THESIS

ASSESSING THE IMPACT OF THE DIGS CURRICULUM ON AGRICULTURAL LITERACY IN YOUTH

Submitted by

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ABSTRACT

ASSESSING THE IMPACT OF THE DIGS CURRICULUM ON AGRICULTURAL LITERACY IN YOUTH

This research examines the impact of the DIGS curriculum on agricultural literacy, the breadth of agricultural understanding, and affinity for agriculture. The DIGS curriculum is a third thru fifth-grade curriculum emphasizing hands-on, interactive lessons in eight agricultural pathways. Students participated in each lesson and completed a supplemental activity in the DIGS booklet. This curriculum was implemented over a school year with one monthly lesson and activity.

Chapter one assesses the impact of DIGS on agricultural literacy. Researchers define agricultural literacy as understanding agriculture as an integrative system built on experiences, relationships, and inspiring investment in the future of agriculture. The Longhurst Murray Agricultural Literacy Instrument (LMALI) is used to collect pre- and post-scores to evaluate the agricultural knowledge of participants. Researchers then assessed the breadth of agricultural understanding by completing a content analysis on the booklets. The breadth of understanding is broken into three themes based on the definition of agricultural literacy: (1) agriculture as a system, (2) agriculture and relationships, and (3) the future of agriculture. Researchers found that DIGS participants had increased LMALI scores after completing the curriculum, and many had evidence of a breadth of agricultural understanding.

Chapter two assesses the impact of the DIGS curriculum on students' affinity for agriculture. Students responded to an affinity survey at the end of the curriculum and completed

monthly activities in their DIGS booklets. Researchers performed a content analysis on the booklets and post-curriculum posters to evaluate how students felt about the curriculum and agriculture throughout the process.

Researchers found that many students had or developed an affinity for agriculture during the curriculum. Many shared thoughts of wanting to participate in agricultural activities and reported that the curriculum was “fun” and that agriculture was “important.”

This project demonstrates the impact of the DIGS curriculum on agricultural literacy, a breadth of agricultural understanding, and affinity for agriculture. Overall, the findings show that DIGS impacted all three of these areas; increasing agricultural literacy based on knowledge, demonstrating a breadth of understanding in agriculture, and developing an affinity for agriculture throughout the curriculum.

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CHAPTER 1 - AGRICULTURAL LITERACY AND BREADTH OF UNDERSTANDING

Introduction

Elementary agricultural education was introduced to schools in the early 1900s by Garland Bricker (1911), who emphasized agriculture's place among other sciences such as chemistry, botany, physics, and physiology (Hillison, 1998). Shortly before this, the industrial revolution saw a decrease in individuals' involvement with production agriculture due to the increase in automation, crop production improvements, and the United States suburban population (Burrows et al., 2020). This decrease in agricultural involvement and agriculturally literate individuals led to the necessity of elementary agricultural education to educate the next generations of informed agricultural consumers and political and economic influencers (Burrows et al., 2020).

With the introduction of National Agriculture in the Classroom in 1981 and other elementary agricultural education efforts, the need to evaluate the efficacy of agricultural literacy in youth has risen. This paper seeks to assess the impact of the DIGS (Developing Individuals, Growing Stewards) curriculum on knowledge and breadth of understanding in agriculture.

In 1988, agricultural literacy was introduced as the "understanding of the food and fiber system [that] includes its history and current economic, social, and environmental significance to all Americans" (National Research Council, 1988, p. 8). Frick (1990) defined an agriculturally literate person 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 agriculture" (p. 41). Kovar and Ball added the ability to understand agriculture to lessen "current challenges facing agriculture through good decision making"

(2013, p. 168). The definition of agricultural literacy was further adapted within the 2013 Agricultural Literacy Logic Model to describe "a person who understands and can communicate the source and value of agriculture as it affects our quality of life" (Spielmaker et al., 2014, p. 2).

While agriculture literacy definitions may vary slightly, general themes that emerge from each description include that an agriculturally literate individual understands agricultural concepts, values the relationships within agriculture, effectively communicates agricultural ideas and transfers their understanding into decision making.

This paper defines agricultural literacy as understanding agriculture as an integrative system built on experiences, relationships, and inspiring investment in the future of agriculture (affinity). Based on this definition of agricultural literacy, the author of this paper emphasizes and evaluates the difference between basic agricultural knowledge and breadth of understanding.

Purpose/Research Questions

The increasing need for agriculturally literate individuals inspired the Colorado State University (CSU) program of Agricultural Education and CSU Extension AmeriCorps. The DIGS (Developing Individuals, Growing Stewards) curriculum was developed to respond to the need. This curriculum is written for third thru fifth-grade students and is designed to introduce students to eight agricultural pathways in Colorado. The lessons provide a positive experience with agriculture through hands-on, interactive learning. Students not only hear about agriculture; they are deeply immersed in specific areas in the industry.

The curriculum uses a three-level strategy to engage students at three different ages. Third-grade students participated in introductory lessons, fourth-grade in Colorado Agriculture lessons, and fifth-grade in diving deeper lessons, combining agriculture and STEM (science, technology, engineering, and math). See Appendix A for the complete DIGS curriculum matrix.

The purpose of this research is to explore the impact of the DIGS curriculum on students' agricultural understanding, agricultural literacy, and their interest and connection to agriculture in two elementary schools.

This research project assesses the impact of various agricultural literacy outcomes due to the DIGS curriculum. The first half, Chapter 1 of this thesis, focuses on the impact on agricultural literacy and understanding of the breadth of agriculture. The second half, Chapter 2, focuses on the impact of DIGS on students' emotional connection to agriculture, or affinity. The thesis includes two chapters because the amount of data and specificity of the questions were too distinct for one paper.

The research questions addressed in this chapter were:

1. Did the DIGS curriculum impact students' agricultural knowledge?
2. How does the DIGS curriculum impact students' breadth of understanding in agriculture?

This paper addresses the history of agricultural literacy, the various definitions, the assessments for youth agricultural literacy, and the role of agricultural curriculums in elementary schools. It assesses how DIGS impact agricultural knowledge and breadth of understanding in youth. Researchers utilize a mixed-method approach to evaluate DIG's impact on participants' agricultural literacy.

Literature Review

Introduction

This research project focuses on youth's agricultural literacy and, more specifically, agricultural knowledge, including (a) origins and definitions of agricultural literacy, (b) assessments of agricultural literacy, and (c) agricultural literacy in elementary schools.

Agricultural Literacy

When many families were directly involved with production agriculture, there was “a common agrarian culture and heritage [resulting] in a shared sense of agricultural literacy” which arose “from intimate familiarity with the production, distribution, and use of agricultural products” (Powell et al., 2008, p. 87). According to the USDA, there are about 19.7 million full and part-time jobs in United States food production. However, only about 1.4% of those, or about 2.6 million jobs, are directly related to agricultural production (USDA ERS, 2022). The decrease of those involved in production agriculture and the increase in urbanization may lead to “societal disconnections with the agricultural industry” (Burrows et al., 2020, p. 358). Agriculturally literate individuals break through those disconnections and help shape “attitudes towards agriculture’s important role in our everyday lives” (Burrows et al., 2020, p. 359).

This disconnect began following the industrial revolution due to fewer people’s involvement in production agriculture (Burrows et al., 2020). To face this rising issue, the National Research Council (NRC) introduced agricultural literacy around 1988. The NRC described an agriculturally literate person as someone who “would understand the food and fiber system and this would include its history and its current economic, social and environmental significance to all Americans" (NRC, 1988, p. 8). This publication also recommended an agricultural curriculum in elementary schools starting in kindergarten and lasting through twelfth grade, despite background or career interests (NRC, 1988).

A couple of years later, Frick et al. (1991) suggested adapting this definition to include “possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (p. 52).

In 2008, Powell et al. added the “ability to think critically and make value judgments” regarding agriculture from environmental, economic, societal, and political standpoints (p. 86). They defined an agricultural literacy person as “able to analyze and evaluate “trade-offs” to individuals and society resulting from agricultural enterprises.” They can “enter into discourse about and make decisions” surrounding agriculture and society (Powell et al., 2008, p. 86).

Other definitions were written by Kovar and Ball (2013) and the American Farm Bureau Foundation for Education (2013). The former noted the importance of making informed decisions by understanding various agricultural impacts. They shared that this ability could “lessen current challenges facing agriculture” (Kovar and Ball, 2013, p. 168). The American Farm Bureau Foundation for Education mentioned the importance of seeing agriculture as a system with ″all of the industries and processes involved in the production and delivery of food, fiber, and fuel that humans need to survive and thrive" (2013, p. 2).

These definitions vary slightly and have different main foci, but general themes emerge from each. These themes include seeing agriculture as a system with interacting pieces, the importance of relationships, an investment in agriculture based on critical thinking and decision making, and the drive to face problems facing the agricultural industry.

Based on these themes, researchers here define agricultural literacy as understanding agriculture as an integrative system built on experiences, relationships, and inspiring investment in the future of agriculture. This definition touches on knowledge of the industry and the breadth of understanding. Students take factual information about agriculture and assign meaning to a broader system.

Assessing Agricultural Literacy

After defining agricultural literacy, the next step is to explore how researchers assess and evaluate the literacy rates of individuals. Similar to the definition, the assessment of agricultural literacy has evolved over the years.

One of the earliest forms of assessing agricultural literacy was introduced by Leising & Zilbert (1994), who proposed what would be known as the Food and Fiber Systems Literacy (FSSL) Framework in 1998 (Pense & Leising, 2004). The framework had five themes with questions of varying complexity at benchmarked groups of grade levels: 1). Understanding food and fiber systems; 2) History, geography, and culture; 3) Science, technology, and environment; 4) Business and economics; and 5) Food, nutrition, and health (Powell & Agnew, 2011). Spielmaker et al. later developed the National Agricultural Literacy Logic Model, which "provides a theoretical framework for critical agricultural literacy research and program evaluation" (2014, p. 2). This model helped create the National Ag Literacy Outcomes (NALOS) framework through Utah State University (Spielmaker & Leising, 2013), which slightly adapted the five themes from the FSSL Framework. These themes include Agriculture and the Environment; Plants and Animals for Food, Fiber & Energy; Food, Health, and Lifestyle; Science, Technology, Engineering & Math; Culture, Society, Economy & Geography (Spielmaker, & Leising, 2013). These themes were then broken into early elementary, upper elementary, middle school, and high school categories with outcomes for each. While not a form of the assessment, this framework helped shape evaluation techniques within agricultural literacy to assess a student's agricultural literacy.

This paper utilizes the Longhurst Murray Agricultural Literacy Instrument (LMALI), a 3rd – 5th-grade agricultural literacy assessment based on NALOS and proficiency stages for included grade levels (Longhurst et al., 2020). This assessment has 15 questions, one for "each

proficiency stage in each of the five NALO themes" (Longhurst et al., 2020, p. 179). These proficiency stages include exposure, factual literacy, and applicable proficiency (Longhurst et al., 2020), emphasizing the different levels of understanding outlined in some definitions of agricultural literacy. This includes the difference between being exposed to the industry versus being able to apply that knowledge to an individual's life and developed a deeper understanding.

Elementary School Agricultural Curriculum

School-based agricultural education is not a new concept and was partly inspired by the introduction of agricultural literacy mentioned above. Before the NRC recommended elementary agricultural education, Bricker introduced the importance of agricultural education in elementary schools in the early 1900s, citing its place in education next to other topics such as chemistry, physics, botany, and physiology (1911, in Hillison, 1998).

A few years later, 21 states required agricultural education in rural schools, and half that number required agricultural education in urban schools (Hillison, 1998). These earliest curriculums focused on themes determined by each state and utilized various techniques. The consistency between the states included themes such as plants and animals and the use of hands-on projects to immerse students in the topic (Hillison, 1998). There was an early focus on appealing to "students' senses with touching and feeling of natural objects and drawing of natural objects" (Hillison, 1998, p. 17).

Years later, the development of Agriculture in the Classroom (AITC) influenced the elementary agricultural curriculum. The state-based, grassroots, agricultural literacy effort looked to various partners, volunteers, and individuals to provide "agriculture education in a way best suited to its own needs" for each state (National Agriculture in the Classroom, 2020, p. 1). AITC provides resources and support for each of these state programs and works with the United

States Department of Agriculture and other stakeholders to ensure its success (National Agriculture in the Classroom, 2020).

Today, organizations and individuals work to bring agriculture into students' lives through the classroom. This drive to have agriculturally literate youth is inspired by the desire for individuals who can address future "global food supply chain insecurities" and for a generation "encouraged to aspire to a career in agriculture which is vital to attracting and retaining the future workforce" (Cosby et al., 2022, p. 1).

Efficacy of Elementary Agricultural Education

Based on the discussion above, elementary-aged students have resources and opportunities to engage in agriculture and learn about the industry. However, there is a gap between these lessons, the delivery, and students' learning demonstrated by recent research focused on youth agricultural literacy.

A lack of agricultural literacy is seen in elementary students from various locations and backgrounds. Research has demonstrated that elementary students' knowledge of agriculture is lacking, leading to misconceptions about the food industry (Hess & Trexler, 2011). It has also been found that those who grew up in a rural area did not necessarily know more about the agricultural industry compared to their urban classmates. Meischen & Trexler (2003) found that students raised in rural areas "lacked understanding of agricultural concepts" (p. 52). During a study of eighteen 10- and 11-year-old students, researchers found participants "displayed a limited understanding" of agriculture and "held no discernable understanding that crops" and food come from various places (Trexler, Hess & Hayes, 2013, p. 55). Research has demonstrated that many students in elementary schools "do not exhibit high levels of agricultural literacy" (Brandt et al., 2017, p. 145).

On the other hand, elementary agricultural education impacts some students' agricultural understanding. Mabie and Baker (1996) highlighted some students' ability to connect certain commodities and products, such as pigs and bacon, corn and tortillas, sheep and wool, and cotton and t-shirts. With experiential learning in agriculture, students can better explain agriculture and share the names of crops grown (Mabie and Baker, 1996). Knobloch et al. (2007) also demonstrated that some elementary school teachers believe that "agriculture [provides] situatedness, connectedness, and authenticity to teach their content areas to their students" (p. 32). Elementary agricultural education can connect students to other areas of learning, such as food and nutrition, history, literature, the ecosystem, and the interrelationships between humans and nature (Knobloch et al., 2007; Hillison, 1998).

The history of elementary agricultural education started in the early 1900s and has adapted throughout the years. While the impact has varied, the emphasis on experiential learning and the importance of agricultural education in elementary schools has stayed the same (Hillison, 1998).

Research Method

This project assesses the impact of the DIGS curriculum on participants' agricultural literacy, specifically agriculture knowledge and breadth of understanding. Knowledge of agriculture and the breadth of agricultural understanding were evaluated using a mixed-method approach which collected qualitative and quantitative data to answer the research questions.

The protocol for this research was submitted to the Institutional Review Board (IRB) at Colorado State University. It was approved on September 13, 2021, under protocol #2163.

Participants

This research project utilized an opportunity sample of 92 students at Yampa Elementary School and Hayden Elementary School in Colorado. These two schools earned the RISE grant offered throughout the state of Colorado.

School #1, referred to throughout this paper as Yampa Elementary, had a student population of 22 third-graders, 16 fourth graders, and 20 fifth graders. These classes are titled Yampa 3rd, Yampa 4th, and Yampa 5th grade. These students received the curriculum twice a month from the same teacher each time. Students participated in the monthly DIGS lesson for each pathway during the first visit and did the DIGS booklet activity during the second. These students completed the LMALI assessment before and after the curriculum and completed the activity booklets.

School #2, referred to as Hayden Elementary, had a total student population of around 98 students. However, only the third-grade classes completed the DIGS curriculum. This population included 32 students: 16 in each class. These are called Hayden 3rd Grade Class 1 and 2. At Hayden, the students' regular teacher was responsible for delivering the curriculum. This school opted out of completed the DIGS booklet and instead completed post-curriculum posters.

The lessons' materials were delivered bi-monthly to both schools, two lessons at a time. Each class was provided the lessons and necessary materials for every lesson in the curriculum. Regular emails and correspondence were sent to the teachers from DIGS facilitators to ensure support throughout the process.

Activity Booklet Development

To evaluate the impact of the DIGS curriculum on the breadth of agricultural understanding, researchers created an activity booklet that asked students to share what they

learned and complete a small activity for each monthly lesson. Each grade level (third, fourth, and fifth) completed a different activity booklet with similar activities and questions based on the age level and age-appropriate lesson completed. The questions included in the book were related to the activities and agricultural pathways delivered that month. Please see Appendix B for the DIGS activity booklets.

For example, the "What is Agriculture" pathway questions focused on broad agriculture, while questions for the "Power, Structure, and Technology" pathway focused more on energy production and engineering. Some of these questions included:

- What do you think a world without agriculture would be like? Draw a picture below!
- Why should we care about the different commodities grown in Colorado?
- How would we farm or ranch without energy?

Collecting this qualitative data throughout the DIGS curriculum delivery provides the ability to evaluate the impact of the DIGS curriculum on participants' knowledge and their breadth of agricultural understanding.

Methods

Quantitative data was collected via the Longhurst Murray Agricultural Literacy Instrument (LMALI). LMALI was written for 3rd – 5th-grade students to assess their agricultural literacy based on the National Agricultural Literacy Outcomes (NALOS). The 15-question survey assessed what students know, understand, and can apply within agriculture based on three proficiency levels according to the number of correct responses: exposure, factual literacy, and applicable proficiency (Longhurst et al., 2019; & Longhurst et al., 2020). Those who answer seven or less questions correctly are at the exposure or developing level. Those who answer between eight and eleven correct are at the factually literate level. Finally, those who answer 12

or more questions correctly are at the proficient level (Longhurst, et al., 2019). Please see Appendix C for the LMALI assessment.

Students completed this assessment before participating in any activities and after the curriculum. LMALI assessment scores were collected from both Yampa and Hayden Elementary. This provided data from 75 students between schools.

Qualitative data was collected via the DIGS activity booklets. These were collected from 58 students at Yampa Elementary. Due to researcher limitations, the DIGS posters completed by Hayden Elementary were not used in this part of the research project.

The DIGS activity booklets were collected from students at the end of the curriculum implementation. A team of coders was chosen to analyze these booklets. These individuals were separate from RISE grant and research procedure at either school. It included a variety of individuals who work in agricultural literacy including education, extension, and communication. The content analysis performed by this group of individuals was framed by three themes that were previously identified by the researcher's definition of agricultural literacy: agriculture as a system, agriculture and relationships, and future of agriculture. As explained by literature, these three frames were seen by researcher as essential components of agricultural literacy development.

Collecting this qualitative and quantitative primary data throughout the DIGS curriculum delivery provides the ability to evaluate the impact of the DIGS curriculum on participants' knowledge and their breadth of agricultural understanding.

Discussion

The pre-and post-curriculum survey was analyzed using a paired t-test to see the change in average scores and assess the significance of the shift (Creswell & Guetterman, 2018).

Researchers took the scores students earned on the LMALI assessment and compared them to the scores they received after completing the curriculum. The paired t-test looked at the change between scores and determined that the change was significant.

Researchers performed a qualitative content analysis to assess the activity booklets for the presence of breadth of agricultural understanding. This systematic analysis is the "assignment of communication content to categories according to rules, and the analysis of relationships involving those categories using statistical methods" (Riffe et al., 2014, p. 3). Through this process, researchers were able to identify patterns and indication of breadth of agricultural understanding.

The primary instruments used in this analysis were a researcher-developed coding procedure and code sheet. Broad categories were established based on the definition of agricultural literacy used in this project. Using an emerging coding method, researchers further established specific frames based on an initial review of the booklets (Stemler, 2000). Please see table 1 for frame descriptions.

Researchers created a coding procedure and code sheet based on these frames using an inductive process. Please see Appendix D for a complete procedure. The coding procedure included a description of each of the frames and examples for each in order to help researchers identify the frames within each booklet. The code sheet was broken into three sections based on the frame. Each frame asked the coder to report three variables: 1) student name, 2) location in the activity booklet, and 3) quote or drawing description. To ensure consistency, the coding procedure asked coders to indicate when the presence of a frame was in the form of a picture.

Table 1

Frames Used to Identify the Presence of Breadth of Agricultural Understanding

Frame	Description
Agriculture as a System	Referring to the student's ability to recognize that there is more than one part of agriculture. Examples included noting other pathways within an activity page, such as mentioning crops on the "Power, Structure, and Technology" page or bringing up cattle on the "Seasons" page. Writing out these other parts of agriculture demonstrated that the students understood that there is more than one part of agriculture; it is a system of interacting pieces that rely on one another
Agriculture and Relationships	Referring to the importance of people in the agriculture industry. Phrases or pictures coded with this theme included those that mentioned any people, including but not limited to the lack of money for farmers if crops die or the need for farmers to have help when they are sick.
Future of Agriculture	Referring to the students themselves. This was coded for any times the students mentioned any interest in agriculture or shared an interest they had that was related to the agricultural industry. Examples included caring for their horses, loving cows, and driving a tractor.

Researchers chose to use a hand analysis for this procedure because it allowed coders to fully evaluate the whole picture of the students' work. Researchers did not believe that a computer software would be able to completely assess the entirety of the students' quotes and drawings throughout the booklets.

After the coding procedure and frames were established, a team of three educators were trained to read the booklets and use the procedure and code book. During this process, coders were able to assess the clarity of the coding process and discuss reliability. Intercoder reliability was established by discussing each of the frames thoroughly before beginning the coding process to set a clear understanding of each. The team of coders coded 38% (n=22) of the booklets as a group to ensure consistency and clarity in coding.

Results

Research Question 1

Students completed the LMALI assessment before participating in the DIGS lessons and when the curriculum was complete. Five classes completed the curriculum and provided data on knowledge change. The change in average scores for each class is in table 2.

Table 2
Average Pre- and Post-Scores for LMALI, including change and p-value

Group	*Average Pre-Score*	*Average Post-Score*	*Change*	*P-Value*	*Responses*
Yampa, 3rd Grade	7.048	7.778	0.73	0.428	n=16
Yampa, 4th Grade	6.143	9.143	3	0.001*	n=12
Yampa, 5th Grade	6.688	9.368	2.68	0.001*	n=15
Hayden 3rd Grade Class 1	7.133	8.8	1.667	0.016*	n=15
Hayden 3rd Grade Class 2	7.286	10.385	3.099	0.0005*	n=13

*$p < 0.05$

As demonstrated by the data above, each class improved agricultural literacy scores. The p-value for all but one class shows that this change was significant; the students' LMALI scores were significantly different before and after the curriculum. The average pre-score for every class before the curriculum indicates that they were at the "exposure" or developing level of agricultural literacy, according to the LMALI proficiency levels (Longhurst et al., 2019). Following the curriculum, the average score for these classes moved four of the five classes to the "factually literate" level of LMALI. This indicates that students' agricultural literacy rates increased after participating in the curriculum.

Research Question 2

To assess the breadth of agricultural understanding, a team of researchers analyzed the DIGS booklets to locate quotes based on three frames. There were 58 booklets returned from

students, and 52 of these had quotes in at least one of these themes. The quotes ranged between students and between grade levels, but each theme was present throughout the curriculum.

The first frame, agriculture as a system, identified students' understanding that agricultural pathways interact; there are multiple aspects of the agricultural industry. This was identified within 72 quotes among 58 booklets. Examples of these quotes include:

- Energy is important because "you can water your plants."
- "You have to have power when working or plowing."
- "Without inventions, you can't farm."

Agriculture and relationships, the second frame, was highlighted in 73 quotes among the 58 booklets. This was focused on the importance of people in agriculture; agricultural pathways impact people from different viewpoints such as personal, financial, etc. Some of these quotes included:

- "Inventions make it easier for the farmer."
- "If it was winter all year around we would not be able to grow anything and not be able to get any work done in the snow."
- Without bees… "no food, no air, no flowers, no people, no earth, everything."

Finally, the third frame, the future of agriculture, zoomed in on the students' abilities to view themselves as a part of agriculture, either present or future. Fifty-eight booklets included quotes that demonstrated this 59 times. Examples of these quotes included:

- "We need to feed our planet."
- "So that we can feed us and animals and the whole world."
- Do certain activities because "I like them because I never drive tractor or test crops."

Table 3 shows the frequency of quotes per frame for each grade. This includes the percentage of booklets that had at least one quote indicating the frame, the total number of books that had frames present, and the total number of quotes for each frame and theme.

Table 3

Frequency of quotes for each breadth of understanding theme

Frame	Group	%	*n (booklets with quotes)*	*n (total number of quotes)*
System	3rd Grade	72	16	19
	4th Grade	56	9	19
	5th Grade	80	16	31
Relationship	3rd Grade	77	17	29
	4th Grade	86	14	36
	5th Grade	30	6	6
Future of Agriculutre	3rd Grade	55	12	16
	4th Grade	50	8	14
	5th Grade	95	19	27

Discussion

Research Question 1

The significant change in LMALI scores, as mentioned above, demonstrated that the DIGS curriculum impacted students' agricultural knowledge. The DIGS curriculum focused on various agricultural pathways in Colorado, which may have played a significant role in the knowledge increase according to the LMALI scores. The LMALI assessment focuses on different topics in agriculture, from economics to crop growth (Longhurst et al., 2020). The variability of the DIGS curriculum may have helped increase the LMALI scores, given the number of topics touched upon in the assessment.

Throughout the curriculum, students participated in a 30-minute lesson written by DIGS facilitators. These lessons emphasized hands-on learning, encouraging students to have fun while

learning about agricultural pathways. Students then completed a follow-up activity that further discussed the pathway being focused on that month. Throughout this process, students were consistently exposed to agriculture and learned about the many factors within the industry, their importance, and how they relate to them. This hands-on, interactive approach may have played a role in the knowledge increase demonstrated by LMALI.

Research Question 2

Researchers here recognize the importance of going beyond basic understanding when discussing agricultural literacy. While knowledge is essential, the role of deeper learning is highlighted. This breadth of understanding dives into recognizing agriculture as a system built on relationships encouraging individuals to see themselves in the industry's future. The three frames were chosen based on definitions of agricultural literacy.

The quotes above demonstrate that students developed a breadth of agricultural understanding throughout the DIGS curriculum. They were able to identify those different pathways in agriculture, such as plant systems or food products, are not isolated aspects of agriculture. These are part of a more extensive system with multiple factors at play. Identifying the presence of various pathways was most common within the Power, Structure, and Technology pathway. Twenty-five students noted within the activity page that agricultural inventions impacted or played a role in growing crops, raising livestock, and making money. The student's ability to understand that different pathways are present simultaneously and interact with one another demonstrates that the DIGS curriculum deepened their understanding of agriculture as a system, not as isolated parts of an industry.

The DIGS curriculum also influenced students' understanding of agriculture as it pertains to relationships. This frame explicitly focused on the relationship of agriculture to humans and

vice versa; how the two impacts one another. Many students discussed that the crops were necessary for people's finances and survival. The students shared that they thought that if a farmer's crop failed due to the weather, then they would have no money and no food to eat. One also highlighted the importance of relationships between people in agriculture, focusing on the need for individuals within the industry to help one another:

"If a farmer gets sick and no one could help, then crops will die."

This demonstrates that students saw relationships between people and agriculture and people in the industry.

Finally, the DIGS curriculum and activity booklet demonstrated that the students expressed interest in the future of agriculture and their current role within the agricultural system. These quotes emphasized how they are responsible for caring for animals and are interested in different agricultural activities. Participants' experience and background in agriculture varied, but all students except a handful expressed interest in engaging in agricultural activities such as driving a tractor, raising livestock, testing crops, and more. These results show how the students were able to identify ways they are already working in agriculture and ways in which they could deepen their experiences. Given the increase in students' interest in agriculture, there may be an increase in possible agriculture-related career interests.

One of the aspects of agricultural literacy, especially in recent years, is the need for individuals to help solve issues within the industry (Kovar and Ball, 2013). These students who participated in the DIGS curriculum and developed this interest in the industry may help lead the next generations of agriculturalists to help solve the problems and challenges agriculture faces.

Overall, students shared that agriculture is important to them. They identified the parts they enjoyed the most and would want to engage further in, but most students expressed positive feelings towards agriculture.

Limitations

The limitations of this project were seen the most in the number of participants who completed the curriculum. Given the hands-off approach of researchers to allow teachers to deliver the curriculum, it is not guaranteed that students received the full curriculum. There were also varying levels of agricultural experience among the teachers, which may have influenced the students' learning.

Implications for Future Research

This research highlights the importance of hands-on, interactive lessons as it demonstrates an increased agricultural knowledge in participants. Students received the curriculum in different ways depending on the school and teacher, but each class saw an increase in LMALI scores, implying an increased agricultural knowledge. This research goes beyond that knowledge, however, and challenges educators to look deeper than completing a knowledge assessment. This project introduced the importance of evaluating the breadth of understanding that a student may have regarding agriculture. It is one thing to recite facts and answer questions in a test about agriculture. A breadth of understanding goes beyond that to where a student sees past the surface-level knowledge of agricultural facts.

Future research should look further into this role of understanding versus knowledge. The varying definitions of agricultural literacy include different foci but each hint at this ability to understand agriculture past surface-level knowledge. Research should expand on this and dive

into how to inspire this breadth of understanding and how it could impact an individual's agricultural literacy.

Conclusion

The results demonstrate that the DIGS curriculum impacted students' agricultural knowledge and breadth of understanding. This year-long curriculum exposed students to different pathways in agriculture and emersed them in interactive, hands-on activities designed to deepen their agricultural experience.

The first research question asked in this project was: "Did the DIGS curriculum impact students' agricultural knowledge." Students completed the LMALI assessment before and after the curriculum and demonstrated significant growth. The LMALI assessment was written to evaluate agricultural literacy based on knowledge and touched on many pathways in agriculture (Longhurst et al., 2020). The DIGS curriculum positively impacted students' agricultural knowledge with a significant increase in assessment scores.

The second research question was: "How does the DIGS curriculum impact students' breadth of understanding in agriculture." Breadth of understanding is the ability to see agriculture as a system built on relationships, sharing an interest in the future of agriculture. These three frames were used to find quotes in the DIGS activity booklets, which students completed throughout the curriculum. These quotes were analyzed by a team of researchers and assigned a specific theme to help demonstrate the breadth of understanding. Over 89% of students returned booklets that included quotes that fit into one of the three frames. This indicates that students developed a breadth of agricultural understanding, as defined by researchers here. Students saw agriculture as more than an isolated system; they understood it to include multiple parts interacting with one another. They mentioned the presence and importance

of relationships between agriculturalists and individuals and agriculture. Finally, many mentioned interests in the future of agriculture and shared ways in which they are agriculturalists.

The DIGS curriculum impacted students' agricultural literacy. The curriculum led to an increase in LMALI scores, demonstrating an increase in agricultural knowledge. Quotes then highlighted the breadth of understanding students gained while participating in the curriculum. This went beyond assessing what students know; it looked at what they understood about the agricultural industry, why it matters, and how they are a part of it.

Recommendations

The recommendations that arise from this research project focus on agricultural literacy efforts. The results demonstrated that students increased in knowledge of agriculture after participating in the DIGS curriculum. These indicates that agricultural education for youth is beneficial for increasing agricultural literacy. These lessons were highly interactive and emphasized positive experiences. A recommendation for future work in this area is to include more agriculture-based lessons that are hands-on and fun for students to complete.

There were two different environments for delivering this curriculum in the two schools. School #1 had a separate teacher who was responsible for teaching all of the DIGS lessons while school #2 left the responsibility up to each individual teacher. Based on observations throughout this project, a recommendation is to host agricultural education classes as "specials" for students, similar to physical education, music, and so forth.

Overall, this project's results highlight the need for fun, interactive lessons that encourage students to go beyond factual knowledge of agriculture and inspires them to develop a deeper level of understanding within the agricultural industry.

CHAPTER 2 – AFFINITY FOR AGRICULTURE

Introduction

The overarching themes of agricultural literacy encompass an understanding of systems, relationships, the ability to communicate, and a drive to face problems facing agriculture from environmental, social, economic, and political viewpoints (Cosby et al., 2022) A certain degree of investment within these themes encourages agriculturally literate individuals to learn, speak, act, and more.

The concept of affinity is posited as a factor of agricultural literacy and explore the role that affinity has within elementary agricultural education. Briefly defined as a positive, emotional connection an individual feels towards a subject, affinity can influence behaviors, identity, aspirations, and more (Kals et al., 1999, p. 182; Müller et al., 2009; StGeorge et al., 2014). Within the context of agricultural literacy efforts, affinity can inspire students to develop a connection with agriculture, later leading to various possible outcomes for the student, such as pursuing agricultural careers.

This paper explores affinity within the bounds of elementary agricultural education through the DIGS (Developing Individuals, Growing Stewards) curriculum. By evaluating students' self-reported affinity rates and assessing their work throughout the curriculum, researchers can gain insight into how students feel towards agriculture based on the agricultural literacy efforts.

Definitions

The two terms used regularly throughout this paper are affinity and agricultural literacy. The research here does not attempt to show a correlation between the two but does introduce the

possibility that affinity could be a factor in agricultural literacy. Affinity is broadly defined as a "positive feeling of inclination" that can impact behavior, increase commitment, and inspire individuals to internalize a concept (Kals et al., 1999, p. 182; Müller et al., 2009; StGeorge et al., 2014). Internalizing agriculture and developing a positive, emotional attachment could inspire a society of agriculturally literate individuals who view themselves as part of agriculture and are invested in the industry's future.

This rationale for this research comes from a combination of interest in affinity and its role in agricultural literacy. The roots for this stem back to the industrial revolution, when people saw a decrease in those involved in production agriculture (Burrows et al., 2020). After this time, fewer people were directly involved with the industry due to an increase in automation, crop improvements, and an increase in suburban populations. This led to fewer agriculturally literate individuals, the same individuals who shape the industry as consumers, policymakers, and economic influencers (Burrows et al., 2020).

Following this decrease in individuals in agriculture, the National Research Council (NRC) first defined agricultural literacy in 1988 as the "understanding of the food and fiber system [that] includes its history and current economic, social, and environmental significance to all Americans" (National Research Council, 1988, p. 8). Frick (1990) later defined an agriculturally literate person as an "individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (p. 41). Kovar and Ball added the ability to understand agriculture to lessen "current challenges facing agriculture through good decision making" (2013, p. 168). The definition of agricultural literacy was further adapted within the 2013 Agricultural Literacy Logic Model to describe "a person who understands and can communicate the source and value of agriculture as it affects our quality of

life" (Spielmaker et al., 2014, p. 2). Based on these definitions and themes, this paper defines agricultural literacy as understanding agriculture as an integrative system built on experiences, relationships, and inspiring investment in the future of agriculture.

Purpose/Research Questions

The increasing need for agriculturally literate individuals inspired the Colorado State University (CSU) program of Agricultural Education and CSU Extension AmeriCorps. To respond to the need, the DIGS (Developing Individuals, Growing Stewards) curriculum was developed. This curriculum is written for third thru fifth-grade students and is designed to introduce students to eight agricultural pathways in Colorado. The lessons provide a positive experience with agriculture through hands-on, interactive learning. Students not only hear about agriculture; they are deeply immersed in specific areas of the industry.

The curriculum utilizes a three-level strategy to engage with students at three different ages. Third grade students participated in introductory lessons, fourth grade students in Colorado Agriculture lessons, and fifth grade students in diving deeper lessons, which combined agriculture and STEM (science, technology, engineering, and math) in its lessons.

The purpose of this research is to explore the impact of the DIGS curriculum on students' affinity for agriculture as it pertains to their positive, emotional connection to the industry.

This research project attempts to assess the impact of various outcomes due to the DIGS curriculum. The first half, Chapter 1 of this thesis, focuses on the impact on agricultural literacy and understanding. The second half, Chapter 2, focuses on the impact of DIGS on students' emotional connection to agriculture. The thesis includes two chapters because the amount of data and specificity of the questions were too distinct for one paper.

The following research question was addressed in this chapter: Did the DIGS curriculum impact students' affinity for agriculture?

Researchers defined affinity and related it to agriculture based on previous research on affinity and nature. Other examples of affinity development in learning were addressed within the context of music. Assessments of affinity, the impact of increased affinity, and the importance of affinity are framed up in this research. A brief explanation of agricultural literacy follows. This paper then moves into the methods section, where the DIGS curriculum will be further explained. Data, conclusions, and implications follow.

Literature Review

Introduction

This research project focuses on agricultural affinity in youth. This literature review will present current research relevant to answering our research question. More specifically: (a) definitions and development of affinity; (b) impacts of increased affinity; and (c) assessing affinity. This literature review also provides a short history of agricultural literacy.

Affinity

Affinity is the emotional space within an individual that goes beyond surface-level interest. Interest encourages individuals to explain or understand phenomena; affinity motivates them to do more (Kals et al., 1999). It is when an individual assigns value and meaning to a topic, eventually allowing it to impact their beliefs and attitudes (StGeorge et al., 2014).

Affinity is the "feeling of closeness and understanding" that an individual may feel towards a person or subject because of "similar qualities, ideas, or interests" and having the likeness for or attraction to something (Merriam-Webster, n.d.). When individuals have an affinity for a topic, they feel an "emotional attraction" to it (Eastep et al., 2011, p. 127). An

individual experiencing affinity may express a link between themself and the topic that is personal, significant, and meaningful (StGeorge et al., 2014).

Affinity has been explained as an "internalizing" of a topic or action where an individual takes what they learn or are exposed to on the outside and associates meaning and value to it within themselves (StGeorge et al., 2014, p. 272). This internalization is more than thinking about a topic; it is experiencing it, leading to an emotional response (Kals et al., 1999). The topic becomes part of an individual's identity, inspiring them to value and protect it (Müller et al., 2009).

Affinity is not used within agriculture often; though it is often expressed as ideology, value, or experiences in agriculture. Here research focused on affinity and topics such as music and nature are used to build an understanding of this emotional attraction and connection in agriculture.

Affinity Development

This emotional, empathetic connection is most influenced by positive exposures and experiences with impactful individuals (Kals et al., 1999). Where some research highlights the possibility of a "genetic disposition" when it comes to an affinity for specific topics, others emphasize that the highest cause of an increase in affinity comes from exposure to, positive experiences with, and involvement with a topic (StGeorge et al., 2014, p. 273).

Kals et al. claim that the highest influencer determining emotional affinity towards nature for youth is experiences with nature. Both the experiences themselves and who these experiences take place with influence youth affinity rates (Kals et al., 1999). Hinds and Sparks explain that "repeated exposure" can influence the affinity rate for individuals, meaning that the frequency of those experiences with the topic impacts affinity rates (Hinds and Sparks, 2008, p. 110). One

study demonstrated that children who engage with nature, such as playing or exploring, are more likely to develop a relationship or connection with nature (Cheng & Monroe, 2012). It has been further shown that students who have "nature-rich routines" are significantly more likely to develop stronger emotional ties with nature compared to children with "nature-deficit routines" (Giusti et al., 2014, p. 29).

One example of affinity development comes from music education, where different degrees of affinity are identified (StGeorge et al., 2014). From lowest to highest affinity rates, these four degrees were early explorers, early engagers, music lovers, and musicians (StGeorge et al., 2014, p. 269). The early explorers are at one end of the affinity spectrum. This group of students had the lowest levels of affinity compared to the other groups of students but still demonstrated interest and responsiveness to music. StGeorge et al. explain that these students had exposure to music earlier in life. Their previous experience with music, combined with the opportunity to learn how to play an instrument in this class, led to their beginning stages of affinity development toward music (StGeorge et al., 2014).

In this example, the affinity of each level deepened until an individual was considered a musician, where affinity was strongest. These individuals identified with music. Music was something they "did" and "were" (StGeorge et al., 2014, p. 271). StGeorge et al. explained how an affinity for music developed to these varying degrees due to active involvement as an individual and with others. These experiences and relationships encouraged connections between learner and topic, sharing that "the phenomenon of affinity was able to account for the personal, significant and emotional feelings of connection with music and music learning" (2014, p. 274). This research has demonstrated a link between experiences and a positive emotional connection

to topics. This link can lead to various outcomes, such as a change in attitude, behavior, or aspirations (Cheng & Monroe, 2012; StGeorge et al., 2014; Hinds and Sparks, 2008).

Impacts of Increased Affinity

One of the main factors inspiring an interest in affinity within this research is this emotional connection's possible impact the agricultural industry, or aspirations. Typically, an increase in affinity can influence an individual's behaviors, aspirations, choices, and more (Cheng & Monroe, 2012; StGeorge et al., 2014; Hinds and Sparks, 2008).

An example demonstrating these impacts is an affinity for nature. Müller et al. (2009) found that students with an increased affinity had outcomes such as "love of nature, feelings of freedom in nature, feelings of security in nature, and feelings of oneness with nature" (p. 59-60). A similar set of affinity indicators for nature included "enjoyment of nature, empathy for creatures, sense of oneness, and sense of responsibility" (Cheng & Monroe, 2012, p. 43). A common thread demonstrated by these two groups is that individuals feel a connection to nature around them and, to a certain extent, feel at home within nature and are responsible for it.

The impact of these feelings can go beyond the temporary feelings of closeness to a topic. Cheng and Monroe demonstrate that a connection to nature can impact individuals' participation in activities that support nature (2012). This supportive engagement with nature increases an individual's investment in and empathetic feelings towards nature, forming an inclination to participate in activities to protect nature (Hinds and Sparks, 2008; Musicco, 2021).

The impacts of increased affinity range among individuals, but research has demonstrated that, typically, higher rates of affinity towards a topic lead to feelings of closeness, attachment, and investment towards the topic, which then causes the individual to make choices and act in ways that support that topic (Hinds and Sparks, 2008; Cheng & Monroe, 2012).

Assessing Affinity

Based on the various outcomes mentioned above, measuring affinity is challenging. The authors here utilize research on affinity and nature to gain insight into assessing affinity. In previous research, affinity is assessed on reflective, feeling-based statements from participants.

Kals et al. (1999) developed questions that assess four subcategories to measure affinity towards nature. These subcategories were written based on the affinity outcomes mentioned above. The subcategories included feelings of freedom, love of nature, safety, and "oneness with nature" (p. 187). These four subcategories were divided into four statements per category, and the authors wrote Likert statements that participants answered (Kals et al., 1999). Using Kals et al. as inspiration, Müller et al. developed a shorter questionnaire version, shortening the original copy from 16 to 11 Likert statements (2009). Some examples included:

- "When I spend time in nature, I feel free and easy."
- "I have the feeling I can live my life to the full in nature" (Müller et al., 2009, p. 69).

Using Kals (1999) and other authors for background, Eastep (2011) changed these categories of emotional affinity into four domains: "(a) general feelings of attraction to nature, (b) feelings of freedom in nature, (c) feelings of comfort in nature, and (d) feelings of oneness with nature" claiming that these domains "better represent current understandings of both emotion and child development" (Eastep et al., 2011, p. 130). Eastep et al. used these domains to write ten questions assessing the emotional affinity of children towards nature. Participants rated these statements on a 1-6 scale, with one representing "false" and six being "true" (Eastep et al., 2011). These statements included phrases such as:

- "I enjoy being outdoors."
- "I like being in nature."

- “I want to spend time outdoors.”
- “I am attracted to nature” (Eastep et al., 2011, p. 132).

These statements were adapted to assess affinity towards agriculture for this research project. Overall, the scales mentioned above and used in this research project focus on an individual’s feelings regarding nature and agriculture. These feelings included enjoyment, safety, belonging, relaxation, closeness (Müller et al., 2009), attraction, freedom, and comfort (Eastep et al., 2011).

Agricultural Literacy

The other part of this paper touches on the role and importance of agricultural literacy for youth. The definition of agricultural literacy has changed throughout the years, and this section provides a brief overview of the topic and how it is assessed in young audiences.

According to the USDA, there are about 19.7 million full and part-time jobs in United States food production. However, only about 1.4% of those, or about 2.6 million jobs, are directly related to agricultural production (USDA ERS, 2022). The decrease of those involved in production agriculture and the increase in urbanization may lead to “societal disconnections with the agricultural industry” (Burrows et al., 2020, p. 358). Agriculturally literate individuals break through those disconnections and help shape “attitudes towards agriculture’s important role in our everyday lives” (Burrows et al., 2020, p. 359).

In 1988, the NRC described an agriculturally literate person as someone who “would understand the food and fiber system and this would include its history and its current economic, social and environmental significance to all Americans" (NRC, 1988, p. 8). A couple of years later, Frick et al. (1991) suggested adapting this definition to include “possessing knowledge and

understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (p. 52).

In 2008, Powell et al. added the “ability to think critically and make value judgments” regarding agriculture from environmental, economic, societal, and political standpoints (p. 86). They defined an agricultural literacy person as “able to analyze and evaluate “trade-offs” to individuals and society resulting from agricultural enterprises.” They can “enter into discourse about and make decisions” surrounding agriculture and society (Powell et al., 2008, p. 86).

Other definitions were written by Kovar and Ball (2013) and the American Farm Bureau Foundation for Education (2013). The former noted the importance of making informed decisions by understanding various agricultural impacts. They shared that this ability could “lessen current challenges facing agriculture” (Kovar and Ball, 2013, p. 168). The American Farm Bureau Foundation for Education mentioned the importance of seeing agriculture as a system with ″all of the industries and processes involved in the production and delivery of food, fiber, and fuel that humans need to survive and thrive" (2013, p. 2).

These definitions vary slightly, but general themes emerge from each. These themes include seeing agriculture as a system with interacting pieces, the importance of relationships, an investment in agriculture based on critical thinking and decision making, and the drive to face problems facing the agricultural industry.

Based on these themes, researchers here define agricultural literacy as understanding agriculture as an integrative system built on experiences, relationships, and inspiring investment in the future of agriculture.

Assessing Agricultural Literacy

After defining agricultural literacy, the next step is to explore how researchers assess and evaluate the literacy rates of individuals. Spielmaker et al. (2014) developed the National Agricultural Literacy Logic Model, which "provides a theoretical framework for critical agricultural literacy research and program evaluation" (p. 2). This model helped create the National Ag Literacy Outcomes (NALOS) framework through Utah State University (Spielmaker & Leising, 2013), which utilized five themes including Agriculture and the Environment; Plants and Animals for Food, Fiber & Energy; Food, Health, and Lifestyle; Science, Technology, Engineering & Math; Culture, Society, Economy & Geography (Spielmaker, & Leising, 2013). These themes were then broken into early elementary, upper elementary, middle school, and high school categories with outcomes for each. While not a form of the assessment, this framework helped shape evaluation techniques within agricultural literacy to assess a student's agricultural literacy.

This paper utilizes the Longhurst Murray Agricultural Literacy Instrument (LMALI), a 3rd – 5th-grade agricultural literacy assessment based on NALOS and proficiency stages for included grade levels (Longhurst et al., 2020). This assessment has 15 questions, one for "each proficiency stage in each of the five NALO themes" (Longhurst et al., 2020, p. 179). These proficiency stages include exposure, factual literacy, and applicable proficiency (Longhurst et al., 2020), which emphasize the different levels of understanding as outlined in some definitions of agricultural literacy. This assessment evaluates an individual's increase in agricultural knowledge before and after participating in an agricultural curriculum.

Bringing it Together

Cosby et al. emphasize that the lack of agricultural literacy in youth may have a significant impact on "economic, social, health and environmental concern[s]" (2022, p.1).

Cosby's et al. systematic review continues to state that agricultural literacy in elementary schools is vital to "bridge the knowledge gap, develop an understanding of the breadth and influence of agriculture's production processes, overcome negative perceptions and stereotypes, and encourage (eventual) workforce participation" (2022, p. 10). Affinity for agriculture may have a place within agricultural literacy as it inspires students to protect, support, and pursue agriculture. Research has demonstrated that increased affinity for nature and music encourages students to engage with these topics, which could be the case for agriculture.

Research Method

This project assessed the impact of the DIGS curriculum on the emotional connection participants felt toward agriculture. Researchers evaluated knowledge of agriculture and affinity for agriculture to determine these significant points. Researchers used a mixed-method approach and collected qualitative and quantitative primary data to assess affinity and agricultural knowledge from survey data and document collection.

This research protocol was submitted to the Institutional Review Board at Colorado State University. It was approved on September 13, 2021, under protocol #2163.

Participants

This research project utilized an opportunity sample of 92 students at Yampa Elementary School and Hayden Elementary School in Colorado. These two schools earned the RISE grant offered throughout the state of Colorado.

School #1, referred to throughout this paper as Yampa Elementary, had a student population of 22 third-graders, 16 fourth graders, and 20 fifth graders. These classes are titled Yampa 3rd, Yampa 4th, and Yampa 5th grade. These students received the curriculum twice a month from the same teacher each time. Students participated in the monthly DIGS lesson for

each pathway during the first visit and did the DIGS booklet activity during the second. These students completed the LMALI assessment before and after the curriculum and completed the activity booklets.

School #2, referred to as Hayden Elementary, had a total student population of around 98 students. However, only the third-grade classes completed the DIGS curriculum. This population included 32 students: 16 in each class. These are called Hayden 3rd Grade Class 1 and 2. At Hayden, the students' regular teacher was responsible for delivering the curriculum. This school opted out of completed the DIGS booklet and instead completed post-curriculum posters.

The lessons' materials were delivered bi-monthly to both schools, two lessons at a time. Each class was provided the lessons and necessary materials for every lesson in the curriculum. Regular emails and correspondence were sent to the teachers from DIGS facilitators to ensure support throughout the process.

Activity Booklet and Survey Development

DIGS Activity Booklet

Qualitative data was collected through the DIGS activity booklets. Researchers created an activity booklet that asked students to share what they learned and complete a small activity for each monthly lesson. Each grade level (third, fourth, and fifth) completed a different activity booklet with similar activities and questions based on the age level and age-appropriate lesson completed. The questions included in the book were related to the activities and agricultural pathways delivered that month. Please see Appendix B for the DIGS activity booklets.

For example, the "What is Agriculture" pathway questions focused on broad agriculture, while questions for the "Power, Structure, and Technology" pathway focused more on energy production and engineering. Some of these questions included:

- What do you think a world without agriculture would be like? Draw a picture below!
- Why should we care about the different commodities grown in Colorado?
- How would we farm or ranch without energy?

Classes that did not complete the booklets were asked to design posters at the end of the curriculum to assess their breadth of agricultural understanding based on how they answered the following questions:

- What was your favorite part of the lessons?
- Which was your favorite lesson?
- What is one thing you learned during the DIGS lessons?
- How do you feel about agriculture?

A team of coders were chosen based on their agricultural literacy involvement to perform a content analysis with the booklets and post-curriculum posters. These individuals had different backgrounds in agricultural literacy including extension, communication, and education.

Based on the definition of affinity as a positive, emotional connection to a topic, themes were identified to perform the content analysis. These themes, future in agriculture and enjoyment of agriculture, were then used to identify the presence of affinity for agriculture in the DIGS activity booklets and post-curriculum posters.

Affinity Survey Development

Quantitative data was collected via an affinity survey developed by DIGS researchers. Using questionnaires designed to assess affinity for nature, the DIGS researchers wrote a 7-question survey consisting of 6-point Likert scale questions (Kals et al., 1999; Müller et al., 2009, p. 69; & Eastep et al., 2011). These questions were chosen because each asked the students to reflect on how they felt. While some focused on the short-term emotions the student felt

towards the curriculum and agriculture, other questions touched on higher levels of affinity such as identifying with the industry, as discussed by StGeorge et al. (2014).

These seven questions were broken into groups based on the designations of emotions and identity. This included three groups of questions that emphasized different aspects of the research. The first set of questions asked about feelings directly related to the DIGS curriculum and agriculture in general. The second set asked participants to share their interest in learning more about agriculture. The third set then asked participants to rate how they viewed themselves within agriculture.

Participants circled a number between one and six: one representing completely disagree and six representing completely agree. Examples of these statements are below. Please see Appendix E for a complete list of statements.

- During the agricultural activities, I felt excited.
- During the agricultural activities, I felt interested
- During the activities, I felt like a part of agriculture.

The collection of this qualitative and quantitative data from throughout the DIGS curriculum delivery provides the ability to evaluate the impact of the DIGS curriculum on participants' affinity for agriculture.

Discussion

Researchers performed a qualitative content analysis for the presence of affinity for agriculture. This systematic analysis is the "assignment of communication content to categories according to rules, and the analysis of relationships involving those categories using statistical methods" (Riffe et al., 2014, p. 3). The primary instrument used in this process was a researcher developed coding procedure and code sheet. The code sheet was broken into two sections based

on the frame. Each frame asked the coder to report three variables for the activity booklets: 1) student name, 2) location in the activity booklet, and 3) quote or drawing description. For the posters, coders were asked to record the name of the student and the quote. Please see Table 4 for the frames and descriptions of each frame. Please see Appendix F for the content analysis procedure for determining the presence of affinity for agriculture and for a complete list of chosen words and phrases.

Table 4

Frames Used to Identify the Presence of Agricultural Affinity

Frame	Description
Agricultural Interest	Does the page demonstrate the student's interest in the agriculture industry, past, present, or future? Examples include: statements such as "I can't wait to learn more," "I want to do ____when I grow up," "I wonder/ask/question ____ (enter a topic in ag)" Other examples: Drawings of animals to be taken care of or are liked by the student, any mentioning of own farm/ranch, and interest in agricultural activities
Emotional Attachment/Positive Words	Does this page demonstrate the student's emotional attachment or positive view of agriculture? Specific words include Like, love, enjoy, part of, family friend, do again, want to learn more, fun, great, good, awesome, special

After the coding procedure and frames were established, a team of three educators were trained to read the booklets and posters using the procedure and code book. Intercoder reliability was established by discussing each of the frames thoroughly before beginning the coding process to set a clear understanding of each.

The final part of analyzing for change in affinity came from completing the affinity survey at the end of the booklet. While there was no pre-curriculum data for this survey, researchers used the self-reported scores from participants to evaluate how the participants felt

about agriculture at the end of the curriculum. The survey allowed for a comparison between agricultural knowledge scores and the self-reported affinity rate. Materials were collected and analyzed after participants completed the curriculum, took the post-curriculum assessment, and finished the activity booklets.

Results

Throughout the curriculum, 58 students completed the DIGS activity booklets and 28 completed post-curriculum posters. Of the 58 booklets, 28 of them had phrases indicating affinity. This included seven third-graders, eight fourth graders, and 13 fifth-graders. Twenty-eight third-graders completed the posters; of these, 21 posters demonstrated affinity. Between 48 posters and booklets, there was a total of 63 phrases showing affinity.

For the booklets, the most common phrases indicating an affinity for agriculture included words demonstrating a love of animals in agriculture (n=11), showing the desire to participate in certain activities in agriculture (n=10), and highlighting their view of agriculture as fun (n=7). Other phrases indicated students already viewed themselves as a part of agriculture with a positive view towards the industry. This included taking care of animals they already have and owning a ranch.

The 21 posters, which indicated a positive experience and view of agriculture, included various words and phrases. The most common words were love (n=6), important (n=5), and good (n=4). Other words included like, fun, awesome, happy, and great.

At the end of the curriculum, students completed the affinity survey mentioned above. This short survey asked them to identify how much they agreed or disagreed with statements regarding their enjoyment of the curriculum and connection to agriculture.

Seventy-two students completed the affinity survey at the end of the curriculum. This was a 6-point Likert scale where one indicated completed disagree and six indicated agree complete. The average score for all 72 students was 4.75, indicating an agreeable response. Please see Table 5 for the average responses for each class.

Table 5

Average self-reported affinity rate according to Affinity Survey Scores

Group	*Average Total Affinity Rate*	*Number of Responses*
Yampa, 3rd Grade	4.376	n=16
Yampa, 4th Grade	4.89	n=13
Yampa, 5th Grade	4.865	n=18
Hayden 3rd Grade Class 1	4.679	n=12
Hayden 3rd Grade Class 2	4.934	n=13

The first group of questions of the survey focused on how students felt about agriculture and the DIGS curriculum. The second group, question 5, asked about students' interest in learning more about agriculture. Finally, questions four, six, and seven emphasized the students' place in agriculture. The overall average score for questions regarding emotions during the curriculum was 5.15. The average for identity and place in agriculture was 4.30. The average for interest in learning more about agriculture was 4.90. Please see table 6 for a complete list of average scores based on question groups.

Table 6

Average survey responses based on question group

Group	*Average Total Score*	*Group 1*	*Group 2*	*Group 3*
Yampa, 3rd Grade	4.38	5.02	4.31	3.74
Yampa, 4th Grade	4.89	5.03	5.38	4.59
Yampa, 5th Grade	4.87	5.19	5	4.5
Hayden 3rd Grade Class 1	4.68	5.2	4.67	4.17
Hayden 3rd Grade Class 2	4.93	5.29	5.15	4.51
Average Total	4.75	5.15	4.90	4.30

There were also differences in the average scores per class for each question. Please see table 7 for a complete breakdown of average scores for each question asked on the affinity survey.

Table 7

Average scores for affinity survey per question

Group	*Question 1*	*Question 2*	*Question 3*	*Question 4*	*Question 5*	*Question 6*	*Question 7*	*Number of Responses*
Yampa, 3rd Grade	5.25	5.13	4.67	3.67	4.31	3.81	3.73	n=16
Yampa, 4th Grade	5.08	4.62	5.39	4.31	5.39	4.85	4.62	n=13
Yampa, 5th Grade	5.33	5.12	5.06	4.56	5	4.78	4.17	n=18
Hayden 3rd Grade Class 1	5.17	5.17	5.25	4.08	4.67	4.08	4.33	n=12
Hayden 3rd Grade Class 2	4.92	5.39	5.54	3.87	5.16	5.07	4.62	n=13
Average Total	5.15	5.086	5.182	4.098	4.906	4.518	4.294	n=72

Discussion

The results above indicate that students had a previous affinity for agriculture or developed a positive emotional connection during the curriculum. The phrases demonstrated that some of the students, those with agricultural backgrounds, were quick to share their experiences, highlighting that they "own a ranch" or that their cows eat hay, "hay that we make." This demonstrated that those with agricultural backgrounds might already have an affinity for agriculture. Those without agricultural backgrounds showed that the DIGS curriculum may have influenced their affinity for agriculture. This included the phrases which emphasized the students' interest in driving tractors, growing crops, raising livestock, and similar activities. It is impossible to say that the DIGS curriculum alone influenced these statements. Still, researchers are confident that the interactive, hands-on lessons impacted how students viewed agriculture and felt about the topic.

The affinity survey further indicated that students generally felt positively toward the DIGS curriculum and agriculture. The questions asked in the survey challenged students to share how they thought about the curriculum, how they felt about agriculture, and whether they viewed themselves as a part of agriculture. Answers to these questions vary, but overall, students responded positively to the questions.

The first three questions received the overall highest average score from students. These questions focused on how students felt about the curriculum and agriculture. The second highest was question four, and the last three questions had the lowest score, demonstrating that students did not necessarily view themselves as a part of the agricultural industry. These results show that the DIGS curriculum influenced positive feelings toward agriculture based on the curriculum. Students generally felt excited and interested in agriculture while participating in the activities.

They enjoyed their experience with agriculture and the curriculum. This did not, however, cause the students to identify with agriculture. The results show that students were interested in learning more about the industry but did not strongly think there is a place for them in agriculture.

Limitations

This research had a small sample set of students. This research also relied on the teachers to implement the curriculum. While some were excited to deliver the lessons, others were not so inclined, making collecting data for this project challenging.

This research was also one of the first of its kind in assessing agricultural affinity. While others have evaluated affinity for other topics, the lack of research may be a limitation in determining and analyzing survey results and content analysis. Researchers gathered as much information as possible in assessing affinity based on the other topics, but there are opportunities for improvement now that this research is complete.

Implications for future research

The opportunity to further evaluate the role of affinity and its place in agricultural literacy is vast. While the past has focused more on knowledge and understanding, there is space to see how affinity and emotional connection impacts an individual's view of and choices regarding agriculture. Further research needs to first focus on how to evaluate affinity. It is challenging to assess emotions, but this should be further explored in the context of agriculture. Following this affinity line and its impacts may lead future research to examine how youth affinity for agriculture impacts their career choices later in life.

Conclusion

The two data sets show students' affinity for agriculture during the DIGS curriculum. The content analysis demonstrates that over 55% of students who completed the curriculum reported affinity through words and phrases in their DIGS activity booklets and posters. This varied between foci such as love of animals, interest in agricultural activities, and more, while others shared that they thought agriculture was fun, important, and something they loved. The results of the affinity survey indicate that this positive affinity does not necessarily correlate to an identity within the industry. While students felt favorable toward agriculture and the curriculum, they were less inclined to see themselves within the industry.

The research question asked in this project was: Did the DIGS curriculum impact students' affinity for agriculture? Researchers claim that the DIGS curriculum impacted affinity for agriculture depending on the individual. This was demonstrated by phrases used by the students throughout the curriculum and by the results of their affinity surveys completed at the end of the curriculum.

This research introduces the potential of affinity for agriculture. This positive emotional connection students feel towards agriculture may play a part in their decisions later in life, whether in the form of participating in agricultural education in high school, pursuing a career in agriculture, or simply supporting the agricultural industry through consumer preferences and policy choices. Demonstrated here was the first step in assessing affinity and recognizing its importance and role in agricultural literacy. It is up to agricultural educators to dive further into this opportunity and investigate how affinity, a positive connection, to agriculture can impact an individual's life.

Recommendations

Given the scope and the results of this research project, the recommendations include encouraging student to engage with agricultural curriculum and to continue investigating the role of affinity in agricultural literacy.

The students in this project participated in interactive lessons that encouraged fun in learning. These students demonstrated that some of them had positive emotions during the curriculum and were interested in learning more. This leads to the recommendation of writing agricultural curriculum that emphasizes fun and encourages students to develop a positive connection with the industry.

Finally, the last recommendation is to continue diving into the role of affinity within agricultural literacy. This project introduced this area, but further research is necessary to explore the impact that emotion plays in agricultural education and agricultural literacy. There is an opportunity here to dig into a space of agricultural literacy that has yet to be explored. The results of this project encourages future researchers to start digging into this new realm of agricultural literacy.

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APPENDICES

Appendix A. *The full DIGS curriculum matrix, created by the CSU Program of Agricultural Education and CSU Extension AmeriCorps*

Month	**September**	**October**
Pathway	*What is Agriculture?*	*Power, Structure, and Technology*
Introductory Activity	A Day Without Ag	Cracker Barn
Colorado Connection	Colorado Bingo	Connecting Power, Structure, and Technology
Digging Deeper	Busy Bees!	Getcha S'More Solar Energy!

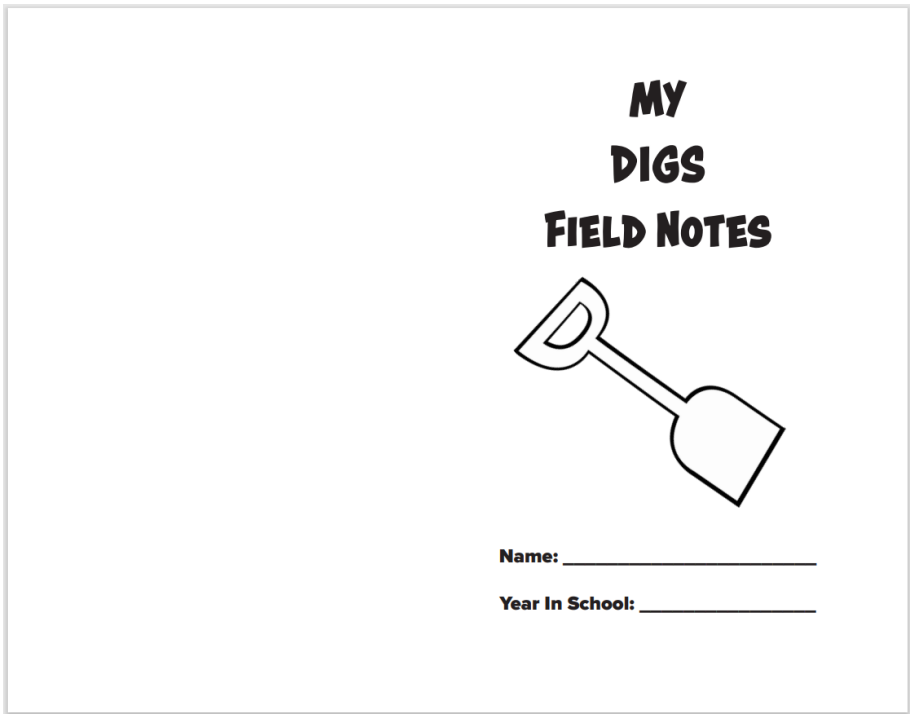
Month	**November**	**December**
Pathway	*Natural Resources*	*Agriculture and the Seasons*
Introductory Activity	Compass Your Way	Frosty Fun
Colorado Connection	Natural Resource Superheroes!	Global Agriculture
Digging Deeper	Let's Engineer Our Own Water Cycle!	The Reasons for the Seasons

Month	**January**	**February**
Pathway	*Agriculture and Business*	*Food Products and Processing*
Introductory Activity	Becoming an Agricultural Entrepreneur!	Let's Go to Market!
Colorado Connection	A Year in a Farmer's Life!	Value Chains!
Digging Deeper	Farm Code	Making Butter!

Month	**March**	**April**
Pathway	*Plant Systems*	*Animal Systems*
Introductory Activity	Life in a bottle	Animal Scattergories
Colorado Connection	Wonderful Wheat	Marshmallow Pig
Digging Deeper	Apple Scientists	Marble Cattle

Appendix B. *Example of the DIGS activity booklets*

Level 1, Third Grade



MY
DIGS
FIELD NOTES

Name: _____

Year In School: _____

WELCOME TO DIGS!

"Developing Individuals, Growing Stewards" (DIGS) was was designed especially for **YOU** to be exposed to agriculture, grow as an individual, become a good steward, and have a little fun!

WHAT IS A JUNIOR AG AMBASSADOR?

Each year a select group of outstanding students within the College of Agricultural Sciences at Colorado State University are called to become leaders and share what they know about agriculture and natural resources with everyone they meet! They are referred to as Ag Ambassadors.

YOU can become a part of this ambassador team by completing this booklet!

Once a student is inducted as a Junior Ag Ambassador, they are challenged to be leaders in their communities and to continue to explore and share what they know about agriculture and natural resources.

Explore. Share. Lead.

We can't wait to get started!

WHAT IS AGRICULTURE?

Agriculture Around Us

1. What would be the most difficult to give up?
Why?

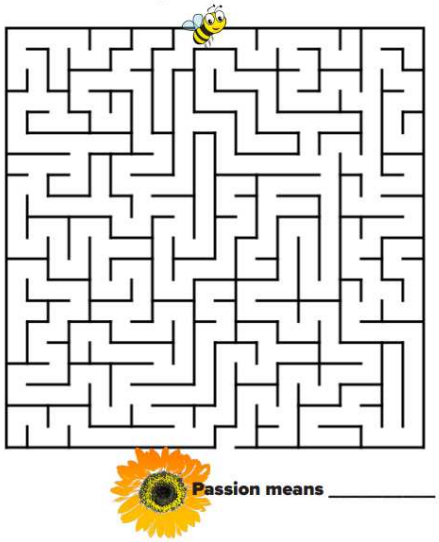
2. What do you think a world without agriculture would be like? Draw a picture below!

1

STEWARDSHIP = PASSION

To be a steward of the land means being passionate! Passion is the feeling of **strong beliefs** or **emotions**.

Help the bee get through the maze to the flower! Then, finish the sentence at the end of the maze to complete the flower!



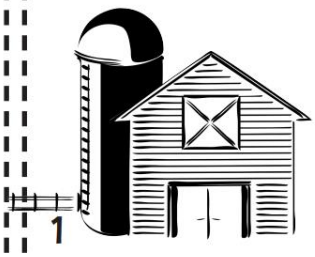
Passion means _____

POWER, STRUCTURE, TECHNOLOGY

Cracker Barn

1. What sort of inventions do you see in agriculture?

2. Why are these inventions important to farmers and ranchers?



1

STEWARDSHIP = INNOVATIVE

To be a steward of the land means being innovative! Innovative means being **creative** or **original.**

Below is a picture of a landscape with a lot of sunlight! Color the picture and add in different things that are impacted by sunlight.

Natural Resources

Compass Your Way

1. Where do you see maps in agriculture?

2. Why are those maps important?

Stewardship = Connection

To be a steward of the land means being connected! Being connected means looking at the **whole.**

Below are some images of objects you may or may not need for a camping trip! Draw a line from the tools you do need from the object to the pickup. Draw an 'X' through the objects you don't need. Then, answer the questions below!

How many different objects are you bringing on your camping trip? _____

Why did you choose those objects?

_____

1

Agriculture and the Seasons

Frosty Fun

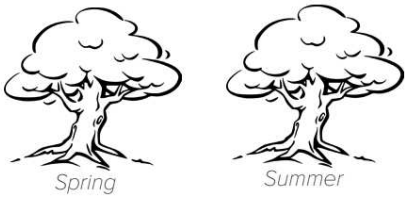
1. What do you think happens when crops are covered in frost in the winter?

2. Why should farmers care about this?

Stewardship = Knowledgeable

To be a steward of the land means being knowledgable! Knowledgeable means being **well-informed.**

There are four trees below. Color each tree for each of the four seasons. Then use the space below to share what your favorite season is!



My favorite season is_____

Because...

1

Agriculture and Business

Becoming an Agricultural Entrepreneur

1. What type of agricultural invention can you think of?

2. Why are these inventions important?

STEWARDSHIP = Motivated

To be a steward of the land means being motivated!
Motivated means having **interest** in something.

If you could own anything in the world, what would it be? Draw that object or describe it below.

1

Food Products and Processing

Let's Go to Market

1. Why is it important to know where our food comes from?

STEWARDSHIP = Systems-focused

To be a steward of the land means being systems-focused!
Systems-focused means **thinking about the entire system, from start to finish**

Use the space below to draw your favorite meal! Then, answer the question below!

How many different agricultural products are in your favorite meal? _____

1

Plant Systems

Life In a Bottle

1. What type of plants do you want to plant?

2. Why are terrariums and greenhouses important in agriculture?

1

Stewardship = Adaptable

To be a steward of the land means being adaptable!
Adaptable means **being able to change.**

You have been given a large terrarium where you can put any plants you want! Use the space below to draw the different plants (and animals) that you would want in your terrarium!

Animal Systems

Animal Scattergories

1. What types of animals are important in agriculture?

2. Why is it important to know different types of animals?

1

Stewardship = Sustainable

To be a steward of the land means being sustainable!
Being sustainable means **keeping the same amount.**

Use the space below to draw an animal for each category.

Livestock	Wildlife
Companion Animal	Mammal

Appendix C. *The Longhurst Murray Agricultural Literacy Instrument (Longhurst et al., 2020)*

LMALI	FORM 3-5: 1	GRADES 3-5

1. Jill grows pumpkins, and the local water company had a canal break, which has caused her to reduce her watering. How does the decrease in water impact Jill's pumpkin patch?

   a. the number of pumpkins grown will be the same as previous years

   b. some plants may die resulting in fewer pumpkins grown

   c. all the pumpkins grow bigger

---

2. Which of the following natural resources does a farmer need to grow crops? **Circle all** the correct choices.

   a. water

   b. cars

   c. trees

   d. rocks

   e. sunlight

   f. air

   g. soil

---

3. What do farmers manage in order to give us food, clothing, and shelter?

   a. irrigation

   b. animal waste

   c. soil nutrients

   d. animal life cycles

   e. all of the above

TURN TO NEXT PAGE

4. Why is it important for farmers to rotate the crops they grow in a field?

   a. plants will not grow in the same soil twice

   b. to make the field look nice

   c. farmers do not want other people to know what they are growing next

   d. to replenish nutrients in the soil

---

5. Match the definition to the term:

   renewable ____ nonrenewable ____ recyclable____

   a. available in limited supply, because it takes a long time to be replenished

   b. can be replenished naturally

   c. a product that is produced and can be broken down to make something new

---

6. Which of the following is **not** true?

   a. farmers grow plants in greenhouses so fresh fruits and vegetables are available to buy in the wintertime

   b. farmers ship fresh fruits and vegetables in the wintertime from other states or countries that have warmer weather

   c. farmers keep extra fruits and vegetables in warehouses to sell in the winter

   d. farmers heat the ground so they can grow fresh fruits and vegetables in the winter

TURN TO NEXT PAGE

7. What is the most important reason to practice safe food handling?

   a. to have a good reputation for your restaurant

   b. so you are not on the news

   c. to avoid sickness

   d. so you don't have to buy extra food

---

8. Which type of food provides the most protein for your body?

   a. grains

   b. vegetables

   c. fruits

   d. meat or beans

---

9. Samantha is making a list of reasons that food might cost more at the store. Select the item below that will **not** be on her list.

   a. kids do not want to eat fruits and vegetables

   b. weather conditions damage crops

   c. increased fuel costs for farmers

   d. not enough workers to harvest food

TURN TO NEXT PAGE

10. Why should scientists continue to study agriculture?

    a. to reduce the number of farmers

    b. to improve the quality and safety of farm products

    c. to reduce the number of farm workers

    d. scientists do not need to study agriculture because we already know how to grow food

---

11. Science and technology helps farmers grow healthier plants and animals.

    a. true

    b. false

---

12. Farmers use the science of inherited traits to determine what kinds of plants and animals they will grow on their farm.

    a. true

    b. false

---

13. When you drink a glass of orange juice for breakfast, the oranges most likely came from which state?

    a. Nebraska

    b. Washington

    c. Florida

    d. New York

TURN TO NEXT PAGE

14. Select the **one** choice that is **not** a reason people eat different foods around the world.

    a. people have different religions

    b. people celebrate different holidays

    c. people live in different climates

    d. people have different types of soil

    e. people speak different languages

---

15. What would happen if farmers in a community stopped doing their job? **Circle all** the correct choices.

    a. food prices would increase

    b. food prices would decrease

    c. people would demand changes

    d. nothing would change

    e. food would be imported from other places

    f. food would be exported from the community

STOP

Appendix D. *Procedure used in content analysis for breadth of understanding in DIGS booklets*

Procedure for Content Analysis

This is the question we are trying to answer:

- How does the DIGS curriculum impact the breadth of understanding of agriculture in elementary-school students?
    - Breadth of understanding is defined as:
        - Agriculture as a system
            - More than one 'topic' example: barn, cow, sheep, tractor
        - Agriculture and relationships
            - Presence of people and interactions between
        - Future in agriculture
            - Demonstrates interest in learning more, being "in" ag

As you read through the booklets, please ask yourself:

- Does this page demonstrate the student's understanding of agriculture as a system?
    - Example: sentences that talk about two or more agricultural pathways (water supply and animal production; a red barn and a money symbol)
    - Look for **any** mentioning of a different pathway than the one that is being focused on for specific activities
        - Important…the way the book is laid out online, the pathway and activity on the same spread are not the same pathway. They are kitty-corner to each other.
        - Ranching gives you meat."
        - Water for…watering animals, fishing for food, transportation
        - "Snow makes more water."
        - Using inventions to work/garden
- Does this page demonstrate the student's understanding of agriculture with relationships?
    - Example: arrows pointing between agricultural pathways, any comments about people in agriculture, plants – berries – jam – farmers market
    - Phrases such as:
        - "Broke down tractor means more money."
        - "Horses eat hay which farmer grows."
        - Crop failures which cause the farmer to lose money
        - Lack of inventions make it more difficult for farmers
- Does this page demonstrate the student's interest in future agricultural activities?
    - Example: statements such as "I can't wait to learn more," "I want to do ____ when I grow up," "I wonder/ask/question ____ (enter a topic in ag)"
    - Phrases such as:
        - "It is fun."
        - 4th grade, Ag Business pathway asks if they want a farmer's life…watch out for that question!
        - Drawings of animals when asked what they're passionate about
        - Any mentioning of own farm/ranch

Procedure

- Open the attached excel document that is pre-organized with framess and details
- "Save as" with your last name at the beginning of the document name
    - "Appel_Content Analysis."
- As you read through the booklets, record quotes that demonstrate the three foci above in the appropriate excel sheet
    - Please record:
        - Name
        - Pathway
        - Quote
- If there is evidence of the frames in a drawing, please describe the drawing in the "quote" column AND start your description with "**DRAWING DESCRIPTION."**

Appendix E. *Affinity Survey Questions (*Inspired by Kals et al., 1999; Müller et al., 2009, p. 69;

& Eastep et al., 2011)

1. During the agricultural activities, I felt enjoyment
2. During the agricultural activities, I felt excited.
3. During the agricultural activities, I felt interested
4. During the activities, I felt like a part of agriculture.
5. I am interested in learning more about agriculture.
6. Agriculture is a complex system which I am a part of.
7. There is an important role for me within agriculture.

Appendix F. *Procedure for Affinity Content Analysis*

This is the question we are trying to answer:

- How does the DIGS curriculum impact students' affinity for agriculture?

As you read through the booklets and posters, please ask yourself:

- Does this page demonstrate the student's emotional attachment or positive view of agriculture?
    - Specific words include
        - Like
        - Love
        - Enjoy
        - Part of
        - Family

        - Friend
        - Do again
        - Want to learn more
        - Want to see…*something in agriculture*
        - Want to be…*career in agriculture*
        - Fun
        - Great
        - Good
        - Awesome
        - Special
- Does the page demonstrate the student's interest in the agriculture industry, past, present, or future?
    - Example: statements such as "I can't wait to learn more," "I want to do ____ when I grow up," "I wonder/ask/question ____ (enter a topic in ag)"
    - Other examples:
        - Drawings of animals to be taken care of or are liked by the student
        - Any mentioning of own farm/ranch
        - Interest in agricultural activities

Procedure

- Open the attached excel document
- "Save as" with your last name at the beginning of the document name
    - "Appel_Content Analysis"
- As you read through the booklets and posters, record quotes that demonstrate the three foci above in the excel sheet
    - Please record:
        - Name
        - Pathway
        - Quote
- If there is evidence of the themes in a drawing, please describe the drawing in the "quote" column AND start your description with "**DRAWING DESCRIPTION."**