CONTENT AREA READING STRATEGIES AND TEXTBOOK USE IN AGRICULTURAL EDUCATION

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Abstract

Increasingly, agriscience teachers are called upon to demonstrate their contributions to student achievement in math, science, and reading. This national survey of 216 agriscience teachers investigated the current attitudes and practices related to reading in agriscience. Agriscience teachers generally appreciated reading for personal development and learning, but were in less agreement about allocation of time for reading. Further, teachers agreed that reading was important in agriscience, but were in less agreement about their role in teaching content area reading strategies (CARS). Reading is a fundamental part of instruction in agriscience, with nearly 20% of class time being devoted to reading. Teachers exhibited limited knowledge of, confidence in, and frequency of CARS use. Teachers understood how to select textbooks and how to assess student comprehension. Indications suggested that teachers helped students summarize, determine important ideas, generate questions, and define unfamiliar words. However, they did not regularly help students think aloud, make predictions, use multiple strategies, activate background knowledge, preview texts, or create graphic organizers. In essence, teachers need assistance in helping students with the first two micro-periods of reading and professional development to boost knowledge, confidence, and frequency of use of content area reading strategies (CARS).

Introduction

Students need literacy skills for succcessful careers, households, citizenship, and personal lives (D'Arcangelo, 2002; Meltzer, 2001; National Reading Panel (NRP), 2000; Vacca, 2002). Good readers internalize information, make critical decisions, form opinions, and respond intelligently (D'Arcangelo), which are necessary skills for analyzing and comprehending the plethora of knowledge and facts available today (Moore, Bean, Birdyshaw, & Rycik, 1999; Vacca). Yet, American students compare poorly with their foreign counterparts, especially where content knowledge and literacy is central to the curriculum (Snow, 2002).

Reinforcing reading is a shared responsibility among all teachers (Readence, Bean, & Baldwin, 1998; Vacca, 2002). Content area reading is reading in the content area, such as agriscience, and is fundamentally different from literature. As a student moves from middle to high school, students must become more adept at meeting the challenges of more sophisticated content area reading and information (Meltzer, 2001; Musthafa, 1996; Snow, 2002; Tomlinson, 1995). Even though building literacy skills enhances learning, few content area teachers employ content area reading strategies (CARS) (Barry, 2002; Durkin, 1978). Further, content area teachers, including agriscience teachers, are being called upon to enhance student achievement in math, science, and reading (Belcher, McCaslin, & Headley, 1996; Conroy & Walker, 2000). Thus, how do agriscience teachers perceive their role in developing students' reading comprehension skills? What are agriscience teachers' personal values of reading? What are teachers' interest and effectiveness in implementing

CARS? How do agriscience teachers use texts in the classroom?

Theoretical and Conceptual Framework

The RAND Reading Study Group (RRSG) (Snow, 2002) developed a research agenda for research on comprehension, which provided the theoretical framework for this study. The RRSG defined reading comprehension as "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (p. xiii). It is comprised of three elements: reader, text, and activity or purpose for reading, all occurring in a larger sociocultural context, including the teacher (Figure 1). The reader brings cognitive capabilities, motivation, knowledge, and experiences to the reading processes. Texts can include many forms. Reading activity involves the purposes, operations, and outcomes of reading, including problem solving, knowledge gain, or engagement. Context is the student's sociocultural environment, which encompasses the classroom, teacher, community, and world.

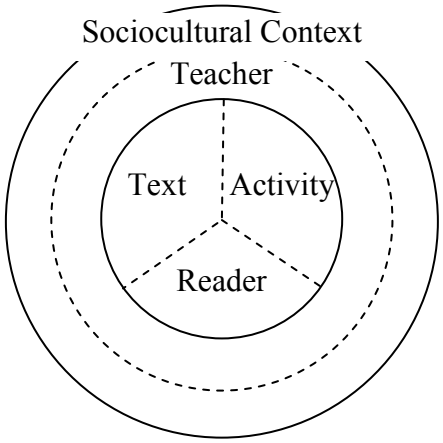

Figure 1. A heuristic for thinking about reading comprehension.
Note. From *Reading for Understanding: Toward an R&D program in reading comprehension* (p. 12) by C. Snow, 2002, Santa Monica, CA: The RAND Corporation. Copyright 2002 by the RAND Corporation. Reprinted with permission.

Teachers are often reluctant to implement CARS in the content areas, because they 1) feel inadequate to handle reading problems in their classrooms, 2) feel that reading instruction infringes on content area time, and 3) deny the importance of reading techniques (Barry, 2002; Bean, 1997; Bintz, 1997; Durkin, 1978; Ivey, 2002; Moore et al., 1999; Snow, 2002; Stewart, 1990; Stewart & O'Brien, 1989). Because content area teachers expect students to possess adequate reading skills, they perceive their role in education to be content area experts (D'Arcangelo, 2002; Forget & Bottoms, 2000; Moore et al.; Snow; Vacca, 2002; Vaughn, Klinger, & Bryant, 2001). O'Brien and Stewart (1990) found that 85% of preservice agriscience teachers rejected content area reading. Choosing to ignore reading as a tool, agriscience teachers felt they reinforced content area reading and needed little instruction in strategies.

A teacher's attitude toward reading affects student reading performance (Bintz, 1997; Jorgensen, 2001; Morawski, 1995; Readence et al., 1998). Digisi (1993) found that 215 biology teachers viewed reading as essential to learning biology, yet lacked knowledge of strategies and how to incorporate them. Surveying 61 mixed-experience teachers, Menke and Davey (1994) found that experienced teachers provided more class time for reading, used text less often to supplement instruction, and exhibited less reading strategy instruction.

Purpose and Objectives

The purpose of this national study was to describe practices and attitudes associated with reading in agriscience. Specifically, the study pursued the following objectives:

1. To ascertain the emphasis on and importance of reading in secondary agriscience,
2. To identify how teachers select and use textbooks, and
3. To identify content area reading intervention strategies employed by teachers.

Procedures

This study used a sample of the population of active and life members of the National Association of Agricultural Educators (NAAE) as listed in the 2003-04 database of membership provided by the NAAE (N = 6586). Active and life members of NAAE was the most accurate and accessible frame available. However, this frame may not accurately reflect the 11,000 plus agriscience teachers in the nation (National FFA Organization, 2004), thus the results should only be applied to NAAE members. From the accessible population, a random sample of 367 members was selected to estimate the distribution of characteristics within the population (Dillman, 2000).

The researcher-developed questionnaire consisted of questions related to the objectives of the study and was reviewed by two content area reading experts to establish face and content validity. The instrument was developed after extensive research and adaptation of instruments for elementary school teachers. To ensure construct validity and reliability, the survey instrument was administered to 14 agriscience teachers. Reliability for attitudinal and behavioral items ranged from 0.77 to 0.88. Because other closed-ended items involved questions for which respondents had "an accurate, ready-made answer" (Dillman, 2000, p. 37), items did not elicit demands for considerable time, thought, nor variation, and thus posed no considerable reliability risk.

Data was collected from February 26, 2004, through May 4, 2004. The study was administered via the suggested survey design with a mailed questionnaire as outlined by Dillman (2000). Teachers were mailed a cover letter from the investigators, a letter from National FFA Advisor Dr. Larry Case, the questionnaire, and a two-dollar incentive to enhance response, resulting in a usable response rate of 58.9% (n = 216).

To control for non-response error, researchers compared early to late responders (Ary, Jacobs, & Razavieh, 2002; Linder, Murphy, & Briers, 2001). Research has shown that late responders are often similar to non-responders (Goldhor, 1974; Krushat & Molnar, 1993). Early responders were those participants who returned their survey prior to mailing the reminder postcard, while late responders were those who responded after the second questionnaire was mailed. Researchers compared respondents based on gender, years of teaching experience, education level, college reading course completion, and the summated means of personal attitude toward reading, attitude toward reading in agriscience, and general approach to reading. No significant differences existed between early and late responders.

Findings

Respondents consisted of 84.6% males who held standard or permanent teaching licenses (96.7%). Years of teaching experience ranged from one to 39 years (M = 17.4 years, SD = 10.25). High school teachers represented 80.1% of the sample. On average, teachers taught 6.03 (SD = 2.97) agricultural education courses and 0.25 (SD = 0.66) non-agricultural education courses. Over one-third of the sample held bachelor's degrees (35.7%), 62.9% held master's degrees, and 1.4% held degrees above the master's level. A college content area reading course was completed by 38.8% of teachers.

Related to objective 1, teachers were asked about their attitudes toward reading (Table 1). Internal consistency for the construct was α = 0.88. Agreement on the nine construct items ranged from 96.7% to

23.3% with means ranging from 4.78 to 2.66 (Likert-type scale, 1=strongly disagree to 5=strongly agree). Teachers generally agreed with the value of reading (over 80% agreement), as demonstrated by their agreement that reading was a good use of time, that people learn a lot from reading, and that it is useful for professional development. However, they were in less agreement as to their personal engagement with reading as a hobby or on a daily basis (less than 60% agreement). Nearly half of teachers agreed that reading was a hobby and less than half of the teachers made time for reading on a daily basis.

Teachers were also asked about their attitudes related to reading in agriscience. Internal consistency for the construct was α = 0.77. Teachers generally agreed that reinforcing reading was part of the responsibility of agriscience teachers (over 80% agreement), but were in less agreement for actually teaching reading skills (less than 80%). They agreed that reading is important, necessary for success, and should be reinforced. However, they were in lesser agreement that good instruction involves teaching reading or that agriscience teachers are responsible for teaching reading skills.

Table 1
Teachers' Personal Reading Attitudes and Attitudes Toward Reading in Agriscience (n = 211)

Personal reading attitude	Agree[b]	Undecided	Disagree[b]	*M*[c]	*SD*
Reading is a *good use* of time.[a]	96.7%	0.5%	2.9%	4.78	0.69
A person learns *a lot* from reading.[a]	96.2	1.0	2.9	4.78	0.71
Reading has been useful for my personal development.	90.1	5.2	4.8	4.42	0.88
Reading is almost *never* boring.[a]	84.1	10.6	5.2	4.35	0.92
Books help us understand people and ideas.	86.6	6.7	6.7	4.24	0.98
I enjoy reading.	81.5	11.9	6.7	4.17	0.92
Reading for pleasure is one of my hobbies.	52.7	21.1	26.3	3.41	1.25
I make time for reading every day.	40.5	21.9	37.7	3.08	1.26
I do not have enough time to read books.	23.3	27.6	49.1	2.66	1.16
Attitude toward reading in agriscience					
Reading is important in agriscience.	93.4	4.3	2.4	4.44	0.69
Reading textbooks, magazines, etc. is necessary for success in agriscience.	94.3	2.8	2.8	4.41	0.69

Attitude toward reading in agriscience	Agree[b]	Undecided	Disagree[b]	*M*[c]	*SD*
Reading is important for agriscience success.[a]	90.5	1.9	7.5	4.41	1.01
Agriscience teachers should reinforce CARS.	91.4	6.2	2.3	4.35	0.76
Agriscience teachers are responsible for developing students' reading skills.[a]	81.5	10.0	8.5	4.09	0.98
Good instruction in agriscience involves teaching CARS.	60.7	29.9	9.4	3.71	0.92
Agriscience teachers are responsible for teaching reading skills.	47.8	27.5	24.6	3.32	1.09

[a]Presented to participants as a negatively stated items, but positively stated and reverse-coded for data analysis.
[b]Strongly agree and agree were collapsed into agree column. Strongly disagree and disagree were collapsed into the disagree column.
[c]1 = Strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree.

Objective 2 sought to determine how teachers select and use texts. Related to this objective, 91.1% of teachers said that their agriscience program used textbooks. A classroom set of texts was available in 90.1% of classrooms, while students were assigned individual texts in 38.0% of classrooms. Trade books were used by 49.5% of teachers. Teachers selected textbooks 90.6% of the time, while the agricultural advisory committee and school boards were also involved (19.3% and 11.3%, respectively). Texts were generally replaced every five to seven years (58.9%) and as needed (24.4%).

Teachers were asked to rate the frequency (fraction of class meetings per week) and intensity (minutes per use) of textbook use in their agriscience courses (Table 2). Teachers used textbooks most frequently in animal science, introductory level, middle school, natural resource management, horticulture, and plant science courses (greater than 20% used texts on a daily basis). Teachers used textbooks most intensively in animal science, introductory level, agricultural mechanics, plant science, and middle school courses (greater than 30% of teachers used texts for 25 minutes per use).

Using the mean frequency and intensity of textbook use, the researchers computed the total amount and percent of class time per week spent using textbooks assuming a standard schedule of five 55-minute class periods per week (Table 3). The weighted means were calculated by multiplying the percentage of respondents in each category by the fraction of classes and the intensity in minutes. Textbooks were used 51.8% of class periods per week, 17.7 minutes per use, 45.7 total minutes per week, and 18.3% of total class time. Teachers spent more than 50 minutes per week using textbooks in animal science, introductory level, plant science, horticulture, and natural resource management courses. They spent less than 40 minutes per week using textbooks in middle school, agricultural leadership, agricultural communication, food science, biotechnology, and Supervised Agricultural Experience (SAE) courses.

Table 2
Percent Frequency and Intensity of Textbook Use in Agriscience Courses (n = 216)

		Frequency (fraction of classes)					Intensity (minutes/use)				
Course	*n*	0	¼	½	¾	daily	5	10	15	20	25
Animal science	149	1.3	17.4	33.6	18.8	28.9	2.7	3.4	28.6	29.3	36.1
Introductory level	108	4.6	22.2	27.8	20.4	25.0	2.8	15.9	21.5	25.2	34.6
Middle school	33	15.2	33.3	12.1	15.2	24.2	24.2	18.2	9.1	18.2	30.3
Natural resource mgt.	89	4.5	23.6	32.6	15.7	23.6	5.7	9.1	36.4	22.7	26.1
Horticulture	122	4.1	23.0	34.4	18.0	20.5	3.4	12.6	25.2	31.1	27.7
Plant science	119	2.5	25.2	32.8	19.3	20.2	2.6	8.6	28.4	29.3	31.0
Floriculture	70	1.4	31.4	37.1	11.4	18.6	4.4	7.4	27.9	32.4	27.9
Agribusiness mgt.	92	2.2	39.1	23.9	17.4	17.4	3.3	15.2	27.2	30.4	23.9
Ag mechanics	128	4.7	47.7	16.4	14.1	17.2	8.1	22.0	19.5	17.1	33.3
Farm mgt.	65	0.0	41.5	24.6	18.5	15.4	6.5	22.6	21.0	24.2	25.8
Ag communications	48	8.3	41.7	22.9	12.5	14.6	6.4	21.3	36.2	17.0	19.1
Landscape mgt.	88	8.0	30.7	31.8	15.9	13.6	6.0	16.7	25.0	28.6	23.8
Ag leadership	112	6.3	34.8	38.4	8.9	11.6	6.5	20.6	30.8	23.4	18.7
Food science	35	8.6	51.4	17.1	11.4	11.4	5.9	29.4	17.6	23.5	23.5
Soil science	84	3.6	35.7	32.1	19.0	9.5	6.0	12.0	34.9	27.7	19.3
Biotechnology	54	9.3	44.4	24.1	13.0	9.3	9.4	22.6	26.4	22.6	18.9
SAE	118	18.6	40.7	22.9	11.9	5.9	17.7	25.7	30.1	11.5	15.0

Table 3
Frequency and Intensity of Textbook Use in Agriscience Courses

		Mean			
Course	*n*	Frequency (percent)	Intensity (minutes)	Time/week (minutes)	Class time (percent)
Animal science	149	64.2	19.7	63.0	25.2
Introductory level	108	59.8	18.6	55.7	22.3
Plant science	119	57.4	18.9	54.1	21.6
Horticulture	122	57.0	18.4	52.3	20.9
Natural resource mgt.	89	57.6	17.7	51.0	20.4
Floriculture	70	53.6	18.6	49.8	19.9
Agribusiness management	92	52.2	17.8	46.5	18.6
Farm management	65	52.0	17.0	44.2	17.7
Landscape management	88	49.1	17.4	42.7	17.1
Soil science	84	48.7	17.1	41.7	16.7
Agricultural mechanics	128	47.9	17.3	41.4	16.5
Middle school	33	50.0	15.6	39.0	15.6
Agricultural leadership	112	46.2	16.4	37.8	15.1
Agricultural communication	48	45.9	16.1	36.8	14.7
Food science	35	41.4	16.5	34.0	13.6
Biotechnology	54	42.2	15.9	33.6	13.4
SAE	118	36.5	14.0	25.6	10.2
Weighted mean	---	51.8	17.7	45.7	18.3

Objective 2 also regarded teachers' selection of textbooks. Teachers were asked about criteria for textbook selection (Table 4). Mean agreement ranged between 4.68 and 2.50. Means over 4.50 were found for current and relevant information, readability, and overall ability to interest students. Items with the lowest agreement (less than 3.50) were for recommendations from the university, statewide textbook adoption, and the publishing company.

Table 4
Mean Criteria for Agriscience Textbook Selection (n = 212)

Criteria	*M*[a]	*SD*
Current and relevant information	4.68	0.52
Readability	4.55	0.59
Overall ability to interest students	4.54	0.60
Curriculum associated with the text	4.42	0.79
Organization and structure	4.40	0.66
Vocabulary	4.24	0.71
Graphics	4.19	0.71
Pictures	4.13	0.77
Associated curriculum materials (overheads, handouts, etc.)	4.03	1.00
Recommendations from other agricultural education teachers	4.03	0.96
Overall appearance	3.74	1.05
Price	3.67	1.15
Supplemental websites	3.56	1.19
Recommendations from the university agricultural education program	3.26	1.16
Statewide textbook adoption	2.90	1.45
Publishing company	2.50	1.25

[a]1 = strongly disagree and 5 = strongly agree.

Objective 3 sought to determine how teachers used CARS and which CARS were implemented in agriscience. Reliability for this construct was $\alpha = 0.87$. Researchers asked teachers 13 questions related to the application of general approaches to reading (Table 5). Means for the general approaches to reading ranged from 3.85 to 2.24. Percent *often* and *always* ranged from 73.4% to 15.3% for the approaches to reading. Summarizing was taught by 73.4% of teachers, followed by determining important ideas (60.8%), generating questions (58.1%), defining unfamiliar words (57.6%), and identifying the purposes for reading (51.4%). The fewest teachers taught students to think aloud while reading (15.3%), make predictions (18.8%), and use more than one reading strategy (28.5%).

Table 5
Percent Application of General Approaches to Reading (n = 206)

In my agricultural education courses, students are taught to…	Often & Always	Occ.	Never & Seldom	*M*[a]	*SD*
…summarize what they read.	73.4	17.6	9.0	3.85	0.92
…determine important ideas.	60.8	29.7	9.5	3.64	0.94
…generate questions about the text.	58.1	26.4	15.4	3.54	1.04
…define unfamiliar words during reading.	57.6	27.1	15.2	3.57	1.08
…identify their purpose for reading.	51.4	33.3	15.2	3.44	1.04
…use text structure to build comprehension.	41.3	34.0	24.8	3.12	1.10
…monitor comprehension during reading.	40.4	37.0	22.6	3.17	1.04
…create visual representations to aid recall.	38.1	37.1	24.8	3.13	1.12
…preview texts before reading.	35.1	28.4	36.5	2.92	1.21
…activate background knowledge.	34.5	36.4	29.2	3.02	1.10
…use more than one reading strategy.	28.5	33.3	37.7	2.81	1.11
…make predictions before reading.	18.8	33.3	48.1	2.58	1.03
…think aloud while reading.	15.3	22.4	62.4	2.24	1.10

Note. Occ. = Occasionally
[a]*Never* = 1 and always = 5.

Teachers were asked about their knowledge of, confidence in, and frequency of implementation of specific CARS (Table 6). Teachers' knowledge of CARS ranged from 1.16 to 3.05 with "1" being *none* and "5" representing *expert* knowledge. Agriscience teachers' confidence in the use of CARS ranged from 1.17 to 3.04 with "1" representing *no* confidence and "5" representing *expert* confidence. The range of strategy use per week was 1.80 to 0.14 strategies per class. Agriscience teachers used an average of 6.78 CARS per week.

Table 6
Mean Knowledge of, Confidence in, and Frequency of Use of CARS (n = 216)

	Knowledge		Confidence		Frequency	
Strategy	*M*[a]	*SD*	*M*[a]	*SD*	*M*	*SD*
Study guides	3.05	1.27	3.04	1.34	1.80	1.54
Guided reading procedure	2.28	1.29	2.27	1.34	1.11	1.36
Reciprocal teaching	2.18	1.11	1.69	1.08	.61	1.12
Graphic organizers	2.13	1.30	2.07	1.30	.95	1.50
Collaborative strategic reading	2.06	1.10	2.01	1.09	.91	1.21
K-W-L	1.49	1.00	1.43	0.91	.31	0.79
Jig-sawing	1.43	0.89	1.41	0.90	.27	0.76
SQ3R	1.34	0.78	1.32	0.77	.26	0.78
Cornell notes (2- or 3-column notes)	1.28	0.72	1.27	0.73	.21	0.71
Socratic questioning/seminar	1.22	0.63	1.26	0.72	.21	0.65
Directed reading-thinking activity	1.16	0.55	1.17	0.57	.14	0.54

[a]1 = none and 5 = expert.

Conclusions, Implications, and Recommendations

Agriscience teachers generally value reading as a meaningful activity for learning, personal development, and enjoyment. However, they are not in agreement as to the allotment of daily instructional time for engagement in reading. Agriscience teachers place high value on reading in agriscience, but were in less agreement as to their role and responsibility in teaching students reading skills. Prior research indicates that content area teachers perceive their responsibility to instruction about content, not reinforcing CARS (D'Arcangelo, 2002; Forget & Bottoms, 2000; Moore et al., 1999; Snow, 2002). The disconnection between attitude and behavior toward reading may give an indication as to the culture of reading in secondary agriscience whereby teachers may not regularly engage in reading or demonstrate the value of reading for learning to their students.

Modeling an appreciation for reading and use of CARS encourages students to read and implement strategies (Bintz, 1997; Moje, 1996; NRP, 2000; Sanchez, 2003; Stephens, 2002). Agriscience teachers should be encouraged to model reading for their students, as well as incorporate CARS in classroom instruction. To further this aim, teacher educators can reinforce effective active CARS in their teaching methods courses and teach about proper text use, text selection, and general approaches to reading. Pre-service teachers should also be encouraged to complete content area reading courses as part of their plans of study. Further, methods courses should include content area

reading components as approaches to instruction.

Only 38.0% of agriscience teachers assign students an individual text. Yet, teachers generally understand how to select textbooks and select texts based upon appropriate criteria, including current and relevant information, readability, and interest for students. Teachers allocate up to 25% of their class time to using textbooks for learning. Classes where texts are more heavily utilized include animal science, introductory level, middle school, natural resource management, horticulture, and plant science courses. Because SAE courses are not typically classroom-based courses, teachers use texts least in SAE courses. Still, why do teachers use texts to a lesser extent in agricultural communication, food science, and biotechnology courses?

However, while textbooks are used regularly in many courses, only a few agriscience teachers assign texts to individual students. When agriscience teachers fail to assign an individual text to all students, they may inadvertently hinder the reading development of some students. Some students require additional time to comprehend text and need to take the text home for further study. Less than 40% of agriscience classrooms assign texts to students, thus agriscience teachers must make allowances for students to take texts home or provide supplemental texts for additional learning.

While agriscience teachers in this study indicated textbook selection was based primarily upon current and relevant information and readability, two implications arise. First, textbooks by nature contain questionably current information. Secondly, trade books and magazines, those which are sold to the general public, contain current information and are often easier to read and more interesting. Additionally, these are the forms of text to which students will refer in their futures as lifelong learners. How are teachers using trade books and magazines in agriscience?

The recommendations of university teacher education programs seem to have little influence over textbook decisions. One could propose that recommending textbooks is beyond the scope of influence of teacher education programs. While this may be true, one also hopes that teacher education programs work with pre-service teachers to ensure that they know the proper criteria upon which to select textbooks. Supplemental websites also ranked low in selection criteria. However, this is a growing field of text production and becoming more important as students become more accustomed to learning from electronic texts. The use of electronically mediated texts by agriscience teachers is an area of inquiry that should be explored further.

When approaching reading, teachers instruct students to summarize, determine the important ideas, generate questions, define unfamiliar words, and identify their purpose for reading. Teachers do not regularly teach students to activate background knowledge, use more than one strategy, make predictions, or think aloud. Further, teachers lack knowledge of specific CARS. Teachers are most knowledgeable and confident in use of study guides with lesser knowledge and confidence with other CARS.

Reading involves three micro-periods: pre-reading, during reading, and post-reading (Ryder & Graves, 1994; Snow, 2002). Content area teachers have traditionally excelled in assessing post-reading activities, such as summaries, quizzes, and questions from the end of the chapter, but have implemented fewer pre-reading and during CARS (Durkin, 1978). The agriscience teachers in this study would indicate the same. If one divided the responses from the general approaches to text use into the three micro-periods, agriscience teachers implemented CARS most frequently in the post-reading micro-period, with during reading and pre-reading strategies lagging behind. Students who fail to understand the purposes of reading, do not activate background knowledge, abandon the use of multiple strategies, and neglect to monitor comprehension while reading will also struggle with assessments following reading. These students have not engaged in learning practices before and during reading to ensure successful comprehension after reading (Snow).

Agriscience teachers clearly need assistance with developing a repertoire of CARS that are beneficial to learning in the context of agriscience. Researchers in agricultural education need to identify and develop CARS that are appropriate for learning from the context of agriscience and the diversity of text found in our discipline. Then, professional development is needed to equip agriscience teachers with these strategies so that they can assist their students in learning from text and reinforce reading as a skill for lifelong learning.

Being called upon to demonstrate contributions toward student achievement (Belcher et al., 1996; Conroy & Walker, 2000), agriscience teachers can contextualize the reading experiences of students by implementing CARS when using texts in agriscience. As textbooks are utilized in all agriscience classes for a significant portion of class time, agriscience teachers should learn and implement effective strategies for using text as a learning tool. Further research is needed in this area of inquiry. What are teachers' specific attitudes toward reading? How do teachers perceive their role in reinforcing CARS? How prepared are teachers to enhance students' reading? What difference does professional development about reading, CARS, and other active learning strategies have on students' achievement in reading and comprehension?

Among the implications for this study is the need for teacher educators to ensure that CARS are a facet of the pre-service teacher experience. Further, teacher educators should do their part in reinforcing content area reading by implementing CARS, demonstrating an appreciation for reading, and helping students navigate the myriad of text options in agriscience. With the lack of knowledge of, confidence in, and frequency of use of CARS, current agriscience teachers may need additional professional development in the areas of reading and CARS use.

Reading is a skill that can develop throughout a person's education (Snow, 2002). It is enhanced through applications in a variety of contexts with multiple strategies. To ensure viability of agriscience and contribute to students' overall academic performance (Belcher et al., 1996; Conroy & Walker, 2000), agriscience teachers must become reading teachers (Readence et al., 1998; Vacca, 2002).

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