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Service-Learning in Agriculture: Technology and Subject Integration are Keys to Student Success

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Abstract

A focus on modern-day people and problems can serve to engage students in the learning process. This approach can aid teachers who struggle to bring meaning to the curriculum and motivate children to learn. The agriculture unit described in this article is based on service-learning principles and enriched by technology integration. Through these deliberate unit activities based on math, social studies and science standards, students reached a level of understanding about agricultural issues facing our community, country and world.

Unit Background

The idea for the service-learning unit on agriculture was inspired by a North Carolina Ag in the Classroom workshop (<http://www.ncagintheclassroom.com/>). The workshop emphasized the need for students to connect to the lives of North Carolina farmers and to realize the importance of the work they do for the people of the world. The theme of agriculture provided an opportunity to connect seventh grade science, social studies, math, language arts, technology and character education standards as well as to address common misconceptions that children have about the foods we buy in the grocery store. Though service-learning activities forged connections between the material, technology played an important role throughout the unit. Internet searches and the creation of spreadsheets and charts were used regularly in various components of the unit.

Weather

The 10-week project began with a study of weather and of the consequences of tornadoes and hurricanes. After learning some basic weather fundamentals, students took an in-depth look at the weather in North Carolina and how it can

be drastically altered by storm systems, particularly hurricanes. Students were able to track the storms of past and current hurricane seasons on the Internet. Students found statistics about the damage of previous storms using the following sites:

WRAL Weather

<http://www.wral.com/weather>

USA Today Hurricanes

<http://www.usatoday.com/weather/hurricane/whur0.htm>

NOAA National Hurricane Center

<http://www.nhc.noaa.gov>

Hurricane and Storm Tracking

<http://hurricane.terrapin.com>

AccuWeather.com Hurricanes

<http://hurricane.accuweather.com/adcbn/hurricane/facts.asp?partner=accuweather>

With ironically “good timing,” Hurricane Isabel struck North Carolina just as students completed this component. The students used their knowledge to make power point presentations on hurricanes for the students in the elementary school, a part of their science outreach to younger children. The Hurricane Webquest (<http://asterix.ednet.lsu.edu/~edtech/webquest/canequest.htm>) guided students in the creation of the powerpoint.

[Download a sample student powerpoint project \(1.1 MB\)](#)

Environmental Impacts of Weather

Next, students read current events to find out how the hurricane impacted the farming industry in North Carolina. As expected, North Carolina farmers were hit hard when Isabel struck the coast. Students looked at land use, population, and the storm destruction, all of which are topics in the social studies curriculum. Students learned about flooding and how water pollution can increase as a result of a hurricane. Students also read stories and articles that described the life of farmers today versus farmers of the past, an appropriate topic for comparison and contrast writing. Some technological advances make it easier for farmers to prepare for and handle weather irregularities, but farmers still face the challenge of unpredictability. Inspired by their research, students passionately defended farmers and told others about their history and present situation as if the students suddenly had a great revelation about a forgotten industry.

The USDA Agricultural Statistics Data Base (<http://www.nass.usda.gov:81/ipedb/>) provided a wealth of agricultural statistics for the United States and other countries in the world. It allowed students to look at the statistics for one particular region and then correlate the rise or fall of production to economic or natural phenomenon that was taking place during that time.

This provided students with a great opportunity to make inferences based on the results of data that has been collected over time. For instance, the following spreadsheet was developed from statistics for corn production between 1993 and 2003. It was challenging for students to try to account for the fluctuations in production and prices over the ten-year period. With research and the use of analytical thinking, students could come up with some very feasible reasons for the shifts in the data table. Thousands of other spreadsheets can be created by using the data from the website given above.

Corn for Grain Statistics for N.C. (1993-2003)

Commodity	Year	State	Planted 1000 acres	Harvested 1000 acres	Yield bushel	Production 1000 bushels	Price per Unit \$/bu	Value of production \$1000
Corn For Grain	1993	NC	1000	850	65	55250	2.65	146413
Corn For Grain	1994	NC	1000	900	91	81900	2.48	203112
Corn For Grain	1995	NC	800	700	107	74900	3.54	265146
Corn For Grain	1996	NC	1000	900	95	85500	3.43	293265
Corn For Grain	1997	NC	960	870	89	77430	2.83	219127
Corn For Grain	1998	NC	860	770	70	53900	2.33	125587
Corn For Grain	1999	NC	750	640	80	51200	2.27	116224
Corn For Grain	2000	NC	730	640	116	74240	2.01	149222
Corn For Grain	2001	NC	700	625	125	78125	2.36	184375
Corn For Grain	2002	NC	790	700	83	58100	2.89	168490
Corn For Grain	2003	NC	740	640	110	70400		

Soil Characteristics

Throughout the unit, the students monitored worm habitats in the classroom. Students made the connection between the role of worms in the development of fertile soil and their consequential effect on plant growth. They set up a variety of experiments investigating soil type, compost methods, and commercial plant foods. Students worked in groups to set up and monitor these experiments and then reported back to the other students about the progress and findings

Agribusiness Careers and Economic

Students next used the Internet to research a school-provided list of careers related to agriculture. One example is PlanetAg's Careers in Agricultural Science (<http://www.fl-ag.com/PlanetAg/careers.htm>) They realized the wide variety of agribusiness careers through hands-on activities for middle school children provided by NC Ag in the Classroom. For example, one of their activities uses a large apple to represent the Earth. The apple is cut to demonstrate that 3/4 of the Earth is made up of water. Slowly the rest of the apple is cut away to represent the types of landforms that cannot be used for growing food, such as swamps, deserts, and polar ice caps. Finally only 1/32 of the original apple is left. The peeling on this small piece of the apple represents

all of the soil that remains for the people of the world to grow food. A similar activity is provided by the American Farmland Trust (http://www.farmland.org/what/apple_movie.htm) which gives a very good visual representation of the problem that children can easily understand.

Students also used resources to investigate the top agricultural products in North Carolina and the economic and market factors that have influenced top products in the past few years. The North Carolina Department of Agriculture and Consumer Services' Agricultural Statistics division (<http://www.ncagr.com/stats/index.htm>) provides many different charts that outline statistics related to N.C. as well as other states.

Students learned about genetically altered crops that are being developed in the Research Triangle Park and contacted scientists working on this important research. From Internet activities and classroom visits by scientists, the students learned about biotechnology and how it makes it possible for farmers to increase the amount and quality of food produced:

Brookhaven National Laboratory
<http://www.bnl.gov/scied/k12students/middle>

American Farm Bureau Foundation for Agriculture
http://www.ageducate.org/news/foundation_advances_biotech.html

A Social Science Research Experience



Students were now primed with knowledge needed to interview farmers at the local farmers market. The purpose of the field trip and interviews was to see if farmers would confirm what students had learned through their research. Students wrote survey questions and practiced their interviewing skills. Students practiced using good manners and respectful speaking voices when doing the interview. They practiced interview

scenarios so that they would know how to respond to potential answers. When the actual fieldtrip came, the students were poised, mature and responsible as they conducted their surveys and made observations for discussion. On the day of the fieldtrip, each student interviewed 10 farmers as well as had a lunch of homegrown foods from North Carolina.

Sample Survey Questions:

1. What is the greatest challenge of being a farmer?
2. How long have you been in the farming industry and how long do you foresee yourself remaining in this career?
3. What is the greatest advantage of being a farmer? Greatest disadvantage?
4. What is your opinion of pesticides? How are they used on your farm?
5. Do you think that genetically altered foods will bring improved success to the farming industry?
6. If you could tell the world one thing about farming, what would it be?
7. What changes have you seen over the past 10 years in farming?
8. Would you advise young people to pursue careers related to agriculture?



Students analyzed the responses to the survey questions. This opportunity for students to collect and interpret original data proved the students' common beliefs about farmers to be untrue. The stereotype of a farmer as an uneducated person who wore overalls was not necessarily the case. This study allowed students to reflect on human nature and diversity as well as human tendency to stereotype particular groups of people, relating their reflections to groups beyond farmers.

Population and Hunger

The next unit segment focused on over-population and world and local hunger. Students graphed world population and compared it to the decrease in the amount of land used for agriculture. Quality activities that demonstrate population growth versus the use of natural resources can be found in *People and the Planet: Lessons for a Sustainable Future* (<http://www.zpg.org>) Students also located the World Population web site (<http://www.ibiblio.org/lunarbin/worldpop>) at the University of North Carolina that constantly updates the population growth in the world taking into consideration the birth and death rate and monitored it throughout the unit. Students drew population graphs and land use graphs and saw immediately that the two lines were going in opposite directions.



This research prompted some interesting questions for the students. Where is all of the food going to come from to feed the world? What can be done to improve the current situation? What can we do to understand and help to solve this global and local



problem? Students generated several ideas through discussion and writing assignments. Students agreed that awareness of the problem is the first step to finding a solution for world and local hunger. A group of inspired

students made service announcements about the importance of supporting the farmers of North Carolina by buying their produce. Several others wrote essays and newsletter articles.

Students joined the Food Bank of North Carolina (<http://www.foodbanknc.org/>) food drive to help victims of Hurricane Isabel. They organized a school-wide food drive with rewards to the winning teams. Enthusiasm was generated by morning announcement and a student-made video commercial to advertise the food drive. This allowed the students to be recognized as leaders in the school as well as providing valuable experience with technology. Students collected food each day, set up spreadsheets to calculate the totals, and weighed hundreds of pounds of food each day for three weeks. The goal was to collect 1,000 pounds of food. Within the first four days, students had collected 1,134 pounds. We challenged our school to collect 2,000 pounds with the promise of an ice cream party and free basketball tickets to the winning teams. At the end of the drive, students had collected over 3,000 pounds of food. Students met at school on a Saturday morning to take the food to the Food Bank as a celebration of their hard work in organizing the campaign. Students learned that their contribution was enough food to feed 32 families of 4 for one week.



Assessment

Assessment for this unit of study was multifaceted. Class presentations, oral responses, lab reports, graphs, charts, letters, and answers to essay questions were all used to assess the learning of the children. Class participation was crucial and was given a high percentage of the total grade. In each class, there were different forms of assessment depending on the make-up and learning styles of each class. Observable growth and awareness was seen in every student.

In this type of project with numerous activities that occur simultaneously, it is important to make students accountable for how they spend their time. At the end of each week, students took time to reflect on what they had learned during the week. This time of reflection is essential to making connections between the real world and the learning. The teacher serves as the facilitator, directing students and listening as they came up with new ideas or pieces of information.

Final Notes

Service-learning was the linchpin of this technology-enhanced, integrated unit

on agriculture that captured and sustained the interest of the students. The topic of agriculture successfully integrated math, science, social studies, technology and character education competencies for the seventh grade curriculum. Throughout the unit, students used math skills to graph weather statistics, land use, population, and world hunger figures to share with the school. They also calculated percentages for the responses on their survey and compared their survey data to the data they found during our Internet research. In social studies, students used the Internet to learn about agriculture, economies and population data for various countries. Communication skills, both written and oral, were practiced extensively during this unit of study. Students wrote newspaper articles about their study of agriculture and letters to community members urging them to support the local farmers by buying their products.

Similar projects will certainly follow in the future, as service-learning in combination with technology tools and inquiry-based learning activities provides a framework of meaning where students can grow as learners, analyzers and citizens. Future improvements on this unit will include, for example, a field trip to a research facility where plants are being genetically altered or where students can observe an agriculture-related research environment.

The unit motivated students to research agriculture-related topics at home and share their findings with classmates. One student commented on the unit saying, "I will remember that we have only so much of any natural resource. Each time I throw something away, I am adding to the problems of the world." Another student said, "It is so good to do something that means so much to other people! I liked being in charge of this project and would like to do more." Most importantly, the unit enabled students to come to a clearer understanding of complex agricultural issues and to take positive actions locally to educate others.

About the Author

Carolyn Moser, Leesville Middle school science teacher, holds both NC Environmental Education Certification and National Board Certification. Carolyn received a Fulbright Scholarship in 2002 and traveled to Japan to share her teaching expertise. She recently presented at the Distinguished Teachers forum and has served as a member of the USA Today 2001 Teacher Team. She has received numerous grants towards classroom projects. Her Kenan Fellows project, Making Connections for Environmental Education was developed in collaboration with Dr. Harriett Stubbs from NCSU.
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Teacher Resources for Service-Learning

National Service Learning Clearinghouse
<http://www.servicelearning.org/>

Service Learning at the University of Colorado
<http://csf.colorado.edu/sl/>

The International Partnership for Service Learning
<http://www.ipsl.org/>

The Big Dummy's Guide to Service Learning
<http://www.fiu.edu/~time4chg/Library/bigdummy.html>

The Service Learning Partnership
<http://www.service-learningpartnership.org/>

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