An Evaluation of Attitude Change by Participation in an Elementary Educational Swine Curriculum

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Abstract

The purpose of this study was to field-test an educational swine curriculum, "There's a Pig in My Classroom," and measure the effectiveness of the curriculum at changing fifth grade students' attitudes about the pork industry. The objectives of this study were to evaluate: the overall change in students' attitudes toward the pork industry and the effect of specific demographics on the change in students' attitude following participation in an educational swine curriculum. The effectiveness of the curriculum was measured through a pre-test/post-test survey of fifth grade students (n=435), divided into treatment and control groups. The findings indicated that participation in the educational swine curriculum positively increased the students' attitudes towards the pork industry; and demographics such as 4-H experience, farm experience or prior experience with pigs had limited effect on the changes in students' attitude.

Introduction

Townsend (1990) found that pre-secondary agricultural education programs can build positive attitudes towards agriculture within its students, thus allowing them to develop into positive and informed leaders. Holz-Clause and Jost (1995) found that middle-school children appear to have already shaped their perceptions of agriculture, making it important for agricultural education programs to start in elementary school (Nordstrom, Wilson, Kelsey, Maretzki, and Pitts, 2000). The earlier in life information is presented to kids, "the more receptive they are to accepting and applying wholesome concepts about the topic for the rest of their life (McReynolds, 1985)." These findings present a goal for us, to create educational curriculums geared toward upper elementary students that can result in a life-long impact. For centuries, educationalists such as Aristotle, Socrates, Pestalozzi, Comenius, and Benjamin Franklin believed that early in life, people should learn about plants, animals, and the ways humans utilize these resources (Snowden and Shoemake, 1971). Piaget suggested that between the ages of six and eleven, children develop opinions and ideas that last throughout their lives (Slavin, 1997). Thus, it would seem appropriate to introduce agriculture, with its many concrete examples, to children in the upper grades of elementary school (Terry, Herring, and Larke, 1992). Since the early 1900s, the importance of agricultural education at the elementary level has been advocated in the United States. In 1911, Garland Bricker stated: "Like the more popular sciences such as botany, physics, physiology, and chemistry, agriculture has its common, everyday, elementary facts with which everyone in country and village should be more or less acquainted…" (p. 1-2). Bricker (1911) also believed that elementary agricultural principles should be incorporated into elementary education.

Through the centuries, as the farm population has dwindled, so has the number of elementary agricultural education programs. In 1981, however, under the guidance of the United States Department of Agriculture, in coordination with a national task force of representatives from agriculture, business, education, and governmental agencies, Agriculture in the Classroom was born (Agriculture in the Classroom, n.d.). Since the introduction of Agriculture in the Classroom and several other agricultural education curriculums, research has revealed that students with some type of exposure to agriculture have a more positive view of agriculture than students with no experience (Nordstrom et al., 1999).

Theoretical Framework

The research participants in this study were Indiana fifth grade students who were primarily 10 and 11 years-old. As noted by Wood (1994), students who are ten years-old are beginning to concentrate on

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tangible products that display their competence. They work well in groups, and are actively receptive learners of factual information and scientific principles. In addition, they are good listeners, voracious readers, expressive, talkative, and like to explain. Their cognitive development expresses their increased ability to abstract. They are able to concentrate, are becoming better at problem solving, and like group activity.

By comparison, Wood (1994) found that 11 year-old students are beginning to imitate adult language, appreciate humor, and are beginning to become impulsive. Their cognitive development is beginning to desire new tasks and to enjoy scientific study. Karns and Myers-Walls (1996) found that upper elementary school-aged children (9 to 11 years-old) enjoy hands-on involvement and the use of props or tangible items during classroom instruction. These students were also more receptive to projects that involved making and or doing something that re-enforced classroom instruction. Students in this age group have a need to relate new concepts to previous experiences.

In order for fifth grade students to become active participants in classroom instruction, it is imperative that the presented classroom material meet a child's existing base of knowledge so that presented materials can complete the child's learning process (Wadsworth, 1989). In other words, during the acquisition of knowledge, students gather new information and build it into their existing schemata (McGrath, 2000). In addition, a classroom setting must be interactive (Johnson, Wardlow, and Franklin, 1997; Stoecklin, 2001), containing various methods of knowledge transmission to accommodate various learning styles (Stoecklin, 2001) and promoting the experiential learning method to capture and meet the needs of all participating students (Mabie and Baker, 1996). Kellert (1985) found that between the fifth and eighth grade, students experienced a dramatic increase in emotional concern and affection for animals, as well as an improvement in factual and cognitive understanding of animals.

Purpose and Research Questions

The purpose of this study was to evaluate the effectiveness of an educational swine curriculum developed for fifth grade students. Teacher-ready modules were developed that included lesson plans derived from grade appropriate Academic Standards (Indiana Department of Education, 2004), instructional materials, worksheets, visual aids, and activities to cover subject matter relating to the pork industry, pork as a nutritious protein source, and the value of by-products derived from pork production. The research questions tested included:

1. Does participation in the "There's a Pig in my Classroom" curriculum change fifth grade students' attitudes about the pork industry?

2. Will demographics such as 4-H experience, farm experience or pig experience explain differences in pre and post-test attitudes amongst participants?

Methodology

A quasi-experimental pretest-posttest design was utilized to evaluate the nonequivalent groups in this study (McMillan and Schumacher, 2001). Schools were randomly assigned to either the control or the experimental group, utilizing an internet-based random number generator, Research Randomizer (2005). Schools were assigned numbers from a generated alphabetic listing of schools that matched the criteria of the study. The listing alphabetized schools first by county, then by School Corporation, and finally by school name. The first school selected by the random number generator was designated as a control school, the second as an experimental school, and so forth until 12 schools were identified in each treatment group. This process was conducted twice, thus 24 control and 24 experimental schools were selected to increase the probability of a selected school being willing to participate in the study. Individual students served as the population, and their representative schools were randomly assigned to either the control or experimental groups. To ensure cross talk did not occur, participant schools did not contain both control and experimental students.

A total of six control schools and four experimental schools participated in this study. When they were available, multiple classrooms were utilized to maximize student numbers and the researcher's effective teaching time. A total of 17 control classrooms and 11 experimental classrooms were employed in this study. The curriculum was taught over a four-day period; with the pre-test administered on Day 1 and the post-test given to all students on Day 4. Four experimental and nine control classrooms experienced an altered schedule. This altered schedule was a six-day schedule with the pre-test administered on day one, the curriculum taught on days two through five and the post-test given on day six.

The sampling frame consisted of all fifth grade, non-gifted or talented, public classrooms in a Midwestern state. Simple random sampling was utilized in this study, such that each public school containing a non-gifted or talented fifth grade classroom had the same probability of being selected for this study (McMillan and Schumacher, 2001). Schools were randomly assigned to either the control or the experimental group prior to invitation to participate in the study.

Researchers utilized a survey as a pre and post-test instrument. The instrument assessed change in attitude about the pork industry, resulting from the four-day educational swine curriculum (experimental) or from no intervention (control). The survey instrument was pilot tested in several classrooms that met the research criteria to determine if any

items needed to be adjusted prior to administering in the test environment. The same instrument was utilized for both the pre-test and the post-test. Prior to testing, the survey instruments were coded by the researcher using class rosters provided by the classroom teacher. The same code was used on both the pre-test and post-test, as well as on the corresponding consent and assent forms.

The instrument assessed attitudinal changes using a three-point, Likert type scale. "Scales are used extensively in questionnaires because they allow fairly accurate assessments of beliefs or opinions (McMillan and Schumacher, 2001, p. 261)." The scale was bidirectional with a neutral category. The responses were: agree, undecided, and disagree.

A Cronbach's alpha is a measure of internal consistency for attitudinal type statements. In this study, a Cronbach's α was measured and reported for the attitudinal Likert-scale statements. The instrument reported an overall Cronbach's α of 0.712. When looking into each section, the experimental group received a Cronbach's α of 0.654. This score was lower than the overall, and may be explained by the increased thought created by the educational curriculum. The Cronbach's α for the control group was 0.809, which was an acceptable measure for the instrument.

Data for each student included the completed set of both a pre-test and a post-test. If the data set was incomplete, then that student was eliminated from the study. The data were analyzed using the Statistical Package for Social Sciences (SPSS, 2003). Descriptive statistics were gathered for demographics, and attitudinal responses. The Chi-square analysis was utilized to test significance between the attitudinal responses of each statement over time, since the data was both non-continuous and nominal. In addition, paired T-tests were constructed for each question. A MANCOVA was utilized to test the students' pre-test score (covariate) against their post-test score (the dependent variable), allowing the group to serve as the fixed factor; while a MANOVA was used to test questioned demographics for significant differences among experimental students.

The change in attitude from pre-test to post-test between the control and experimental groups was tested for statistical significance using the GLM procedure of SAS (version 8.2). Similarly, the change in attitude from pre-test to post-test of three subgroups (with or without 4-H, farm, and pig experience), within the experimental group were tested for statistical significance using the same procedure.

Results

Two-hundred and thirteen students participated in the control group and 222 students were in the experimental group, for an overall population of 435 fifth grade students. Students in the control group received no treatment between the pre-test and the post-test, while students in the experimental group received four hours of curricular instruction between the pre-test and post-test.

A summary of the demographics of the students who participated in this study is shown in Table 1. The student population consisted of mostly 10 and 11-year-olds who were primarily Caucasian. The overall percentage of students with a 4-H background, farm experience and experience with pigs is similar to the percentages present among control and experimental students.

Table 1. Frequency Distribution of the Demographic Variables of the Sampling Population

	Experimental (n = 222)		Control (n = 213)	
Variable	*f*	%	*f*	%
Age				
< 10	7	3.2	0	0.0
10	91	41.0	99	46.5
11	108	48.6	98	46.0
12	16	7.2	15	7.0
> 12	0	0.0	1	0.5
4-H Background				
Yes	64	28.8	37	17.4
No	158	71.2	176	82.6
Farm Experience				
Yes	109	49.1	99	46.5
No	113	50.9	114	53.5
Pig Experience				
Yes	26	11.7	24	11.3
No	196	88.3	189	88.7

The pre-test and post-test scores for the experimental and control groups are displayed in Table 2. The pre-test analysis of the attitudinal statements indicated only four statements were significantly different, statements 16, 17, 19, and 23; all of which were higher for the experimental group (Figure 1) than the control group. The experimental group had a significant increase in their score on each of the 10 attitudinal statements from the pre-test to the post-test (Figure 2). The experimental group also had a greater increase ($p \leq 0.05$) in their scores from pre to post-test on all of the attitudinal statements compared to the control group. The control group results indicated six statements resulted in a low gain in attitudinal score, one statement resulted in no gain, and three statements resulted in a slight decrease in attitudinal score overtime.

Table 2. Individual test question mean by research group and testing time

Statement	Time	Experimental Mean[a]	Control Mean[a]	p-value
16. I am affected by the pork industry or pig production.	Pre	2.02	1.84	*
	Post	2.33	1.89	*
17. I use products from the pork industry everyday	Pre	2.26	1.95	*
	Post	2.75	2.15	*
18. The pork industry is important to society	Pre	2.58	2.49	0.119
	Post	2.83	2.49	*
19. Pig producers are concerned about the well-being of their pigs.	Pre	2.55	2.50	*
	Post	2.80	2.53	*
20. Pork is a nutritious source of protein.	Pre	2.47	2.46	0.971
	Post	2.77	2.48	*
21. Pig producers are concerned about food safety.	Pre	2.39	2.36	0.932
	Post	2.80	2.47	*
22. Food safety is important in your home.	Pre	2.84	2.80	0.314
	Post	2.90	2.74	*
23. The pork industry makes by-products that save and improve our lives.	Pre	2.19	1.97	*
	Post	2.72	2.10	*
24. Pig producers are concerned about the environment.	Pre	2.27	2.29	0.848
	Post	2.50	2.23	*
25. The choices I make when I shop affect the pork industry.	Pre	2.08	2.10	0.842
	Post	2.72	2.04	*

[a] Response mean
* $p \leq 0.05$

Attitude Gain Within Groups

Upon final analysis, the experimental group raised their attitudinal score a total of 0.41 points from the pre-test to the post-test. This is in comparison to a 0.03 increase in score by the control group. Table 3 and Table 4 display a paired T-test analysis for each of the 10 statements from within the attitude section of the testing instrument, by group. Nine of the ten experimental group statements exhibited a significant ($p \leq 0.05$) increase in score from the pre-test to the post-test, in contrast to three statements exhibiting significant increase by the control group. Within the experimental group, the statement?

Conclusions and Implications

The first objective of this study was to "evaluate the overall change in students' attitude towards the pork industry after participating in an educational swine curriculum." Within the attitudinal section of the post-test, experimental students exhibited significant change on nine of the ten statements, compared to their pre-test rating. These attitudinal changes, which are more positive toward the pork industry, can be attributed to the educational swine curriculum, "There's a Pig in My Classroom."

Overall, the experimental group had a pre-test mean rating of 2.36, while the control group's mean rating was 2.28. Since each group's ratings were between undecided (2.00) and agree (3.00), these findings were similar to Frick, Birkenholz, Gardner, and Machtmes (1995) who found that high school students had relatively positive perceptions of agriculture.

Furthermore, there was significant change on nine of the ten attitudinal based statements from the pre-test to the post-test for the experimental group. Sixty-three experimental students marked a 3.00 for each statement on the post-test; whereas only five control students marked a 3.00. In the post-test mean attitudinal rating, the experimental group increased 0.41 points for an average rating of 2.77. The control group only increased 0.03 points for an average rating of 2.31 on the post-test. These results were in agreement with Boleman and Burell (2003) and Nordstrom, et al. (2000), who found that an educational curriculum or intervention positively increased students' attitudes and or perceptions on agricultural principles. For the purposes of this study, these increases were in positive attitudes towards the pork industry.

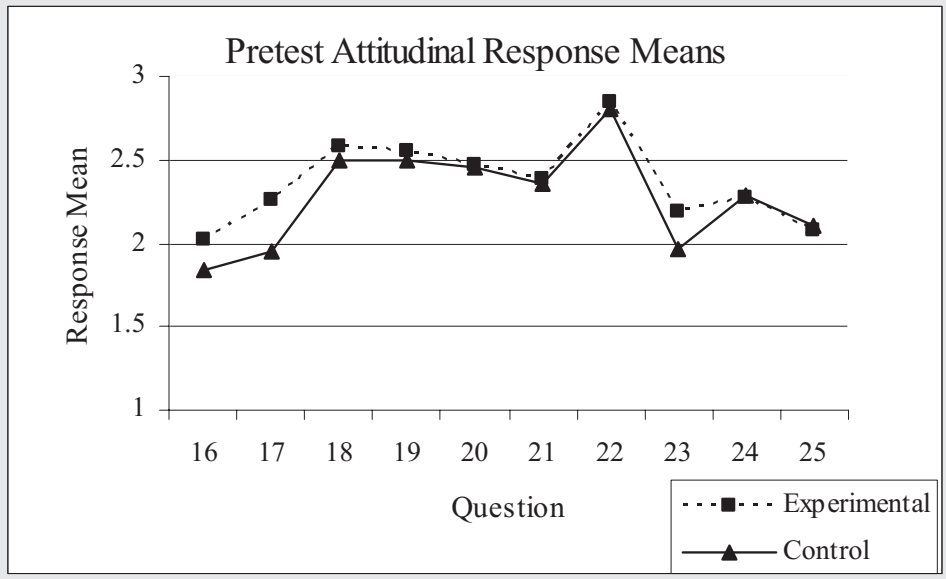

Figure 1: Pretest attitude rating

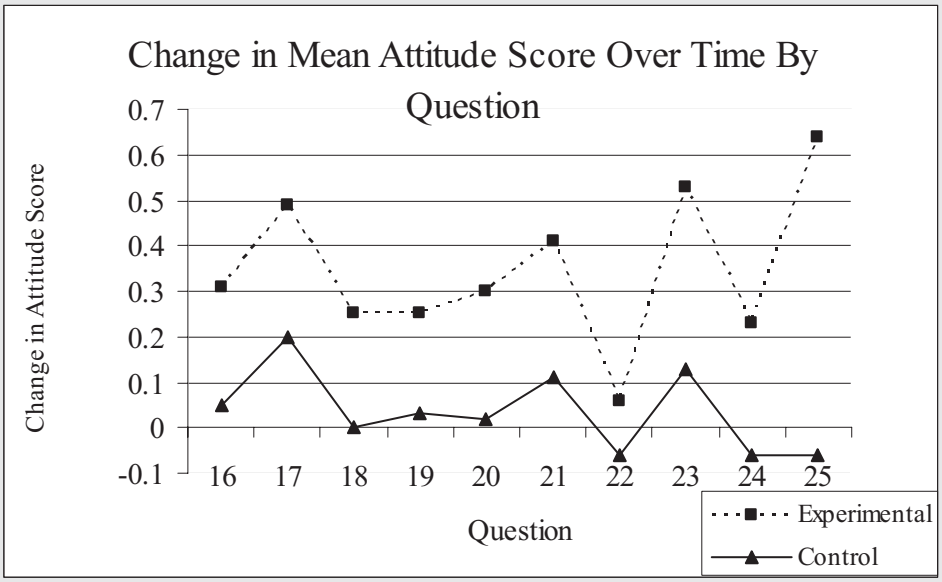

Figure 2: Difference in attitude rating over time

Table 3. Attitudinal pre-test and post-test means and standard deviations for the experimental group

Statement	n[a]	Pre-test Mean[b] (SD)[c]	Post-test Mean[b] (SD)[c]	t	p-value	Difference
16	222	2.02 (.767)	2.33 (.838)	-5.327	*	0.31
17	222	2.26 (.780)	2.75 (.578)	-9.017	*	0.49
18	222	2.58 (.680)	2.83 (.433)	-5.103	*	0.25
19	222	2.55 (.634)	2.80 (.503)	-5.296	*	0.25
20	222	2.49 (.765)	2.77 (.554)	-5.368	*	0.28
21	222	2.39 (.720)	2.80 (.529)	-7.682	*	0.41
22	222	2.84 (.486)	2.90 (.367)	-1.848	0.066	0.06
23	222	2.19 (.699)	2.72 (.597)	-9.158	*	0.53
24	222	2.27 (.744)	2.50 (.717)	-3.527	*	0.23
25	222	2.08 (.809)	2.72 (.573)	-10.893	*	0.64

[a] Number of respondents to that question
[b] Response mean
[c] Standard Deviation
* $p \leq 0.05$

Table 4. Attitudinal pre-test and pos-ttest means and standard deviations for the control group

Statement	n[a]	Pre-test Mean[b] (SD)[c]	Post-test Mean[b] (SD)[c]	t	p-value	Difference
16	213	1.84 (.702)	1.89 (.735)	-0.968	0.334	0.05
17	213	1.95 (.790)	2.15 (.785)	-4.000	*	0.20
18	213	2.49 (.684)	2.49 (.677)	0.091	0.927	0.00
19	213	2.50 (.737)	2.53 (.684)	-0.506	0.613	0.03
20	213	2.46 (.768)	2.48 (.704)	-0.391	0.696	0.02
21	213	2.36 (.731)	2.47 (.684)	-2.122	*	0.11
22	213	2.80 (.503)	2.74 (.572)	1.591	0.113	-0.06
23	213	1.97 (.693)	2.10 (.690)	-2.348	*	0.13
24	213	2.29 (.757)	2.23 (.734)	0.901	0.369	-0.06
25	213	2.10 (.792)	2.04 (.800)	1.080	0.281	-0.06

[a] Number of respondents to that question
[b] Response mean
[c] Standard Deviation
* $p \leq 0.05$

The second objective was to "evaluate the effect of specific demographics on the change in students' attitude towards the pork industry after participating in an educational swine curriculum." The following demographics were assessed to determine whether they had an impact on the change in students' attitude towards the pork industry from pre-test to post-test: previous 4-H experience, previous farm experience, and previous pig experience.

Previous research has shown that 4-H can build leadership and technical skills in participating youth (Gamon and Dehegedus-Hetzel, 1994). These researchers found that 4-H members involved in the swine project attributed life skills development and an improvement in swine subject-matter skills to the swine project. The experimental group's change in attitude from the pre-test to the post-test on the statement, "Pig producers are concerned about the environment," was influenced by previous farm experience. These results are not concurrent with Nordstrom et al. (1999), who found that students with some exposure to agriculture have a more positive view of agriculture than students who have not been exposed to agriculture. However, similar to previous 4-H experience, the author concluded that previous farm experience did not have a significant effect on this study's results when analyzed as a whole.

When analyzing the experimental group's attitude towards the pork industry on the post-test, there was no significant difference between students with previous pig experience. Thus, the researcher concluded that previous pig experience did not affect students' attitude towards the pork industry.

In conclusion, the results of this study are concurrent with the findings of Mabie and Baker

(1996) who found that 5th grade students learned from experiential instruction about agriculture. Specifically, "There's a Pig in My Classroom" was effective at improving students' attitude towards the pork industry. These increases; however, cannot be attributed to outside factors such as previous pig, 4-H, or farm experiences.

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