	7.69	1	0.00	0	23.08	3	69.23	9	13
Content knowledge	0.00	0	0.00	0	8.33	1	33.33	4	58.33	7	12
Teaching ability	0.00	0	0.00	0	15.38	2	15.38	2	69.23	9	13
Interaction with youths	0.00	0	0.00	0	7.69	1	38.46	5	53.85	7	13
Interaction with adults	0.00	0	0.00	0	7.69	1	23.08	3	69.23	9	13
Willingness to accept advice	0.00	0	0.00	0	7.69	1	23.08	3	69.23	9	13

At the end of the assignment period, STEMists submitted reflection papers on their time spent with the program. We asked the STEMists to share perceived strengths and weaknesses and to summarize their overall experiences. STEMists appreciated the peer-to-peer learning and recognized the impact the program had had on their ability to present in front of groups.

We recognized also that the STEMists increased their scientific literacy. One participant said, "I was aware of what STEM was but I had never really looked at how it is involved in my everyday life. This summer really showed me that." We received comments such as "Teaching children to appreciate science was fun and seeing the children change their minds about learning was amazing" and "Not only was I teaching the [4-H] members

but they were teaching me as well." STEMists also acknowledged that the program increased skills important for preparing them for future careers. One STEMist made the following representative remark: "It [the STEMist program] has also impacted my professional attributes, I have been able to work on my public speaking and communication skills with youths and adults alike. I have learned how to manage my time and projects to impact the most people possible."

## Conclusions

STEMists exposed over 2,000 youths, countless adults, and themselves to new scientific concepts and ideas through the STEMist program. We addressed the 4-H science mission mandate by improving the scientific literacy of youths across the state of Oklahoma. Science interest and understanding were increased. Plus, a new awareness of 4-H was raised among audiences unfamiliar with the program.

STEMists improved essential skills for success in the 21st century, such as communication, organization, and decision making, along with advancing career readiness for STEM and non-STEM occupations (National Association of Colleges and Employers, 2015; Partnership for 21st Century Learning, 2015). Four of the five STEMists are currently pursuing STEM-related degrees and are on their way to filling jobs in the STEM pipeline.

## Future of the STEMist Program

The STEMist program will continue increasing the scientific literacy of Oklahoma. New workshops in the areas of renewable energy, water conservation, and biotechnology will be taught by our STEMists. We continually receive programming requests from counties, including counties unreached in previous years. Our STEM impact will continue to expand in Oklahoma, and we recommend that Extension professionals in other states address the science literacy gap by replicating the STEMist program.

## Acknowledgment

This material is based on work supported by the National Science Foundation under Grant No. OIA-1301789 Oklahoma EPSCOR.

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