

AGRISCIENCE TEACHERS' ATTITUDES TOWARD IMPLEMENTATION OF CONTENT AREA READING STRATEGIES

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Abstract

As part of a larger study, four agriscience teachers were interviewed about their perceptions, attitudes, and challenges with implementing content area reading strategies (CARS) in secondary agriscience. In the larger study, two of the teachers implemented a treatment of systematic, planned, and thoughtful CARS in two agriscience courses, while the other two teachers provided the comparison of teaching their "normal" routine of instruction. Prior to the study, agriscience teachers implemented few or no CARS. They possessed limited knowledge and confidence in using CARS. However, due to pressures from administrators, the state department of education, and others, teachers in the comparison group implemented twice as many strategies as the treatment group, yet their students arrived at nearly the same level of agricultural comprehension and motivation as students in the treatment group.

Introduction

In order to help students learn from textual information, teaching reading is every teacher's responsibility, including content area teachers such as those in agriscience. Instruction using CARS is the most effective means of increasing student comprehension and developing skilled readers (Snow, 2002; Tomlinson, 1995). When content areas use text as a learning tool, the responsibility for teaching reading strategies falls on *all* teachers in *all* subjects (Alexander & Kulikowich, 1991; Florida Department of Education [FDOE], 2004; Vacca, 2002). Yet, few teachers, less than 14% in some cases (Irvin & Connors, 1989), employ reading strategies in their classrooms (Barry, 2002; Bean, 1997; Durkin, 1978; Ivey, 2002; Menke & Davey, 1994; Morawski & Brunhuber, 1995).

Some teachers reject content area reading because of their beliefs about secondary schools, misconceptions about reading as additional teaching material, and assumptions about teaching and learning (O'Brien & Stewart, 1990). In a qualitative investigation with 25 Midwestern pre-

service content area teachers, O'Brien and Stewart found that teachers failed to realize the relevance of reading to their discipline and rejected the notion that they are teachers of reading. The teachers did not understand how reading strategies could be implemented in their courses, and even suggested that other courses were more appropriate for reinforcing reading.

The most resistant pre-service teachers were those in agricultural education with 85% of them rejecting content area reading (O'Brien & Stewart, 1990). Because of the perception as a hands-on discipline, agricultural science teachers ignored reading as a teaching tool. Science discipline teachers rejected pre-reading instruction and learning from text, as they believed that when reading was necessary, students could engage in reading independently. O'Brien and Stewart concluded that

the merits of content reading were diluted by another institutionalized misconception—that a dichotomy of academic track versus vocational track curricula represents a clear, logical demarcation between book learning and

hands-on, non-text approaches to acquiring content (p. 119).

More recently, Park and Osborne (2006) found that less than 40% of current agricultural science teachers had completed a reading instruction course in college. They concluded that agricultural science teachers use reading and text approximately 20% of class time. Yet, these teachers lack knowledge and confidence in specific reading strategies, and therefore, implement few or no content area reading strategies in their classrooms. Further, these teachers tend to focus on assessing student comprehension in the third micro-period of reading, while neglecting means of enhancing comprehension in the pre-reading and during reading micro-periods. Agricultural science teachers often fail to instruct students how to create meaning from text in agriculture.

Instruction of reading strategies has a positive effect on reading comprehension and motivation to read (Autrey, 1999; Cooper, 1998; Druitt, 2002; Ferguson, 2001; Guthrie, 2001; Guthrie & Alao, 1997; Hurst, 2004; Knoll, 2000; Kuehl, 2002; Laflamme, 1998; Little, 1999; Lynch, 2002; Mastropieri, Scruggs, & Graetz, 2003; Meyer & Poon, 2001; Rush, 2000; Sanchez, 2003; Ward-Washington, 2002). Teaching reading strategies, especially multiple strategies (Snow, 2002), within a context such as agriscience improves awareness and use of strategies for learning content (National Reading Panel, 2000). Yet, students are seldom willing to expend the

time and effort necessary to implement strategies, and many students initiate reading strategies only when directed by the teacher (Cuevas, 2003).

Theoretical Base/Conceptual Framework

Comprehension is, "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (Snow, 2002, p. xiii). Comprehension is composed of three elements: reader, text, and activity or purpose for reading (Figure 1). These interact within a larger sociocultural context, of which the teacher is a primary component. Comprehension is more than just individual students and their reading; it is socially constructed through reading, writing, and speaking with other students and the teacher.

Contextualized within the individual's social networks and their learning communities (Mann, 2000; Moje, 1996), reading is a social activity among students and even teachers as they collectively construct content and learning procedures (Rex, 2001). Reading occurs as students and teachers "discuss their personal relationships to reading in the discipline, the cognitive strategies they use to solve comprehension problems, the structure and language of particular types of texts, and the kinds of knowledge required to make sense of reading material" (Schoenbach, Braunger, Greenleaf, & Litman, 2003, p. 136).

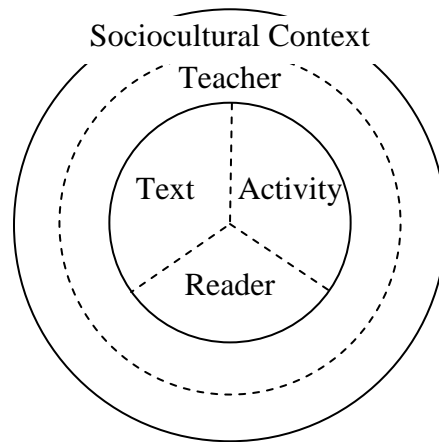


Figure 1. A heuristic for thinking about reading comprehension.

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.

Social patterns in the classroom shape the volume and breadth of student reading (Guthrie, Schafer, Wang, & Afflerbach, 1995). Reading activities are highly associated with social interactions among friends and family, strategies for comprehension and learning, classroom instruction, and teachers' emphasis on reading (Guthrie et al.). Moje (1996) found that teachers and students construct meaning through interactions with each other and the text, and these interactions are based on past experiences, current situations, and future implications.

Content area teachers have three primary reasons for failing to use reading or CARS: 1) teachers feel inadequate to handle reading problems in their classrooms, 2) teachers feel that reading instruction infringes on content area time, and 3) many teachers deny the importance of reading techniques (Barry, 2002; Bean, 1997; Cresson, 1999; Digisi, 1993; Durkin, 1978; Moore, Bean, Birdyshaw, & Rycik, 1999; Rhoder, 2002; Snow, 2002; Stewart & O'Brien, 1989). Many teachers deny responsibility for teaching students to read and write (D'Arcangelo, 2002; Forget & Bottoms,

2000; Jacobs, 2002; Vaughn, Klinger, & Bryant, 2001). Secondary teachers expect students to have the reading abilities necessary to read in the content areas (Snow). They perceive their primary function to be the preparation of students in their subject area (D'Arcangelo; Forget & Bottoms; Jacobs; Vacca, 2002). Some teachers even strive to minimize the amount of reading and writing in their classes (Allen, 2000; Cziko, 1998).

Teachers feel unprepared to teach and reinforce content area reading with students. The most resistant pre-service teachers were those in agricultural education with 85% rejecting content area reading (O'Brien & Stewart, 1990). O'Brien and Stewart concluded that content area reading was ignored because of the "dichotomy of academic track versus vocational track curricula [which] represents a clear, logical demarcation between book learning and hands-on, non-text approaches to acquiring content" (p. 119). Agriscience teachers believed that using hands-on methods compensated for and was more effective than even blending text into agriscience courses.

Purpose and Objectives

The purpose of this study was to investigate reasons for how and why agriscience teachers participating in a larger quasi-experimental study implement or fail to implement CARS in agriscience courses. The objectives of this study were:

1. Ascertain these teachers' motivation to employ CARS in agriscience,
2. Describe the pressures that four agriscience teachers face with regard to reading, and
3. Identify barriers to implementing CARS in their agriscience courses.

Procedures

From an explanatory perspective, long interviews following McCracken's (1988) four-step design were conducted with teachers upon conclusion of a larger study. This constructivist research methodology was chosen to gather information about teacher's construction of reality regarding the use of CARS in secondary agriscience courses. As such, these interviews were respondent interviews (Lindlof & Taylor, 1998) as part of the follow-up to a larger, quasi-experimental study. The four-step interview process involved the following

1. Review of analytic categories and interview design
2. Review of cultural categories and interview design
3. Interview procedure and the discovery of cultural categories
4. Interview analysis and the discovery of analytical categories (McCracken, p. 29)

The interviews were conducted in order to gain deeper understanding into the motivations of teachers participating in a larger study, as well as to explain their use or non-use of CARS in secondary agriscience. The interviews provided a rhetorical construction of the teachers' experiences with CARS (Lindlof & Taylor, 1998). Interviews were "used to verify, validate, or comment on information obtained from other sources" (Lindlof &

Taylor, p. 175), specifically, the quasi-experimental portion of the dissertation.

The literature review included a review of analytic categories (McCracken, 1988). During the review of cultural categories, the researcher examined self as the measurement instrument and began to assimilate ideas for constructing the interview questions. The third step involved constructing the interview questions. The final step involved the inductive analysis of the interview transcriptions and discovery of themes within the interviewee's communicated ideas.

Interview questions were generated from two sources: a review of the literature on content area reading and data gathered from the first part of this study. Thus the interviews were explanatory in nature. Questions used in the interview included, "What are your motivations for using reading in your courses? What about the implementation of CARS worked well? What worked poorly? What are your expectations for student reading? and What changed after the study?" Interviews were not triangulated with actual classroom observations or student interviews, but were compared to teachers' self-reported use of CARS. All interviews were conducted by the researcher in the classroom setting at the teachers' convenience upon completion of the larger study. The interviews were audio taped, and those tapes transcribed for further analysis (Creswell, 1998). Analysis of the transcriptions involved reviewing them for themes and explanatory purposes for the quantitative data.

The audit trail for this research consisted of the audio recordings, interview transcripts, interview guides, list of interviewees, themes generated from the transcripts, and the working conclusions about teachers' implementation of CARS in agriscience. Upon conclusion of interview transcriptions, the researchers read the transcriptions to identify themes running throughout the four interviews. Pertinent themes were assigned a code and the data were reread to find specific examples to support the themes. From the final themes, the researchers wrote summaries of the interviewees' constructed realities.

Findings

The four teachers were comprised of two each from the treatment group (TG) and the comparison group (CG) teachers. Each teacher taught two Foundations of Agriscience courses during the study period. Treatment group teachers, Helen^T and Charlie^T, were instructed where and how to use strategies within the curriculum, so that CARS were implemented in a systematic, planned, and thoughtful manner. In most cases they were instructed to choose between two complementary strategies when instructing students to read. Asked to teach their "normal" routine of instruction, comparison group teachers, Elizabeth^C and Norma^C, were not prompted to use CARS and implemented CARS based upon their knowledge of and preference for using them. Teachers in the treatment group used an average of 16.5 CARS and taught the lessons for an average of 1,570 minutes of instruction, while comparison group teachers used an average of 29.5 CARS and taught for 1,110 minutes.

Objective 1: Teachers' motivation to participate and employ CARS in agriscience

While these teachers were motivated to participate in this study, they were not especially strong or motivated readers. Norma^C noted that she was "a reader, but not an avid reader ... a slow reader." Charlie^T stated that he hated reading in school. Thus, reading was minimized in agriscience courses prior to initiating the study. All four teachers indicated that they did not, at least consciously, implement reading or CARS in their agriscience courses. Charlie's^T response typified those of the other teachers, "Prior to this year, [reading has] been a very minimal part" of agriscience courses. When asked if he regularly employed CARS in agriscience courses, he added, "Never; only when they tried to force me to [use CARS and reading]. I thought I would never do it." When asked if she regularly employed CARS, Elizabeth^C answered, "Probably not as consciously as I did with the study."

When they did use reading, teachers viewed it as an approach to providing baseline information, a supplement to their

lectures and discussions, or an activity for a substitute. Helen^T suggested that reading was "a supplement or one of the tools for presenting the information." When asked about the importance of content area reading in agriscience, Elizabeth^C stated,

We're able to provide real life examples ... With things like reproduction..., I can show them examples, rather than have them read it. Because they're going to retain that knowledge a whole lot better if they see it... Or even me telling them about it; they're going to retain that information a lot better... Sometimes I'll use [reading] as a unit introduction or ... part of lecture notes... But overall, I don't do a whole lot of readings.

Teachers indicated that the typical structure of the reading assignment included assigning a chapter to read and questions to answer at the end of the chapter. A class discussion of the assignment usually followed during the next class period. Charlie^T described his lessons,

From time to time we'll find a unit in the textbook that kind of follows what we're doing and I'll assign them the reading and they'll answer the questions at the back of the chapter. Or, I'll fix a worksheet that goes along with that unit and they'll have to find the information in the reading of the paragraphs. But typically I instruct by discussion or by lecture and [students] asking questions and response and worksheets (Charlie^T).

Teachers cited use of reading only or predominantly for when a substitute was covering a teacher's absence. While teachers believed that they could not trust a substitute to instruct students about a hands-on activity, they did feel comfortable leaving a reading assignment to keep students quiet and behaved. Norma^C delineated her approach to substitute lessons, "When I'm out, I always rely on my textbooks, because I've got a class of 25 kids, there's very few things I can do with 25 kids outside doing the same thing and keep an eye on 'em." She engaged in this practice even though she understood its

potentially detrimental effects on students' motivation:

A substitute is not going to get up there and lecture. They're just going to say, "Read this," and give out a worksheet. And I think that's a problem, because then, I think the kids get the attitude that the reading's not important. The reading's not important, because this is just a busy-work assignment (Norma^C).

Several of the teachers indicated that they understood and embraced the importance of content area reading in agriscience. Norma^C stated, "I think it's important ..., I feel like you need to be literate." She continued, "I don't think that because they're in ag, they shouldn't be doing English and math and history and social studies ..., because really agriculture is a blend of all that." Charlie^T asserted his perceptions of the importance of content area reading; "I think [reading is] important because when they get out in a job, it really doesn't matter what they already know as much as what can they find out on their own when they need it."

Helen^T believed that the use of CARS was a more efficient method of teaching both from a time and learning standpoint. In fact, she believed that the job of the teacher is

To teach them and make them understand [content], and so if you can find a way that is more efficient and better for them to understand, then you need to do that... I feel like [CARS] was probably the most efficient way that I had ever taught the reproduction part of those lessons... I think my students understood [the content] better than the standard here-it-is-let-me-regurgitate-this-information-to-you-and-you-write-it-down (Helen^T).

She related the importance of content area reading to the role of the teacher:

Number one, reading is important—you have to be able to read. You have to be able to understand the concepts, and you

have to vary how those concepts are taught, so that you make sure that every child understands, and not just those geniuses that are sitting there. But that every child needs to be able to understand and I guess that's ... why it's important to have all of those varying [reading strategies], so that you are touching on each student's ability to absorb that material, 'cause that's what you're supposed to be doing (Helen^T).

Objective 2: Describe the pressures that agriscience teachers face with regard to reading

Part of the pressure to incorporate reading in agriscience included the diversity of students in agriscience courses. Teachers noted that their students possessed a wide range of reading abilities, ranging from students who read far below grade level to those with no apparent difficulty in comprehending text. Charlie's^T students included "everything from nonreaders to honors students who read at a very high level." Helen^T summarized the reading levels of her students to include "the basic, basic [Severely Emotionally Handicapped] student ... to the academic honors student, who could probably be already in college... So, there are so many different varying levels of academic ability in that class" (Helen^T).

The teachers indicated a pressure to demonstrate to their administrators both the incorporation of reading in agriscience and attempts to improve students' overall academic achievement. These pressures motivated teachers to teach the accountability standards and prove their contributions to students' overall achievement. As Helen^T stated, "FCAT drives this cart here and drives everyone's cart." Elizabeth^C stated, "[administrators] are putting the pressure on us to read as well as to implement strategies to help students read in our classroom." Norma^C continued, "in our county, reading is a big deal right now, because we did have low test scores." Charlie's^T school even monitored the number of CARS that teachers used each week.

We have a committee at school that puts together reading assessments to assess the students throughout the year to make sure they're learning their reading strategies and every teacher is teaching a certain amount of reading strategies... [E]very teacher in our school is expected to focus on that strategy that particular week... You're supposed to implement that particular benchmark into your everyday curriculum. I find it very difficult to do that and get anything done ... Basically, [the administration's] comment is, 'Every teacher is a reading teacher' (Charlie^T).

Objective 3: Identify barriers to implementing CARS in agriscience.

Teachers in this study possessed a fundamental knowledge of CARS. Collectively, they named 24 different CARS or active learning strategies. While mentioning these strategies by name, teachers exhibited varying degrees of knowledge about how to use the strategies. They also possessed limited confidence in the implementation of CARS. For example, Norma^C noted, "I'm not real comfortable with all of [the reading strategies] yet, because I just started using some of these." Charlie^T indicated his deficiencies in using CARS, "I didn't understand how to do the summaries... And I think that's part of what made it unbearable for [the students]."

These agriscience teachers may not have gotten the help they needed to instruct students about CARS and how to improve their reading skills. Charlie^T also hinted at this problem:

We're academic up until the point that you expect [resource teachers] to help you just as much as they do somebody else, but then you're not. You're reading teachers right up until the point that they're going to be required to help you, and then you're not anymore. You're important until then, then you're not important anymore. But as an ag teacher, you get used to that (Charlie^T).

Teachers in the study indicated experiencing difficulty in motivating students to read and use CARS. Norma^C

noted, "I've tried different things throughout the years, and it is like pulling teeth to get these kids to read these textbooks." She continued,

If it's written work afterwards, like answer the questions at the end of the unit, or if we're going to discuss [questions], they just won't read. They just start immediately from the back. They'll start answering the questions. They won't have read it (Norma^C).

Teachers stated that students were "inundated with strategies" (Charlie^T), and thus preferred using strategies that were easy to use and understand. Charlie^T stated, "I think kids enjoy [CARS] if they don't have to do a pile of writing ... I think a change from time to time is good. I think doing [reading] every day is ineffective." Helen^T also noted the variety of strategies in the treatment; "The fact that [the study] alternated the types of reading strategies that you used hit a larger amount of the students in the class ... I think they enjoyed them all."

Teachers noted that when they were interested in reading and understood and adopted particular CARS themselves, then their students tended to read and use CARS to a greater extent. The opposite was true as well. When the teacher was disinclined to use reading or reading strategies as learning tools, then their students were difficult to motivate to read or use strategies. Elizabeth^C noted, "I don't enjoy a KWL chart a whole lot, and I don't think [the students] do either ... If I like it, then they like it. If I don't like it, it's goin' to bleed over into them." Helen^T expressed similar thinking; "In situations where the teacher's just give [the students] something so the administration doesn't yell at them ..., the kids hate it." She attended workshops to glean new ideas for learning strategies and attempted to implement those strategies. She knew her enthusiasm would carry over to students. The reason that she attended workshops was, to "take advantage of those things I go to, and I'm excited about 'em, and I bring it back and make sure that I show my enthusiasm to my kids, and hopefully they'll be excited about it (Helen^T).

Conclusion, Implications, and Recommendations

While the teachers involved in this study valued content area reading, they had implemented little reading and few or no CARS in their agriscience courses prior to initiation of this study. Research (Barry, 2002; Bean, 1997; Durkin, 1978; Irvin & Connors, 1989; Ivey, 2002; Menke & Davey, 1994; Morawski & Brunhuber, 1995) supports the notion that content area teachers generally avoid reinforcing reading as a means and an ends of instruction, especially agriscience teachers (Park & Osborne, 2005; Stewart & O'Brien, 1989). Teachers in this study may have felt inadequate in their knowledge of CARS (Cresson, 1999; Digisi, 1993; Moore et al., 1999; Rhoder, 2002; Snow, 2002). However, the importance of reading was not one of the reasons that they failed to use CARS. In fact, all teachers in this study attested to the importance of reading for learning agriscience and lifelong learning.

Another possible explanation for the lack of reading in agriscience classes surfaced during the teacher interviews. Most of these teachers indicated that they were poor readers and/or did not take time to read. This may mean that, while teachers did report they believed that reading was important, the reality was that these agriscience teachers did not engage in reading for personal or professional ends. Thus, they did not demonstrate the importance of reading to their students. Agriscience teachers are significant factors in the lives of their students, thus when they demonstrate the importance of reading and use of CARS, their students may adopt similar approaches to reading (Bintz, 1997; Moje, 1996; NRP, 2000; Sanchez, 2003; Stephens, 2002).

Treatment group teachers employed an average of 16.5 CARS and used 1,570 minutes of instructional time to teach the three animal science lessons. Comparison group teachers used an average of 29.5 CARS and used 1,110 minutes of instructional time. Teachers attributed the increase in use of CARS and participation in the study to pressures from school administrators, standardized testing, and the

state department of education. In essence, they responded when pressured to implement a form of teaching for the betterment of student learning by implementing many CARS.

Of interest was the finding that without CARS embedded in the curriculum and without prompting, comparison group teachers implemented twice as many strategies as treatment group teachers. Perhaps their own ideas of enhancing student achievement by implementing learning strategies, their school administration's pressure to focus on reading, and/or their participation in this study motivated these teachers to implement more CARS than the teachers in the treatment group. Regardless of the motivation, comparison group teachers may represent the reality of how agriscience teachers would behave when motivated to implement strategies to improve student learning, that being to implement more strategies than may be necessary.

Agriscience teachers in this study noted the pressures that they feel to implement content area reading and teach CARS. Some were required to demonstrate in their daily lessons which CARS were being used and with what frequency. This accountability reinforced the importance of reading, but also created additional pressures for agriscience teachers. With these additional pressures to teach subjects other than the teacher's own content, one also wonders about the impact that these demands could have on the teacher's longevity in the profession.

The main barriers to integration of reading instruction in agriscience are the teachers' limited knowledge and confidence in the use of CARS. Teachers lacked knowledge of how, when, where, and why to use CARS with their instruction. This lack of knowledge and confidence in use of CARS may help explain why agriscience teachers tended to avoid reading and using CARS in their courses (Stewart & O'Brien, 1989). Agriscience teachers may use instructional strategies and methods that they are comfortable with and shy away from those with which they are less proficient. Thus, for teachers to incorporate additional CARS and use reading to a larger

extent, teachers must become more knowledgeable and confident in their use of CARS and reading as a learning tool. In order to become more knowledgeable and confident in the use of CARS, curriculum should include CARS as learning tools for teachers and students.

In practice, agriscience teachers should also realize their dual teaching roles of teaching content as well as reinforcing reading concepts and skills. The axiom, *all teachers are teachers of reading*, really held true for these agriscience teachers. If a teacher does not adopt this approach to instruction, then he or she may be in jeopardy of becoming inadequate in his or her teaching role. Further, to ensure the teacher's viability, he or she may be required to read materials about teaching method, research effective CARS for their particular classes, and attend professional development about effective use of reading and CARS in agriscience.

These teachers were not averse to implementing CARS in agriscience. Given the power to attempt implementation on their own, the comparison group teachers implemented nearly twice as many CARS as the treatment group teachers with the prescribed curriculum. This gives an indication that with proper motivation, agriscience teachers may be willing to alter their preferred teaching methods and adopt new CARS. As a teacher, though the effort may be great, one must adapt teaching methods to attempt to fulfill the learning needs of students.

The teachers in this study participated in part because of their interest in learning more about implementing CARS in their agriscience courses. This may be indicative of a need among agriscience teachers for professional development in using CARS. In fact, several of the teachers noted this need during their interviews. Agriscience teachers must learn how to implement reading effectively and use CARS with students in order to help them learn from text. Teacher educators and other education professionals may help fill this need by offering in-service about content area reading.

The following conclusions were drawn from the interviews.

1. Prior to initiating the study, the agriscience teachers in this study implemented few or no CARS in their agriscience courses.
2. Teachers are under pressure to implement CARS in their agriscience courses. Teachers are motivated to implement a large number of strategies because of pressures applied by the state department of education and local administrators to improve students' reading scores.
3. Agriscience teachers in this study possess limited knowledge of and confidence in using CARS with their agriscience courses.

Based upon the findings of this study, the researcher recommends the following suggestions for practitioners in secondary agriscience education:

1. Because agriscience students possess a wide range of reading abilities, agriscience teachers must be aware of and address this array by implementing CARS to benefit *all* students. When using texts, teachers should implement appropriate CARS to assist students in comprehending the information and applying it to solve problems in agriscience. Agriscience teachers must adopt the perspective that when they use text, they are teachers of reading.
2. Because of the limited knowledge and confidence in implementing CARS and due to the pressures from the state department of education and local school administrators to reinforce reading with all students, agriscience teachers must realize that implementing CARS in agriscience may mean attending professional development and/or working with other teachers or reading coaches in the school to develop approaches that effectively incorporate reading and CARS in agriscience.

The following recommendations were made for consideration of post-secondary teacher educators in agricultural education:

1. Teacher educators must work to educate current agriscience teachers and equip them with the CARS necessary to assist students in reading. Teacher educators should assess current professional development being utilized by teachers with regard to content area reading.
 2. Teacher educators should explore what and how they model reading behaviors to their students and use CARS. Because many college courses rely heavily upon reading for learning, college faculty could model appropriate uses of CARS and how to use text for learning. This would expose students to CARS, building their knowledge and confidence.
 3. Because CARS that are implemented in a systematic, planned, and thoughtful manner may save teachers time and produce the same effect as implementing a large number of CARS, agriscience curricula should include CARS. Curricula should be developed that incorporates CARS directly into lesson plans and student activities so that teachers are required to spend less time adapting strategies to the content and their own teaching styles.
- reading in agriscience before and after professional development?
5. How do teachers handle the added pressures to teach reading? What are they doing to reinforce core academic areas within agriscience? What impact does the context of agriscience have on learning key math, science, and reading competencies?

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The study also prompts questions for further research, including:

1. How do agriscience teachers model and use reading and CARS in agriscience?
2. What do agriscience teachers believe about content area reading in agriscience? How do those beliefs and attitudes manifest themselves in the secondary agriscience classroom?
3. How does professional development in CARS impact changes in teachers' knowledge of CARS, confidence in their use, and actual teaching methods in the classroom?
4. How effectively do agriscience teachers implement CARS and

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