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## Agricultural Science Fairs: Are Students Truly Learning from This Activity?

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## Agricultural Science Fairs: Are Students Truly Learning from This Activity?

### Abstract

Agriculture Science Fairs are designed to teach youth how agriculture is a part of their lives. A study measured the knowledge change of youth participating in an agricultural science fair in Texas. A pre-test/post-test was administered to 480 participants that revealed an increase in correct responses for nine out of 10 questions. Two scale statements revealed significant increases ( $p < 0.05$ ) related to thoughts on how agriculture affects everyday life. Teachers were administered an ex-post facto instrument, and results indicated that the activity was a positive learning experience but that specific curriculum should be designed to support the activity.

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### Background/Justification

In today's society, most families reside in urban and suburban cities and communities. With this change in demographics, most children have become removed from farms and agriculture in general. These same youth are our future leaders, governmental decision maker, and business people. Therefore, there are new educational program innovations that have been implemented to educate our next generation about agricultural commodities.

In addition, youth tend to have a narrow perception of career opportunities associated in agriculture. Thus, expanding their knowledge in this field could also enhance their opportunities for future success. Finally, Terry, Herring, and Larke (1992) note that elementary teachers need an agricultural literacy curriculum to assist them in educating youth.

Agricultural Science Fairs have been a successful vehicle for emphasizing the importance of agriculture to children and teachers in Texas. Blackburn, Skaggs, and Vestal (1995) and Blackburn (1999) have documented that there is knowledge gained from youth participating in Agriculture Science Fairs. However, the instrument used did not measure perceptions of youth concerning agriculture or ask them about specific agricultural commodities that affect their daily lives. The study described here sought to address these concerns.

Agricultural Science Fairs are 1-day field trips for elementary school students to a local fairground or similar facility. At the facility, 15-20 minute sessions that focus on the importance of agricultural commodities are presented. Some of the commodities represented are beef, swine, sheep, cotton, small grains, and dairy products. The educational stations engage groups of 25-40 students in the learning process to provide experiences that require hands-on activity and critical thinking. Because of these sessions, the hypothesis is that knowledge of production agriculture will increase with students. Last year, 350,000 youth participated in agricultural literacy programs in Texas (Texas 4-H, 2000); however, educational impact of these activities was very limited.

Dallas County has had a long history of developing, coordinating, and implementing agricultural awareness activities for young people. Most notable is their rich tradition of their agriculture science fair, called "Farm Day." Farm Day brings in 4th grade students from the Dallas Metroplex, depicting agriculture and illustrating how it influences and touches these young people's daily lives. In May of 2001, over 4000 4th grade students representing 200 classes and 49 different schools participated in Farm Day during a 3-day time period. In addition to the students, 203 teachers and 167 chaperones accompanied these students through Farm Day. This audience was led and instructed by 110 volunteers from Dallas County.

## **Purpose and Objectives**

The purpose of the study was to determine the impact Dallas Farm Day has on its participants. As these types of educational activities continue to grow, evaluations must be implemented to determine the knowledge being gained from participants. The objectives of the study were to:

- Determine gained knowledge of participants on simple agriculture entities that influence their everyday lives.
- Determine the educational effectiveness of "Dallas Farm Day" through teacher input.

## **Methodology**

There were two populations for the study. The first population was a youth population that included 480 4th-grade students. A tiered cluster sampling technique was used to select the participants. This cluster sample initiated with a sampling of school districts followed by individual 4<sup>th</sup>-grade classes within those school districts. These students represented elementary schools from Dallas, Duncanville, Mesquite, and Richardson.

The questionnaire used for the study was a pre- and post-test designed following a similar format used by Blackburn, Skaggs, & Vestal (1995). However, modifications were made by Dallas County Extension Agents with input from a panel of experts that consisted of three 4-H & youth development specialists and two agricultural commodity specialists within Texas Cooperative Extension. These individuals reviewed the instrument for both face and content validity. The participants were administered a pre- and post-test that asked 10 questions relating to agriculture and two questions on their perception of how agriculture affects their daily lives.

Ten of the 12 questions used a multiple-choice approach in which the students were asked to circle the correct answer. The 10 multiple-choice questions were coded and analyzed using the descriptive and frequency statistical measures for the pre- and post-tests from SPSS (1999). As a result of missing data, percentage correct were noted from the frequency data. Pre- and post-test percentages were compared to determine the knowledge gained between these two tests.

The other two statements used a five-point Likert-type scale (1 = strongly agree, 2 = agree, 3 = no opinion, 4 = disagree, 5 = strongly disagree) to measure the participants' perceptual thoughts regarding agriculture in general. The two scaled statements utilized a t-test to determine if the means from pre- and post-test results revealed a change in the participants' perception of agriculture. An alpha level of 0.05 was predetermined to reveal significance.

The second population consisted of 202 schoolteachers. Eighty-nine were randomly selected to participate in the study. All 89 of the teachers responded to the survey. Using an ex-post facto approach, a three-point Likert-type scale survey (1 = excellent, 2 = good, and 3 = poor) was administered to 4<sup>th</sup>-grade teachers. Its purpose was to help measure the effectiveness of Farm Day by asking questions pertaining to the educational program as a whole and how it supplements learning with the objectives set forth by the individual school districts.

Their responses were coded and analyzed by SPSS (1999) to determine means and standard deviations. Once means and standard deviations were determined, these statements were ranked. Also, one question was an open-ended statement that asked how Farm Day could be improved to establish a more educational program for 4<sup>th</sup>-grade students. These statements were coded for similarities and frequencies were reported.

## **Results**

### **Participants**

None of the 480 pretests revealed a 100% correct response rate. However, the post-test yielded 72 (out of 445) 4th-grade students who answered all questions correctly. (Twenty-one students did not take the post-test or had missing data for at least one question.)

The students revealed an increase in knowledge for nine of the 10 multiple-choice questions when comparing percent correct from the pre and post-test results (Table 1). The only question that revealed a lower percent was the statement that asked what type of animal produced wool (93.2% pre-test vs. 91.4% post-test). This decrease could possibly be explained by the fact that this session was not available for all participants. The presenter was forced to leave early because of another obligation. Four of the 10 questions revealed an increase of 20% for correct responses from the pre- to the post-test.

**Table 1.**

Percent Changes of Correct Answers from Participants Based Pre-Test (n=480) and Post-Test Responses (n=445)

Statement with Answer*	Percent Rate of Correct Responses		
	Pre-test	Post-test	Difference
Most corn grown in the United States is used for feeding <b>livestock</b> .	31.6%	55.6%	24.0%
Cotton is a fiber used to make blue <b>jeans</b> .	48.6%	72.1%	23.5%
Agriculture touches my life everyday. <b>strongly agree</b>	16.8%	40.0%	23.2%
Annual rainfall <b>always</b> influences the type of crop grown in the various geographic regions.	32.8%	54.8%	22.0%
Agriculture will become less important as the population of the earth increases and more people work in the city. <b>strongly disagree</b>	13.8%	33.5%	19.7%
When you eat cereal, bread and donuts you are eating <b>plant seeds</b> .	71.1%	86.8%	15.7%
Water conservation should be practiced by <b>everyone</b> .	55.8%	68.8%	13.0%
<b>Hamburgers</b> come from cows.	67.0%	78.2%	11.2%
You should always wash your hands after handling raw meat. <b>yes</b>	98.3%	98.7%	0.4%
<b>Sheep</b> produce wool.	93.2%	91.4%	-1.8%

\* The pre-test was administered 5 school days before the Agricultural Fair Day.

The t-test for the statements that utilized a five-point Likert-type scale revealed significant changes in perceptions pertaining to agriculture ( $p < 0.05$ ) (Table 2). The first statement, "Agriculture will become less important as the population of the earth increases and more people live and work in the city" displayed a mean of  $2.87 \pm 1.26$  on the pretest compared to a  $3.24 \pm 1.54$  on the post-test. This increase in the mean indicates that the participants did notice the impact of agriculture as a result of Farm Day. However, the larger numerical value for the standard deviation for the post-test responses had a wider range of responses.

The second statement "Agriculture touches my life everyday" had a pre mean of  $2.87 \pm 1.21$  compared to a post-test mean of  $2.20 \pm 1.32$ . Statement two also had a wider range for the standard deviation, but was more narrow than the post-test for statement one. Moreover, the post-test mean of 2.20 indicated that students' perceptions of agriculture affected their everyday lives.

**Table 2.**

T-Tests Results for the Impact of the Dallas County Farm Day on Participants Based on a Pre-Test and Post-Test Evaluation Survey

Statement	Time Administered	N	Mean*	SD	Sig.**

Agriculture will become less important as the population of the earth increases and more people live and work in the city.	Before the Activity	457	2.87	1.26	0.001
	After the Activity	445	3.24	1.54	
Agriculture touches my life everyday.	Before the Activity	459	2.73	1.21	0.001
	After the Activity	443	2.20	1.32	
* 1=Strongly Agree; 2=Agree, 3=No Opinion, 4=Disagree, 5=Strongly Disagree ** Differences were significant at the .01 alpha level.					

### Teachers

The responses from the teachers concerning Farm Day appear to be very favorable (Table 3). The scale for responses was defined as 1 = excellent, 2 = good, 3= poor. All Likert- type responses yielded mean averages ranging from 1.29 - 1.60 (standard deviation ranged from .50 - .73). The statement revealing the most concern (mean of 1.60 & .73) was "Does Farm Day supplement your curriculum through hands-on experience?" These results indicate that a more focused effort should be coordinated to work with school districts to develop a curriculum that would be of benefit to the students as they pertain to agriculture.

**Table 3.**  
Teacher Responses to Nine Statements/Questions Pertaining to the Educational Quality of Farm Day

Statement/Questions	N	Mean*	SD
Our goal was to show how agriculture touches everyone daily through food and fiber production and food safety.	89	1.29	.50
Was Farm Day beneficial to your students?	89	1.34	.54
Did we improve and enhance your students' understanding of agriculture and our food and fiber production system?	89	1.36	.59
Did we meet the educational needs of your specific grade level?	85	1.37	.51
Was Farm Day relevant to you as a teacher?	85	1.40	.60
Was Farm Day exciting?	89	1.42	.56
Did Farm Day leave your students with an agriculture awareness and appreciation?	89	1.42	.56
Please rank the quality of exhibits.	86	1.46	.52
Does Farm Day supplement your curriculum through hands-on experience?	84	1.60	.73
* 1=excellent; 2=good; 3=poor			

The open-ended responses also indicate enjoyment and appreciation for Farm Day (Table 4). Over 40% of the teachers documented that there should be no change or simple positive remarks as they relate to the educational aspect of the activity. Eighteen of 101 responses requested more hands-on activities, and 16 would appreciate smaller groups.

**Table 4.**

Responses to the Open-Ended Statement "Tell Us How We Can Improve or Teach Subject Matters to Meet the Educational Needs of Your Students"

<b>Statement</b>	<b>Frequency Response*</b>	<b>Percent</b>
Nothing should be changed	22	21.8
Positive remarks**	20	19.8
Need more hands on activity	18	17.8
Need to place the students in smaller groups	16	15.8
Presentation time should be longer	7	6.9
Presenters and guides should be better prepared	6	5.9
Supplement activity with school curriculum	3	3.0
Other	9	8.9
Total	101	100.0
<p>* n=89; however, several teachers suggested more than one change, resulting in a total of 101.  ** Positive remarks included statements like: good job, keep up the good work, and thanks for your work.</p>		

### **Extension's Response**

Farm Day is continuing to grow, and verbal testimonials indicate that youth and teachers appreciate this educational activity. It is, however, imperative that Texas Cooperative Extension in Dallas County strongly consider including the following recommendations to make this activity thoroughly educational while still being enjoyable for the participants. These recommendations include:

1. An evaluation effort should be implemented for this activity. In order to more effectively report the impact this program is having on the target audience, the evaluation should closely follow the measurable objectives set forth before the program. The Dallas County Farm Day is an example that can be followed by other county and state programs.
2. Teachers should be incorporated in the planning process to ensure that the educational program adheres to the schools' initiatives. Working closely with the County Extension Agent or program coordinator, these individuals together can effectively prepare a complete program that the participants can enjoy and learn from even more.
3. New curricula should be developed for the classroom. The results from the study indicate that teachers have a strong desire to incorporate general agriculture definitions and terms into their teaching plans. This could significantly enhance the learning environment during the actual activity. Furthermore, this could lead to long-term learning and interest well after Farm

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