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## Industry and Extension Partnership to Enhance STEM and Agricultural Education

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## Industry and Extension Partnership to Enhance STEM and Agricultural Education

### Abstract

STEM education has become essential in the United States, and agriculture allows for a great opportunity to teach STEM education in a fun, hands-on manner. The Virginia Southern Piedmont Agriculture Research and Extension Center (SPAREC), in partnership with King Arthur Flour, has created a program that reinforces what is taught in the classroom while also adding in new lessons in citizenship. This program has been very successful and serves as an excellent model for future partnerships between industry and Extension.

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### Introduction

The level of engagement by students in science, technology, engineering, and mathematics (STEM) is falling in the United States, and this is a trend that does not appear to be stopping (Smith, 2011). Developing an early interest in STEM subjects in children is essential for continued interest in these fields. Another problem in STEM education is connecting the raw mathematics and science to practical purposes (Foutz, Navarro, Hill, & Thomson, 2011). Agriculture education has the ability to lead in this field due to the STEM concepts that are taught every day and with the ability to connect math and science to hands-on application.

Elementary school teachers are often inexperienced or lack confidence in teaching sciences (Horton, Krieger, & Halasa, 2013). A joint program between Virginia Tech (VT), Virginia Agricultural Experiment Stations (VAES), Virginia Cooperative Extension (VCE), King Arthur Flour (KAF), Future Farmers of America (FFA), and the Southside Gleaning Network (SGN) has been developed to introduce fifth-grade students to science and agriculture through a one-day, hands-on event.

Students learn math skills, science, planning skills, problem solving, and many more skills in a baking class. As the instruction progresses, students learn to bake a loaf of bread and are instructed in gleaning. The program reinforces good citizenship and giving back to the community. Students keep one loaf to enjoy with their family and donate the other to a community organization. For the program

held at SPAREC, The Southside Gleaning Network picks up the second loaf from collection points at each school and then distributes the bread to families in need throughout Southside Virginia.

When students are not learning about the science of bread making they are rotating between five learning stations. These activities directly relate to Virginia's 5th grade Standards of Learning (SOLs) and serve as excellent reviews before the students take the standardized tests. The stations reinforce the lessons that have already been taught in the classroom in a fun, hands-on manner.

Collaboration between Virginia Cooperative Extension and King Arthur Flour allows for the interaction of these and many other organizations to promote STEM education and improve the knowledge of fifth-grade students. This program could be used as a model for many other programs to serve a broad audience.

## **Collaboration**

The collaboration between Virginia Tech and King Arthur Flour allows for the success of this program. An instructor from King Arthur Flour presents a 50-minute demonstration on the bread-baking process. The program covers math, science, baking techniques, reading skills, planning skills, creativity, problem solving, food safety, and more. Then each future baker takes home the materials, donated by KAF, to make two loaves of bread, including whole-grain flour, yeast, and the know-how to get baking!

## **Gleaning**

Students are expected to participate by baking the bread at home and returning it to their school on the designated day. Some schools make the bread in school cafeterias and use the experiences as a learning tool. Students enjoy one loaf of bread at home with their families and donate the second loaf to a community organization serving needy families. In conjunction with the Southside Gleaning Network, the bread is picked up and distributed to families in the area.

## **Review of Standards of Learning**

The other part of the day is spent at five different learning stations with hands on activities. These activities directly relate to 5th grade SOLs and serve as a great review before students take the standardized tests at the end of the school year.

**Strawberry DNA**—Students extract DNA from strawberries and learn about DNA and the plant cell while they are completing the extraction, and take home a DNA necklace.

**Animal Cells**—Students learn the parts of an animal cell and make a plastic bag model of the cell.

**Apple Earth**—Students use an apple as a model of the earth and will learn about topsoil and other natural resources.

**Ooblek**—Students learn about matter, solutions, mixtures, elements, and molecules by making ooblek.

**Grain Chain**—Students discuss the plant life cycle. They also grind wheat with a mortar and pestle. This shows students where the flour comes that they be bake into bread.

## Teacher Responses

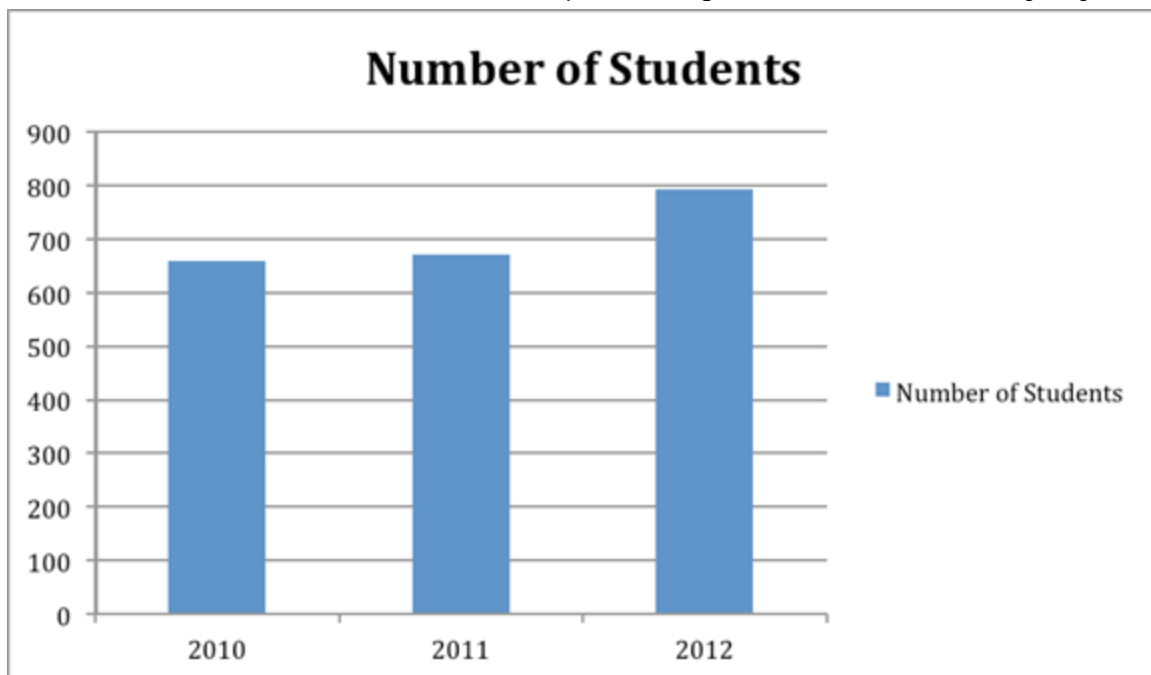
A survey was given to the participating teachers to determine their reaction to the program. Forty-two teachers and their classes participated in 2012, and 81% of the teachers felt that Virginia's SOLs were incorporated to a great extent, and 100% of the teachers felt that the "hands on learning" aspects of Ag Days reinforced the topics that had already been covered in the classroom. When asked about the "Life Skills Bread Program," 100% of the teachers found it to be educational.

## Conclusions

Agricultural Awareness Days for fifth-grade students has been a growing program that has incorporated industry and Extension in a program to bring agriculture to students who do not experience it otherwise. The program has grown from four counties and three private schools to five counties and four private schools in only 3 years (Figure 1). This program has been a huge success and would not be possible without the assistance of an industry partner. With this collaboration there is a benefit to every participant and to all of the cooperators.

**Figure 1.**

The Number of Students Who Have Participated in Agricultural Awareness Days by Year



## References

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