

Changes in Secondary Students' Perceptions of Agriculture Following an Instructional Intervention by Social Studies Teachers

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Introduction, Purpose, and Objectives

It has been said that “perception is reality.” While this may not be entirely true, perception is complex and heavily influenced by life experiences, social influences, and a range of other factors (McDonald, 2011). Regarding agriculture, a person’s perception is also influenced by participation in agricultural organizations such as 4-H and FFA and their exposure to STEM education (Hoover et al., 2007; Knezek et al., 2013; Riedel, 2006; Scott, 2023). Further, while perception may not be reality, Wachenheim and Rathge (2000) found agricultural perceptions may have substantial impacts on farm legislation and regulations. Moore (2020) found that approximately 61% of Americans were either unsure or only somewhat trusted agriculture (12% and 49% respectively). Moreover, there is an agricultural labor shortage in the United States and the rest of the world (Fabino, 2024; Gunahagya et al., 2017).

Careers in agricultural sciences span beyond traditional farm and production labor, it is inclusive of the “production, processing, marketing, distribution, financing, and development of agricultural commodities and resources including food, fiber, wood products, natural resources, horticulture, and other plant and animal products or resources” (Advance CTE, n.d., para 1). Furthermore, students’ perceptions of agriculture impact their decision-making regarding career choices and academic majors (Ganasih et al., 2023). Jean-Felippe et al. (2017) found that 10th grade urban students who associated agriculture with field labor were less likely to choose an agricultural career. Moreover, the middle school years have been identified as the most pivotal time for encouraging student exploration of STEM careers (Bleeker & Jacobs, 2004; Knezek et al., 2013; Roberts et al., 2018; Schmidt et al., 2012).

To improve perceptions of agriculture, agricultural literacy and competence should be fostered amongst both students and teachers (Benedetti & Crouse, 2020). Agricultural competence can be referred to collectively as the knowledge, skills, abilities, attitudes, and beliefs about agriculture (Lindner & Dooley, 2002; Parry, 1996; Vallera & Bodzin, 2016). Agricultural literacy, for the purposes of this study, is defined as: “possessing knowledge and understanding of the food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about [agricultural science and technology],” its value and how it affects quality of life (Frick et al., 1991, p. 52; Meischen & Trexler, 2003; National Agriculture in the Classroom, n.d.).

The SOCIAL Studies Academy (SOCIAL) was developed to help ease the labor shortage and negative perceptions of agriculture through high-impact professional development for middle school social studies teachers in South Carolina. The program provided multi-year programming focused on the South Carolina social studies standard 8.3.CX (South Carolina Department of Education, 2019, p. 80). Participants are called SOCIAL Fellows or Fellows.

This quantitative study was part of a larger study, and its purpose was to contribute to addressing the agricultural labor shortage by examining SOCIAL as an intervention to build agricultural literacy and competence in South Carolina middle school students through cross-curricular and standards-integrated instruction. The following objective guided this study:

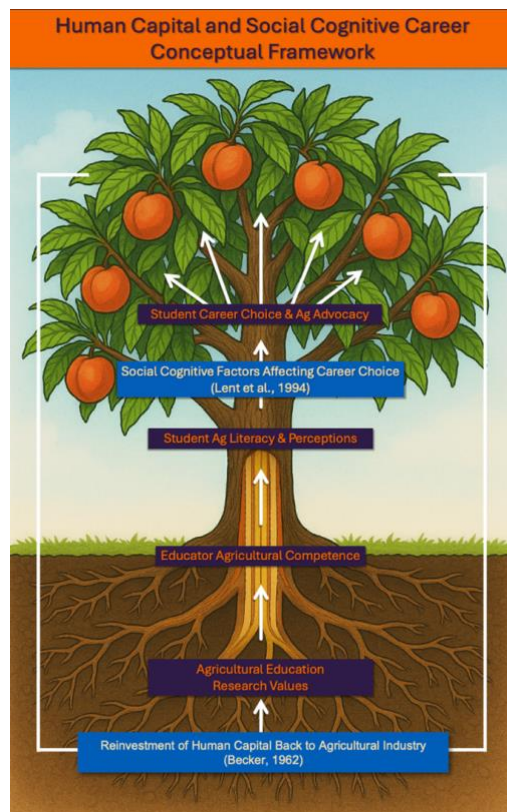
1. Identify eighth grade social studies students' perceptions toward agriculture and agricultural careers before and after a developed lesson plan taught by their teacher.

Conceptual Framework

The conceptual framework for this study (see Figure 1) combined Human Capital Theory (Becker, 1962) and Social Cognitive Career Theory (Lent et al., 1994, 2002). Using the American Association for Agricultural Education (AAAE) *Research Values* (2023) as the root of program development, human capital investments were made into middle school social studies teachers to expand agricultural competence through professional development programming. This was shared with students through standards-based instruction to encourage positive changes in perceptions toward agriculture and agricultural careers. These changes in perception, being a social cognitive career factor (Lent et al., 1994, 2002), may then impact career and academic major decisions in youth beginning at the pivotal middle school years. As students choose careers, some may join the agricultural sector while others may go on to be advocates for the industry, bearing fruit that plants the seed of agriculture as return on investment for the industry.

Figure 1

Peach Tree Model Integrating Human Capital and Social Cognitive Career Theories in Agricultural Education



Methods

SOCIAL Fellows were provided a lesson plan developed and revised by the research team. This plan included a slide deck, hydroponic lab resources, online resources, and a lesson

plan. Fellows were instructed to adapt the lesson plan to suit their preferred method of teaching the material. Because data were collected from minors, both assent and consent were collected after IRB approval. The population in this study was the eighth-grade students ($N = \text{unknown}$) whose teachers were Fellows ($N = 12$) and delivered the provided lesson materials. Four ($n = 4$) schools allowed their Fellows and students to participate, resulting in $n = 256$ student participants. These students were subsequently recruited by their teachers.

The *Perceptions of Agriculture and Agricultural Careers* questionnaire (Talbert & Larke, 1995-a, 1995-b) was used as the instrument. This survey consisted of 27 statements about agriculture and agricultural careers, utilizing a five-point Likert scale: 1 (*strongly disagree*), 2 (*disagree*), 3 (*neither agree nor disagree*), 4 (*agree*), and 5 (*strongly agree*). The survey was administered electronically in Qualtrics (2024) by the students' teacher using a link or QR code provided by the research team. The survey was used as a pre- and post-test with the provided lesson delivered between tests. Participants were provided with an anonymous linker by the Fellow to connect their pre- and post-tests. A post-hoc Cronbach's Alpha reliability test was conducted. The pre-test demonstrated good internal consistency ($\alpha = 0.86$), whereas the post-test demonstrated excellent internal consistency ($\alpha = 0.90$). (George & Mallery, 2003, p. 231).

RStudio (R Core Team, 2023; RStudio Team, 2023) was used for the reliability tests, as well as the paired t -test that was used (Boone & Boone, 2012) for inferential statistics to compare the pre- and post-tests. Both t -statistics and p -values were derived from the t -test. A one-tailed paired-samples t -test of only matched responses was conducted because the intervention was expected to increase post-test scores relative to pre-test scores. Cohen's d was also calculated to provide a measure of "practical significance." A histogram was used to determine the normalcy amongst participants prior to the lesson plan intervention.

Key limitations of this study included the absence of a control or comparison group, restricting causal inference. Instructors' freedom to adapt lesson materials, introducing variability in implementation and teacher background, also provided generalizability limitations. This flexibility was intentionally permitted to reflect authentic classroom practice and align with the objectives of SOCIAL, representing a deliberate design trade-off between standardization and ecological validity. Site participation and sample size were limited due to district-level restrictions on participation.

Results

Respondents who had linked pre- and post-tests were $n = 238$. In the pre-test results, only statements 4 and 5 had negative mean scores (< 2.50). Eight statements had a neutral mean statistic (2.5 - 3.49), and 17 had positive mean values (3.50 - 5.00). Of the tested statements, 10 had a standard deviation of 1.00 or higher. Only statement 4 had a mode of 2, while 11 statements had a mode of 3 and 15 statements had a mode of 4.

Summary statistics for the post-test resulted in one negative mean (statement 4; < 2.50) and seven neutral mean values (2.50 - 3.49). This left 19 statements with an overall positive mean statistic (3.50 - 5.00). Of the standard deviations, 20 statements were 1.00 or higher. Statement 4 maintained a mode of 2. Eight statements had a mode of 3, 14 statements had a mode of 4, and four statements had a mode of 5.

The paired *t*-tests between the pre- and post-tests (Table 1) resulted in an overall increase from pre- to post- with *p*-value < 0.001. Seven of the statements increased from pre- to post- with *p*-value < 0.001, seven additional statements increased from pre- to post- with *p*-value < 0.01), and four additional statements had an increase from pre- to post- with *p*-value < 0.05). One statement had no change from pre- to post-, and four statements decreased from pre- to post-.

Table 1

t-Test Results (n = 238)

Item	N	Pre		Post		Mdiff	t	p	Cohen's d
		M	SD	M	SD				
1	237	3.94	0.78	4.27	0.99	0.33	4.55	< 0.001***	0.37
2	234	3.71	0.87	4.02	1.04	0.31	4.14	< 0.001***	0.33
3	236	3.56	0.91	3.76	1.03	0.20	2.89	0.004**	0.21
4	235	3.71	1.04	3.71	1.09	-0.01	-0.11	0.91	-0.01
5	235	2.51	1.05	2.76	1.14	0.25	3.34	< 0.001***	0.22
6	233	3.16	0.85	3.35	1.04	0.19	2.68	0.008**	0.20
7	226	3.80	1.07	3.80	1.21	0.00	0.00	1.00	0.00
8	232	3.59	0.97	3.78	1.08	0.19	2.32	0.02*	0.19
9	233	3.76	0.87	4.07	0.96	0.32	4.58	< 0.001***	0.35
10	236	3.76	0.91	4.00	0.99	0.24	3.25	0.001**	0.25
11	233	3.83	0.91	3.96	1.00	0.12	1.73	0.09	0.13
12	229	3.58	0.95	4.00	0.91	0.43	5.54	< 0.001***	0.46
13	234	3.74	0.97	4.06	0.96	0.31	4.55	< 0.001***	0.32
14	235	3.77	0.88	4.00	1.02	0.23	2.87	0.004**	0.24
15	230	3.72	0.91	3.67	0.98	-0.04	-0.62	0.53	-0.05
16	228	3.14	1.01	3.17	1.04	0.03	0.35	0.73	0.03
17	236	3.30	0.95	3.49	0.95	0.19	2.62	0.009**	0.20
18	234	3.56	0.98	3.67	1.07	0.11	1.33	0.19	0.10
19	232	3.54	0.92	3.65	0.94	0.10	1.45	0.15	0.11
20	232	2.97	0.98	3.08	1.03	0.10	1.29	0.20	0.10
21	229	3.28	1.05	3.45	1.09	0.17	2.38	0.02*	0.16
22	230	3.82	0.88	3.81	1.04	-0.01	-0.06	0.95	0.00
23	234	2.57	1.15	2.81	1.18	0.24	3.12	0.002**	0.21
24	234	3.25	0.98	3.64	1.02	0.39	5.55	< 0.001***	0.39
25	232	3.73	0.98	3.88	0.99	0.15	2.05	0.04*	0.15
26	236	3.10	1.05	3.28	1.22	0.18	2.51	0.01*	0.15
27	236	3.65	0.95	3.83	1.07	0.19	2.77	0.006**	0.18
Tot.	238	3.48	0.43	3.66	0.57	0.17	6.04	< 0.001***	0.34

Note. Scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree. * = *p* < 0.05; ** = *p* < 0.01; *** = *p* < 0.001.

Discussion, Conclusions, Implications, and Recommendations

Upon examination of *t*-test results, 18 of 27 results were statistically significant, seven of which had correlations that were $p < 0.001$. Further, the overall *p*-value across all statements was < 0.001 . Of the statements that were considered statistically significant, statements 3, 6, and 17 involved earnings and investments in agricultural careers. The correlations from these statements may suggest that students' perceptions of an agricultural career as a financially viable career choice improved from the treatment. Statements 8, 10, 14, and 27 were associated with an increased awareness of the various types of agricultural careers that exist, as well as how diverse the field of agriculture is. This may address the negative implications of false perceptions that relate agriculture to manual field labor (Jean-Felippe et al., 2017). There was a significant correlation regarding the change in student interest as well, as seen by the results of statements 21, 23, 25, and 26. This positive increase in interest and perceptions could imply future impacts on career choice by students (Lent et al., 1994, 2002).

Furthermore, statement 2 may suggest there is a very strong change in perception of agriculture as a viable career option. Increasingly, statement 1 shows a strong statistical change in student awareness of job opportunities, which is supported by the very significant findings of statements 9, 12, and 13. Statement 5 was associated with students' increased interest in not only careers, but in the business side of agriculture through the exposure of the lesson. The lesson also may have provided insight to the intellectually demanding side of agriculture (statement 24).

Statements 7 and 20 results suggest that agricultural jobs are predominantly limited to farming, which aligns with Jean-Felippe et al. (2017). However, this is inconsistent with the results of statements 8, 9, 10, 12, 13, 14, and 27. While not supportive of the other results, it may suggest that students still strongly associate agriculture with farming, despite the heightened awareness of other opportunities. This may also be influenced by a variety of factors—school location, student background, teacher presentation of material, and the students' ability to disconnect from their traditional views of agriculture. Another consideration is whether students felt that all the various career opportunities were connected to farming and thus agriculture was still predominantly farming. While this may indicate more student learning/exposure to the industry may be needed, it does not negate the framework of this study, which uses their non-agricultural teachers as the vehicle for knowledge.

SOCIAL may provide effective, positive human capital investments (Becker, 1962) into teachers that help integrate agriculture and agricultural careers into instruction. Furthermore, student perceptions improved and may be influenced to pursue agricultural careers and academic majors. Students demonstrated improved technical understanding of agriculture and also garnered insights into the economic viability of the agricultural industry and its careers. Moreover, results suggest instructional materials aligned with standard 8.3.CX and were implemented within typical classroom contexts.

High impact professional development programming like SOCIAL may provide growth in the agricultural sector. The conceptual framework of this study is built on the notion that the investments into teachers through professional development programming would be carried to the students, with the teachers as the vehicle. This transfer of knowledge would provide influence on the factors affecting student career choice (Lent et al., 1994, 2002). Therefore, there is potential for growth in the agricultural industry through the education and development of middle school social studies teachers and teachers of other grades and disciplines.

Professional development programs that educate and promote agriculture and agricultural careers may result in an increase in student interest. This interest could result in higher enrollments in agricultural youth organizations like 4-H and the National FFA Organization (including school-based agricultural education programs). Based on the framework of this study (particularly SCCT [Lent, et al., 1994] and the resulting engagement in the agricultural industry), the implications of such programming could result in students who not only participate in organizations but also choose to pursue agricultural degree programs and careers.

Increased enrollment in youth leadership organizations like FFA and 4-H after the middle school years may also result in an even larger awareness of agricultural careers, have positive impacts on career perceptions and aspirations, and improve student leadership skills and career readiness (Scott, 2023). This resulting participation may also lead to an increase in agricultural education and advocacy for the agricultural industry (Scott, 2023). Overall, this could increase the diversity and equitable access to agriculture and agricultural literacy through an increase in non-traditional student involvement in the industry. An increased interest in the agricultural industry in the middle school years may see greater longitudinal returns through opportunities pursued in the high school years, which could lead to an overall increase in agricultural workforce participation and industry advocacy.

Cross-curricular collaboration among agricultural educators and educators in other disciplines could promote student awareness of agricultural careers and growth in the agricultural sector. Agricultural education departments in institutions of higher education should explore curricula and state standards to identify opportunities for cross-curricular integration for agricultural career exploration. Likewise, school administrators are encouraged to promote cross-curricular initiatives and participation in high-impact professional development programming that equips teachers and students with a broader understanding of viable career pathways.

Future research should build on this work by incorporating control or comparison groups to strengthen causal inference related to instructional interventions delivered by non-agricultural educators. Studies employing larger and more diverse samples across districts and school contexts would further enhance generalizability. Additionally, longitudinal research is needed to examine whether changes in student perceptions persist over time and translate into subsequent enrollment in agricultural courses, participation in youth agricultural organizations, and career-related decision-making.

Agricultural teacher educators are also encouraged to seek funding opportunities to support expanded engagement with core subject-area teachers, including social studies educators. Providing joint professional development opportunities—such as training on middle school curricula like CASE AgXplore—for both agricultural and core-area teachers may foster sustained interdisciplinary collaboration and increase access for non-traditional students.

Finally, agricultural teacher educators and professional organizations should consider engaging with core-content educators through state conferences, workshops, and experiential learning opportunities. Inviting core-area teachers to participate in activities such as agribusiness tours or summer professional development experiences may provide exposure similar to that offered in the program examined in this study and further strengthen cross-disciplinary partnerships that support agricultural career awareness.

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