

Agriculture Teacher Awareness and Application of Self-Regulation Strategies

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Abstract

This qualitative study investigated four rural Kansas high school agriculture teachers' comprehension and implementation of self-regulation strategies in their own professional growth and in their instructional practice. The participants included two males and two females, each one having between five and 20 years of teaching experience. Participants were interviewed three times, using symbolic interactionism as the philosophical overview and the Seidman technique of interviewing. Three questions guided this study: 1) how do rural Kansas high school agriculture teachers make meaning of self-regulation and the processes needed to facilitate self-regulation, 2) in what ways do teachers self-regulate for their own professional growth purposes, and 3) what strategies do teachers use to foster self-regulation in their students? Findings suggest while participants described utilizing strategies associated with self-regulated learning, they most closely associated self-regulation with effort and motivation. Key implications for practice include incorporating a self-regulated learning focus into preservice education, specifically during microteaching and student teaching experiences. Recommendations for future research include exploring the effectiveness of self-regulated learning instructional strategies that hold promise for teaching teachers and students to utilize self-regulation cognitive strategies.

Keywords: self-regulated learning; agricultural education

Introduction

Between 2015 and 2020, the U.S. Department of Agriculture expects 57,900 high-skilled positions to open annually (Goecker, Smith, Fernandez, Ali, & Goetz Theller, 2015). As a part of Career and Technical Education (CTE), agricultural education has a need to prepare students not just for post-secondary academic pursuits but also for the workforce (Conroy, 2000). It is likely students entering the agriculture workforce will need critical thinking skills, and agricultural education potentially has the ability to facilitate these skills. Self-regulation may be an avenue to help students develop thinking skills, as Kuiper (2002) suggested, self-regulated learning (SRL) strategies can foster critical thinking and problem solving skills.

Self-regulation is considered to be a component of metacognition, which has been defined as “the awareness of and knowledge about one’s own thinking” (Zimmerman, 2002, p. 65). Zimmerman and Martinez-Pons (1986) described students as self-regulated when they are active in the learning process and plan, organize, and self-evaluate their learning. While metacognition is internalized and covert in nature, self-regulation can be both internalized and overtly physical. In a 2002 article, Zimmerman suggested research has shown self-regulatory processes lead to success

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in school, but few teachers ask students to self-evaluate their work or assess their beliefs about learning, which results in students who are not prepared to learn on their own. Furthermore, research has not been conducted on whether agricultural educators employ self-regulation strategies in their instruction. Using a guide of 15 strategies they attributed to SRL, Zimmerman and Martinez-Pons (1986) found that higher achieving students reported using more self-regulated strategies than lower achieving students.

Knowledge of both metacognitive and SRL facilitating instruction may require more than a broad, generalizable set of strategies that can be used across all academic subjects. In order for transfer of metacognitive knowledge to occur to new situations, students need experiences in multiple contexts while acquiring the new learning (National Research Council, 2000). The real-world relevancy and ability of agricultural education to apply concepts in a concrete setting makes it a logical vehicle to help students learn to transfer self-regulation to other contexts.

The importance of self-regulation has been well documented (Bercher, 2012; Cleary, Platten, & Nelson, 2008; Hughes et al., 2002; Nota, Soresi, & Zimmerman, 2004; Zimmerman & Martinez-Pons, 1986; Zimmerman, 2002) and the need for teachers to educate students about these strategies established. However, research done in high school agricultural education programs to determine whether agriculture teachers incorporate self-regulation strategies into their instruction has not been found. The agricultural education model contains many components, including student leadership (FFA), experiential learning (SAE), and project-based learning (Classroom/Labatory) (Phipps, Osborne, Dyer, & Ball, 2007). This uniqueness provides significant opportunities for teachers to incorporate self-regulation strategies into their instruction.

Researchers have examined self-regulation processes in students with disabilities (Hughes et al., 2002) and general education classes (Zimmerman & Martinez-Pons, 1986) and have suggested that self-regulation is a key component of student success. However, in their study with 28 teachers Seraphin, Philippoff, Kaupp, and Vallin (2012) found it was common for both novice and experienced teachers to be unfamiliar with metacognitive strategies. The same study suggested that both novice and experienced science teachers could benefit from professional development focused on metacognitive science inquiry. As agriculture is perceived as an applied science – and agriculture teachers welcome the integration of science into the agriculture curriculum (Myers & Washburn, 2008) – agriculture teachers could also benefit from these opportunities.

While the research on self-regulation in other classroom settings abounds (Bercher, 2012; Cleary et al., 2008; Hughes et al., 2002; Munby et al., 2007; Zimmerman & Martinez-Pons, 1986), only a few *Journal of Agricultural Education* articles have examined metacognition in general (Pate & Miller, 2011a; Pate & Miller, 2011b; Pate & Miller, 2011c), with only one specifically studying SRL (Filcher & Miller, 2000). Prior research makes a compelling argument for the usefulness of self-regulation strategies in secondary education. Agricultural education, with its broad scope of curriculum, could potentially offer many opportunities to incorporate self-regulation strategies into its instruction. Because research on SRL is mostly focused on student use and less on teacher awareness, more information is needed about teacher awareness of SRL strategies.

Purpose and Research Questions

Because little is known about applications of self-regulation in agricultural education, this study attempted to establish a baseline of agriculture teacher awareness of self-regulation by investigating four rural Kansas high school agriculture teachers' comprehension and implementation of self-regulation strategies in their professional growth and in their instructional practice. Focusing on agriculture teachers and their understanding of self-regulation provides

insights into how they formulate their practice, as Askill-Williams, Lawson, and Skrzypiec (2012) suggested, the quality of teacher knowledge about the learning process influences teacher actions. Cleary et al. (2008) suggested that even though schools value the evaluation of students' self-regulation processing, these processing skills are rarely evaluated by school personnel in a comprehensive manner. This presents a potential problem, as the National Research Council (2000) postulated metacognitive processes may remain unknown to students if they are not taught how to utilize them, "because metacognition often takes the form of an internal dialogue, many students may be unaware of its importance unless the processes are explicitly emphasized by teachers" (p. 21). What teachers know about self-regulation processes and how they can potentially facilitate these processes with students is the focus of this research.

The purpose of this study was explored through three research questions: 1) how do rural Kansas high school agriculture teachers make meaning of self-regulation and the processes needed to facilitate self-regulation, 2) in what ways do teachers self-regulate for their own professional growth purposes, and 3) what strategies do teachers use to foster self-regulation in their students?

Theoretical Framework

Zimmerman (1989) suggested that in order to qualify specifically as SRL, "learning must involve the use of specified strategies to achieve academic goals on the basis of self-efficacy perceptions" (p. 329). Self-regulated learning includes the following strategies: self-evaluation, organizing and transforming, goal-setting and planning, seeking information, keeping records and monitoring, environmental structuring, self-consequences, rehearsing and memorizing, seeking social assistance, and reviewing records (Zimmerman & Martinez-Pons, 1986). Self-regulation involves more than just knowledge of a particular skill; it also involves the understanding to be able to implement that skill knowledge appropriately with the behavior skill, self-motivation, and self-awareness that are needed (Zimmerman, 2002).

Zimmerman and Campillo's (2003) model of self-regulation was used as a theoretical framework, allowing the researcher to interpret participants' descriptions of self-regulating strategies. The Zimmerman and Campillo (2003) model broke self-regulation down into three cyclical phases; the Forethought Phase, Performance Phase, and the Self-Reflection Phase. The Forethought Phase includes both task analysis and self-motivation, with task analysis involving setting goals and planning for learning. Self-motivation is driven by one's beliefs about learning and their own capacity to learn. It is also tied to the intrinsic value of the knowledge the learner is learning, meaning they are interested in the learning (Zimmerman, 2002).

The Performance Phase (Zimmerman, 2002) includes self-control and self-observation, with self-control referring to the deployment of learning strategies chosen in the Forethought Phase and self-observation referring to keeping track of or recording personal events. An example of a strategy in this phase would be a teacher using self-monitoring, a covert form of self-observation according to Zimmerman, to track her pacing while facilitating instruction. If, through self-observation, the teacher finds her pace to be too slow or too fast for students to keep up, she can take corrective measures.

The Self-Reflection Phase consists of self-judgment and self-reaction. Self-judgment can include self-evaluation, where the learner compares his/her performance against a particular standard of performance, or as Zimmerman (2002) suggested, self-judgment can also include causal attribution, where one attributes his/her success or failure to a specific cause. Self-reaction involves a learner reacting, either positively or negatively, to their performance. A positive reaction can increase motivation, whereas a negative reaction may cause a defensive behavior and a decrease in

motivation. Adaptive responses may also take place, causing one to adjust his/her methods in order to increase learning.

The process becomes cyclical when one uses self-reflections from previous events to engage in Forethought processes. According to Zimmerman (2002), self-regulation phases develop differently with novices compared to experts. Novices tend to self-regulate reactively, compare their performance with that of their peers, and typically do not engage in quality forethought. Whereas, experts set goals, have high levels of self-motivation, and evaluate their performance against their goals. Teachers may be empowered to better understand SRL processes by becoming familiar with how they personally apply the phases of self-regulation.

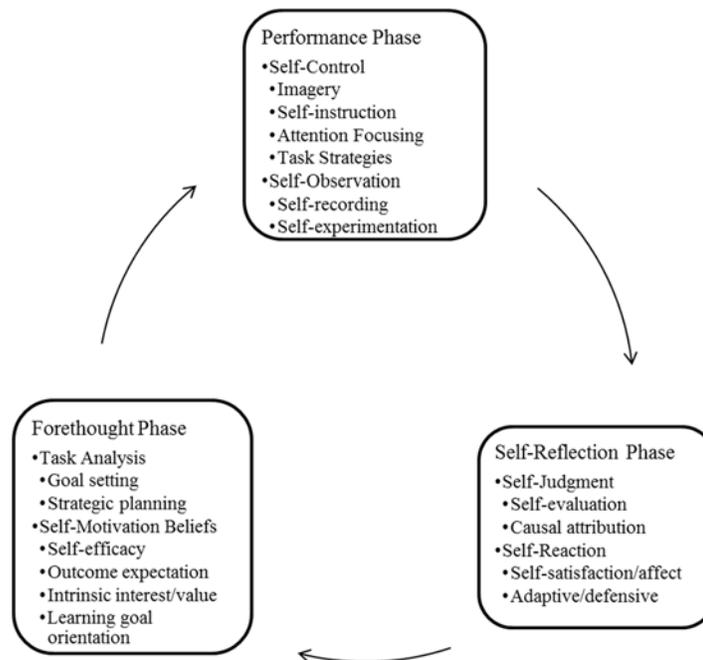


Figure 1. Phases and subprocesses of self-regulation (Zimmerman & Campillo, 2003)

Methods

Philosophical Overview

To investigate agriculture teachers' comprehension and implementation of self-regulation strategies, an interpretivist approach was employed (Merriam, 2002) using the symbolic interactionism methodology. Symbolic interactionism enabled the researcher to gain perspectives of the participants by focusing on the ways in which they make meaning of their experiences (Flick, 2009). Blumer (1969), suggested symbolic interactionism has three assumptions:

- human beings act toward things on the basis of the meanings these things have for them;
- the meaning of such things is derived from, and arises out of the social interaction one has with one's fellows; and
- meanings are handled in, and modified through, an interpretive process used by the person in dealing with the things he encounters. (p. 2)

Based on these assumptions, Flick (2009) suggested research using the symbolic interactionism approach should focus on the different ways in which individuals under study make meaning of their experiences. Flick also recommended the researcher should aim to “reconstruct the subject’s viewpoints” (p. 58) in order to analyze social worlds.

Subjectivity Statement

As an agricultural educator and researcher seeking to comprehend the ways in which agriculture teachers make meaning of and employ self-regulation strategies, I examined and detailed how my own interactions and prior experiences in education impacted my own meaning of the study. Throughout elementary and middle school I was a strong academic student, but my first interaction with consistent, constructive feedback came in the form of competing in Career Development Events (CDEs), as it called for a necessary amount of criticism from my agriculture teacher in order for me to become more proficient at the task. My relationship with my agriculture teacher also had a definite impact on my decision to enter the agricultural education field. As a result of these experiences, I have strong feelings about the impact agricultural education can have on learners, and as a teacher I feel a strong sense of responsibility to my students. I assumed educators in this study shared similar beliefs concerning their diligence to students.

I have always believed myself to have effective study habits as a student, such as monitoring my studying environments, pre-planning what I was going to study and for how long, and seeking help from others. I did not know of a label to assign to these habits, nor do I recall where exactly I learned them. Some, I am sure, were explicitly taught to me as a youngster, but I feel as though I picked up many through observing others and their actions. My resulting assumption is that most SRL strategies are taught implicitly rather than explicitly in public education. My usage of self-regulation strategies as a student have carried over into my work as a professional. I often reflect on lessons and daily events as a teacher, always seeking to improve my instruction and seek advice from other more experienced teachers.

While not knowing the term for these strategies was “self-regulation,” I viewed them as important and beneficial to my growth as an educator. I feel as though I modeled the behaviors well, and encouraged students to self-evaluate their performances and products (especially in shop classes), but did not explicitly give instruction on these strategies and how they may impact the students. Through reflection on my teaching I realize the opportunities I had, but did not take advantage of, as an agricultural educator to incorporate self-regulation into my instruction. These opportunities are due to agricultural education being so broad and encompassing many different topics and interactions with students – agricultural educators have the opportunity to not only interact with students on cognitive tasks, but physical working tasks as well.

Participants

Participants were purposively selected utilizing input from Kansas Team Ag Ed members. Participants met the conditions of being a teacher employed in a Kansas Department of Education approved high school agricultural education program, with a course load consisting of at least 75% agriculture classes, and having more than five years and less than 20 years of experience. A majority of agricultural education programs are located in rural schools; therefore, selecting teachers from rural areas allowed the research participants to most clearly reflect the nature of agricultural education in Kansas. According to the National Center for Education Statistics (2011), 221 of the 312 Kansas school districts are located in rural areas.

Rice (2010) asserted a teacher is likely to grow most in effectiveness within their first five years of teaching, after which there is a plateau on improvement and the differences in pedagogy between a five-year teacher and a 20-year teacher are negligible. Therefore, the author determined to limit participant eligibility to those teachers with more than five years of teaching experience. This criterion allowed a focus on participants generally accepted as skilled teachers. Participants were limited to less than 20 years of experience in order to more accurately reflect the majority of Kansas agricultural educators' experience. The number of participants was set at four to allow for perspectives of teachers within the five to eight-year experience range, the nine to twelve year range, the 13 to 16 year range, and the 17 to 20 year teaching range respectively.

Of the four teachers, two were female and two were male to account for potential different applications of self-regulation based on gender influences. Bidjerano (2005) found differences in self-regulating behaviors between genders, in that females surpassed males in their ability to use six strategies the researcher associated with self-regulation: rehearsal, organization, metacognition, time management skills, elaboration, and effort. It was suggested these differences could be due to gender impacting a proclivity of utilizing self-regulated strategies in their learning, females might have been more reflective about their learning or revealed a higher willingness to report their use of the strategies.

Pseudonyms were utilized in the study to protect participants' rights and reference both the participant's gender and their range of experience, as Aubrey and Claire were both females and Brad and Doug were both males, and the pseudonym beginning with "A" being the least-experienced. Aubrey had taught for six years, Brad for 12 years, Claire for 13 years, and Doug had taught for 20 years. Selecting four participants enhanced the trustworthiness of the study by allowing the researcher to gather different perspectives across experience level as well as gender.

Data Collection

To achieve an understanding of agriculture teacher awareness and application of self-regulation, the researcher utilized three semi-structured, in-person, in-depth interviews per participant following the Seidman interview method. Flick (2009) suggested semi-structured interviews are valuable because, as compared to more structured interviews, interviewees can more accurately establish their viewpoints. The Seidman Technique involves a three interview series, with each interview focusing on a particular theme with the participant. The three interviews on separate occasions allow the researcher to gain the participant's perspective by understanding the context of their experiences, reconstructing their experiences, and then reflecting on the experiences (Seidman, 2013). Each of the three interviews per participant was approximately 90 minutes in length, providing more than three hours of data collection with each participant.

Focusing on the three research questions, the three interviews followed Seidman's (2013) technique with each respective interview concentrated on the following: participants discussing themselves as a learner to set context; discussing themselves as a professional and teacher to reconstruct experiences; and reflecting on the meaning of those experiences. Participants' discussion of themselves as a learner during the first interview was stimulated by prompts such as "Walk me through a typical day for you as a high school learner" and "Tell me about a time when you first remember thinking about your own learning." For the second interview, participants were given prompts such as "Give me an example of a time when you made an instructional improvement" and "If I were to ask you to self-assess any aspect of your life, what steps would you follow?" Lastly, the third and final interview asked participants to reflect, and included items like "When reflecting on your teaching experience, does a student come to mind who could have

benefitted from self-regulation strategy instruction?” and “How might this study effect your instructional strategy use?”

A voice recording device was used during each interview to ensure precise transcription of data. All data transcription was completed by the researcher, with member checks and auditing completed after transcription in order to increase credibility and confirmability. Member checks were completed by emailing the transcribed text to each participant, which allowed the participant to review the transcribed data from the interviews and determine if the contents were accurate and representative of their feelings. This is considered a form of communicative validation - or trustworthiness (Flick, 2009). Auditing was completed periodically by a colleague not involved in data collection in order to cross-check themes, categories, and notes. Applicable and necessary revisions were then made based on the colleague’s recommendations. Flick suggested this allows for an increase in dependability of the research. Guba (1981) suggested audit trails increase the stability (dependability) and confirmability of research findings.

Limitations

Semi-structured, in-depth interview is a successful technique for understanding the depth of an answer to a question and for gaining deep insight into the feelings behind that answer in order to reconstruct the participant’s viewpoint (Flick, 2009). The qualitative nature prohibits generalizing findings to all secondary agricultural teachers in Kansas. Other limitations may also apply, such as: understandings are self-reported by teachers; student receptiveness to instructional strategies and class sizes may vary; socioeconomic status variance between schools and communities may impact resources available to students and teachers. In addition, variance between the 9 to 12 and 13 to 16 experience range was small (one year) as the level of experience was balanced with the other requirements of having a rural program with a predominantly agriculture course load.

Data Analysis

Glaser (1965) stated the constant comparative method of qualitative data analysis is “concerned with generating and plausibly suggesting...many properties and hypotheses about a general phenomenon” (p. 438). The researcher accomplishes this through four stages: comparing incidents to categories, integrating categories and their properties, delimiting the theory, and writing the theory (Glaser, 1965). During the first stage, the researcher compares incidents to categories. During this time theoretical properties of the category quickly emerge. Next, the coding changes from comparing “incident[s] with incident[s] to [comparing] incident[s] with properties” (Glaser, 1965, p. 440). The researcher records memos concerning theoretical notions, then reflects and deliberates about these notions, which produces clearer ideas on the emerging theory, and these recorded in memos. Next, the researcher reduces the theory to fewer, higher level concepts “based on underlying uniformities in the original set of categories of their properties” (Glaser, 1965, p. 441). Finally, the memos are used when writing the discussion.

After transcription, 170 pages of text were included in the data analysis process. Following the constant comparative method, the researcher first reviewed transcripts and identified open codes, or any bit of information that was relevant to the three research questions. Following the open coding process, codes were further analyzed and grouped into categories, sub-themes, and themes. Axial codes were highlighted and then pulled into a separate word processing document. Codes were constantly compared with other incidents until categories began to emerge. Once categories emerged, newly identified codes were then compared to the principles of the categories, continuously rearranging individual codes to fit their changing categories. As analysis proceeded,

the categories were then integrated into sub-themes, and the sub-themes into themes. Using the constant comparative method, six specific themes emerged from the data; teachers as learners, teachers focusing on their own learning, comprehension of self-regulation, application of self-regulation, teachers' growth strategies, and self-regulating professional development.

Findings

After the six themes were determined, they were aligned with the research objectives of the study. The themes relevant to Research Question One: "how teachers make meaning of self-regulation and the processes needed to facilitate self-regulation" included teachers as learners, teachers focusing on their own learning, and comprehension of self-regulation. The themes relevant to Research Question Two: "in what ways do teachers self-regulate for their own professional growth" included teachers' growth strategies and self-regulating professional development. The theme pertinent to Research Question Three: "what strategies do teachers use to foster self-regulation in their students" included application of self-regulation.

How do rural Kansas high school agriculture teachers make meaning of self-regulation?

Research question number one included three themes. The first theme, *teachers as learners*, explored how participants described their experiences as learners during their academic careers and included sub-themes motivation, learning methods, strategies used to improve, and metacognitive instruction. Participants all discussed their own need to be motivated and see value in learning, while their sources of motivation varied. Representative among the participants, Doug described a focus on the need for motivation, "I would say that if it interests me, I was a good learner. If it didn't, then... struggle with it I guess... don't know if struggle is the word, just didn't try." While not explicitly discussing self-regulation strategies, each participant exhibited characteristics of self-regulation, in that they were familiar with how they best learned and discussed an ability to cater to their desired style of learning. Their reflections were focused more on their actions and behaviors as students, and less focused on the cognitive processes that led to those behaviors.

The second theme, *teachers focusing on their own learning*, focused on when teachers began concentrating on the learning process, and their feelings toward teacher education. Relevant sub-themes included: became aware of learning in college, became focused on learning as novice teacher, and shortcomings of pre-service education experience. Participants mentioned they became more aware of their own learning as they started focusing on how they would use the new knowledge, as Aubrey stated, "my attitude changed when I got into college, 'cause I kept thinking about how am I going to use this to teach my students", while Claire further discussed the need to start seeking out more information once she started college, "like thinking and seeking out knowledge, I would say that was probably more college level."

The final relevant theme for research question one was *comprehension of self-regulation*, which described how participants made meaning of SRL and included sub-themes attributing self-regulation to personal preference and attribution of self-regulation to students. When discussing how participants make meaning of self-regulation, they often described an incomplete understanding by associating it with motivation and effort. Participants' discussion of SRL frequently lacked elements of the second and third phases of the SRL model (Performance and Self-Reflection phases), as self-observation, monitoring, and assessing strategies were generally omitted. A focus on outward behavior also limited participants' focus on the underlying cognitions leading to SRL strategy use.

Participants often attributed their personal success (or lack thereof) to motivation and effort when discussing their experiences as learners. As a representative statement, Doug suggested, “to me it just comes down to work ethic I guess. So that’s why I feel I was successful, because I worked at it.” They frequently emphasized needing to be motivated and cited different sources for their motivation, including parents and intrinsic need. Brad was one of the participants who cited his parents as a big motivator, describing a time when he earned a ‘B’ in a class due to lack of effort, and his mom “made that expectation clear to me that, that I needed to work harder.” When they reflected on themselves as students, they were more likely to focus on their behaviors and actions than they were to focus on their cognitions that led them to those actions, often failing to describe the underlying cognitive SRL processes that influenced their behaviors. The focusing on doing, and overlooking cognitions, could explain why participants also associated self-regulation with stereotypical “good student” behavior. Brad provided a typical statement describing a student who self-regulates, “you have got homework to do, are you going to do it? That is self-regulation, I mean regulating your own learning. Taking notes, is self-regulating, you know, without being asked, without being prodded, that is self-regulation.”

Participants frequently described meanings that relate to the first phase of the Zimmerman and Campillo (2003) model of self-regulation (the Forethought Phase), such as this comment from Claire discussing her own learning while emphasizing motivation, “if I want to get an ‘A’ in the class, this is what I am going to have to learn to get myself there, so it's almost kind of a self-motivation to get whatever that knowledge is.” Participants tended to project their own emphasis on motivation to their students when discussing self-regulation, as Aubrey suggested, “making yourself learn, um, being self-motivated I guess. Being self-motivated is always the first thing that comes to mind when I hear that [self-regulation].” She again stated the importance of motivation while discussing students who underachieve, “kids that, that, I have that turn in weak work, I know for the most part can do better. They are just not focused.”

Participants also did not recall receiving instruction concerning metacognition or self-regulation at any point during their academic careers, Brad stated, “I don't ever remember being taught how to, you know, how to self-regulate” and Aubrey stated “never” when asked if she received any instruction on self-regulation strategies and even discussed teacher education, “I’m trying to think back, like teacher-ed stuff, I don’t remember them ever really going over, like, how to have your students do this to make them better learners.” However, participants did describe beginning to focus more on their own learning, and the learning process, once they entered college or as novice teachers. Brad gave an example,

Probably I didn't really think about my own learning until I was really in college...
trying to figure out okay what is it that I need to know, what is it that I don't need
to know and you're kind of planning, scheduling...

Doug described not spending much time thinking about learning until he was a novice teacher,

...when I was in school, especially in student teaching, I was so focused on just
getting it right, I don't know if I was really understanding or grasping, um, about,
you know, worrying about students' learning styles, and how to get that figured
out... definitely wasn't about a reflection because it was all about proving what
you could do...

Different responses were given for the cause of change in participants’ thinking, including the rigor of college and the actual learning by “doing” brought on by student teaching, as Claire

stated, “it wasn't until I was out doing that I became probably the learner that I am now.” Despite adaptations as learners in their professional lives, participants’ unfamiliarity with the cognitive backdrop of self-regulation is likely impacted by their lack of instruction on metacognitive processes while students in school and as pre-service teachers.

In what ways do teachers self-regulate for their own professional growth purposes?

Research Question number two included two themes. The first, *teachers’ growth strategies*, explored how participants attempted to grow professionally on a daily basis, or informally. Relevant sub-themes included: focus of improvement, reflecting to improve, seeking information to improve, and reflections on overall growth. Participants exhibited signs of using self-regulation strategies in their professional growth. Participants discussed when they started reflecting, the timing of reflections, and what triggers them to reflect. For example, Aubrey discussed student teaching as the time when she learned to reflect on her instruction, “I, really in student teaching... I think student teaching is probably when I first started thinking about, kind of reflecting and self-evaluation.” While Claire mentioned trying to do a journal reflection weekly, “my goal is to try and journal about once a week of how I do.”

Participants’ descriptions of progressing through formal professional development events informed the second theme *self-regulating professional development*. Two relevant sub-themes emerged: self-regulation not present and self-regulation present. Participants described a propensity to self-regulate while involved with formal professional development events if the event was deemed meaningful and useful to them. A key factor was immediacy, when something was quickly and easily implemented in their programs, participants were motivated to learn and described ways of self-regulating. As a representative feeling among participants, Aubrey discussed a formal professional development event that did not provide usefulness and immediacy, “it would have been a great book for somebody in college that was going into education, [but] we did that after we have been teaching [for years].” Additionally, what drove teachers to attend formal professional development events varied among participants, some sought content in order to engage their students, and others sought instructional strategies to enhance student engagement.

When informally seeking to improve their abilities as educators on a day-to-day basis, participants described utilizing reflection often as a means for improvement. How participants learned their reflection processes varied, as Brad and Aubrey cited their time in student teaching. Brad described his early reflecting activities with his cooperating teacher, “you sit down and talk with your cooperating teacher. Okay, what [do] you think went well, what didn't go so well, what can we do to improve... what are we going to do tomorrow?” What triggered the informal reflections varied, but included seeing novice teachers teach, seeing a speaker during a formal professional development event, and also attempting to reflect on a daily basis.

Participants described actions that reflect progression through the Zimmerman and Campillo (2003) self-regulation model by making evaluation part of their reflections. When describing reflection strategies, Doug pretends he is being observed by administrators to help him evaluate his effectiveness, “I always try to visualize somebody is watching me, so that way I can always stay professional and don't get too loose.” One similarity between participants was basing at least part of their evaluations on their students, as Brad highlights, “maybe students weren't engaged or I don't think they are really getting [it].”

Once evaluations were made during informal professional growth, participants implied cycling back into the first phase of the self-regulation model, the Forethought Phase, by taking steps to improve that lesson in the future. Claire brainstormed solutions and/or set new goals for

herself to make the decided improvements, while Brad looked to what his goal was, and where he wanted to be, when planning to move forward. Aubrey described a more explicit process when completing the model and continuing back into the Forethought Phase by taking immediate steps once she assesses a problem, "I don't do that next year. I throw it away, or delete something off my computer, I fix it, like, right then."

Similar to informal professional growth strategies, when discussing formal professional development events participants again frequently described actions that reflect utilizing SRL processes. In order for participants to employ self-regulation strategies during formal professional development events, they cited the need for the learning to be deemed valuable and easily accessible for immediate use in their classrooms, as Brad shared "I want to be able to take something back that I can use relatively easily, within my classroom, fairly quickly." They illuminated entering a new professional development event relying heavily on the Forethought Phase of the self-regulation model, and then if their motivational needs were met, they continued to proceed throughout the three phases while undergoing the professional development. Doug demonstrated this while sharing a process similar to Brad's, "the first thing I was thinking was how can I use this ... Then I think about later how I can use it, teach [it] that is."

Another highlight of focusing on the Forethought Phase (seeking value or need for the learning) is illustrated by Claire, who suggested her need to *do*, "something that makes it relevant for me is doing. If I am doing the experiment they are talking about." When describing actions that suggested proceeding through the second and third phases, participants cited how they constantly monitor the new information and reflect on where they could utilize it in their programs, as Claire stated, "I look more at, like, ways that I can help those individual students, or to kind of, like, a group of students that are all similar." In slight contrast, Brad discussed how he takes a total program view while undergoing professional development, "how does it fit my overall program, I look at it from a program perspective of, okay, where is this, where can I put this... Is it an animal science thing... is it agriculture science, or veterinary science."

What strategies do teachers use to foster self-regulation in their students?

Participants' disproportionate attribution of self-regulation to behavior informed the theme relevant to Research Question three, *application of self-regulation*, which explored how participants attempted to facilitate SRL with their students and included sub-themes: structuring instruction based on personal preferences, fostering growth, and self-regulation absent from instructional planning. It was common for participants to focus on student motivation while discussing working with students, as representatively Brad suggested "sometimes it's just a kid that is, you know, it's an effort thing, or it's an attitude thing, so you talk to them." As a result, there appeared to be a disconnect between practitioners' use of self-regulation and their attempts to facilitate those processes within their students, so even though students may become self-efficacious and motivated they still may not know how to utilize the processes in the second and third phases of the self-regulation model.

In contrast to previously discussed findings suggesting the participants utilized self-regulation for their own growth, they described a potential incomplete understanding of self-regulation when discussing how they attempted to facilitate growth in their students. Participants highlighted growth strategies that mostly targeted student motivation, and more specifically student outward actions, when they had a student who was struggling. Doug described how he seeks to improve motivation by working one-on-one, "I'll put in extra time after school, I mean it's in the morning, get them to come in, just kind of, I hate to say it, just do one-on-one work with them." Claire discussed the need for a relationship with students in order to foster motivation and effort,

“trying to build relationships with them. Because they are not going to perform for me, or grow, they aren’t going to put forth that effort unless they respect me.”

The focus on the first phase of the SRL model, and specifically on observable behaviors of students, could be influenced by participants’ propensity to structure their instruction based on their own feelings toward learning, value attribution, and learning preferences. Aubrey discussed liking creativity as a learner, therefore she tries “to give kids as many opportunities to be creative” as she can. Claire described similar patterns, suggesting she recognizes learners who are similar to herself, and that influences her instruction, “the first step is noticing that students either aren’t getting it or that they seem bored. And I think some of that comes from, like, back when I was a student I hated to be bored.”

Participants reflected how their failures were a result of lack of effort and discussed their assumptions that when students failed it is because they lacked the necessary motivation. For example, Doug described how he tries to transfer his own thoughts toward learning to his students, “whatever you want to put your mind to, is what you can accomplish. And I believe that, and that’s what I try to portray to my kids.” He also discussed how his own beliefs impact his expectations of students, “it seems so simple to have some drive and to have some goals.” These descriptions culminated with participants describing attempts to facilitate SRL processes by emphasizing the first phase of the self-regulation model. A possible negative impact of being concerned with observable student behaviors and motivation is teachers are potentially neglecting the second (performance) and third (self-reflection) phases of the model, even though they describe utilizing those processes for their own personal growth.

Conclusions

While teachers discussed actions that suggested they used SRL strategies subconsciously as students and later discussed thinking more explicitly about their own learning when they started teaching, specifically focusing on the Forethought Phase of the Zimmerman and Campillo (2003) model, their descriptions of their actions were less focused on underlying self-regulation processes and more focused on the actual physical manifestation (doing) of the strategy. Teachers were also less likely to describe characteristics from the second and third phases of the self-regulation model presented by Zimmerman and Campillo (2003), this is likely due to a lack of formal training in self-regulation strategies contributing to teachers’ possible incomplete understanding of the cognitions required for self-regulation.

Participants’ own need for motivation may have bearing on their own meaning attributions of self-regulation. While participants discussed utilizing SRL processes such as seeking assistance, self-evaluation, and self-monitoring, their descriptions often highlighted a lack of formal understanding of the cognitions underlying these processes. They disproportionately attributed meaning to effort or behavior, with their students and themselves. Self-regulated learning exercises could teach educators to recognize internal cognitions involved as well as how to make their thinking strategies more “visible” to their students and make connections to the Zimmerman and Campillo (2003) model of SRL. This is an important step, as teachers’ proclivity to utilize SRL processes in their own growth suggests they could become an integral model for helping students develop thinking skills.

The attention placed on motivation was further illustrated by participants alluding to what students were physically doing when they described a self-regulated learner, and the focus on doing led them to attempt to foster growth in self-regulation through behavior rather than cognitions. Aligning with the focus on behavior, when planning instruction, teacher discussions also commonly

focused on teacher actions or student activities, and less how teachers plan to encourage student thinking and reflection. Developing a deeper understanding of motivation could impact how teachers make meaning of self-regulation and how they attempt to foster growth within their students.

Research has shown the importance of metacognition and its related processes, as the National Research Council (2000) discussed in *How People Learn* “experts’ abilities to reason and solve problems depend on well-organized knowledge...” (p. 48), and “knowledge of a large set of disconnected facts is not sufficient...must have opportunities to learn with understanding” (National Research Council, 2000, p. 16). Participants described utilizing SRL to develop organized knowledge, whether in relation to pedagogy or content, and represent a possible avenue for modeling SRL behaviors for students. Self-regulation processes can assist learners with connecting new knowledge, allowing them to become experts in fields they are studying.

Reflecting on our own thinking as educators may provide inroads toward developing a more well-rounded view of self-regulation and metacognition, helping to connect the three phases of the SRL model. While teachers explained employing self-regulatory strategies for their own growth, they did not appear to consistently transfer their own skills to situations involving student use of such strategies. Efforts seeking to improve metacognitive process understanding among teachers should have the end goal in mind: transferring comprehension and the use of these processes from teachers to their students.

Teachers’ making their thinking visible is one way to attempt transfer, as the National Research Council (2000) explained “in research with experts who were asked to verbalize their thinking as they worked, it was revealed that they monitored their own understanding carefully, making note of when additional information was required for understanding” (p.18). While the present study examined experts and how they think about learning, making internal cognitions visible to students may impact students’ understanding and adoption of metacognitive and/or self-regulation processes. Teachers making their thinking visible and becoming a model self-regulated learner could be powerful, as a key component of their reflections was the ability to self-evaluate and self-monitor at proficient levels. This was achieved through different means, such as painting a mental image of how a lesson should go and then comparing reality to that image, or constantly monitoring student engagement and performance – this indicates use of the Performance Phase (self-observation) of the self-regulation model (Zimmerman & Campillo, 2003). These steps may be crucial, as students may be unaware of metacognitive process usage by teachers unless those processes are verbalized (National Research Council, 2000). As a result, even though participants described employing SRL processes and strategies, it is likely their students are unaware of those strategies and their benefits.

Implications

A possible direction for teacher education to take in order to increase the formalized knowledge of SRL by teachers is incorporating an intentional focus on SRL during preservice education. Self-regulated learning instruction is important, because, as discussed previously in findings, participants described not receiving instruction in SRL strategies, as Claire highlighted any instruction was mainly focused on goal setting, “I don't know [about] receiving training [self-regulation]...I would say [mainly] setting goals.” SRL could be intertwined with existing microteaching and reflection experiences that undergraduates undergo as part of their baccalaureate programs. Optimal implementation would incorporate SRL into all microteaching experiences, with early experiences focused on preservice teacher use of SRL and later experiences focused on preservice teacher facilitation of SRL. Explicit incorporation of SRL into teacher education could

potentially satisfy the argument made by the National Research Council (2000), helping teachers make their thinking visible to students.

Infusion of SRL into microteaching experiences would revolve around the SRL model presented by Zimmerman and Campillo (2003): the Forethought Phase, the Performance Phase, and the Reflection Phase. Earlier microteaching experience would need to be comprised of a focus on the Forethought Phase of the SRL model. The teacher-educator would lead preservice teachers through planning activities that challenge them to think about their lessons as they prepare to teach them. After debriefing preservice teachers' thoughts, the teacher-educator would then lead instruction that ties the planning activity back to the Forethought Phase of the SRL model, wrapping up with examples of possible self-monitoring activities preservice teachers can employ during the act of teaching their lessons (Performance Phase). After the microteaching experience, preservice teachers would then be challenged to reflect on their experience utilizing ideas developed during their planning session and data gathered through their own self-monitoring. The discussion would be tied back to the SRL model, specifically focusing on the reflection phase and underlying principles.

Later microteaching experience should then focus on preservice teacher facilitation of SRL with students. Following a similar structure, teacher-educators would lead preservice teachers in the development of a lesson plan that incorporates the three phases of the SRL model. The preservice teacher should be challenged to apply the concept of SRL by providing opportunities for their students to have meaningful forethought, performance, and reflection during their lesson. This aspect could help teachers move beyond the focus on physical, outward behavior of students and require them to focus on the internal cognitions of students. An even further step that could have an impact on teacher awareness and facilitation of SRL is incorporating training for cooperating teachers. Training focused on SRL could assist cooperating teachers with structuring their discussions with their student-teacher around the SRL model. Such discussions could further encourage the student-teacher to consider not only their own development, but also their students' cognitive development while reflecting on lessons.

Recommendations

While this exploratory study did not engage in the final stage of the Glaser (1965) process – theory development – future research should build on the rich data collected here by seeking to develop a deeper understanding of agriculture teachers' perspectives of SRL through additional modes of data collection including observations of teacher strategies during instruction. A broader study could contribute to theory development in the field of agricultural education as it relates to SRL. Possible research paths for SRL in agricultural education are further discussed in this section.

Findings suggest participants formed an incomplete understanding of self-regulation. This incomplete understanding potentially impacted how they tried to facilitate self-regulation processes. These new findings can inform future research to explore self-regulation instructional strategies holding promise for teaching teachers and students to utilize self-regulation cognitive strategies. While there exists a body of evidence suggesting self-regulation is an important component of achievement, and participants in this study described using self-regulation for their own growth, future research is needed concerning the development of self-regulation instruction for teachers and strategies to facilitate self-regulation within students.

Future exploration concerning self-regulation and other forms of metacognition can incorporate several approaches, two of which include focusing on teachers' acquisition of the cognitions needed for self-regulation, and the other focusing on students' acquisition of self-

regulation processes. A crucial step in research involves investigating strategies that hold promise for increasing educators' formal knowledge and comprehension of underlying cognitions required for self-regulation to occur. Reducing the divide between teachers' personal utilization and their apparent incomplete understanding of facilitating self-regulation processes could advance the field of agricultural education toward finding effective ways to facilitate these processes with students. Other possible research includes exploring how instruction in self-regulation processes impacts teachers' attitudes toward the teaching profession, their facilitation of those processes in the classroom, and their future professional development experiences.

Future research should focus on the student impact of self-regulation facilitated instruction. Research might explore which facilitation strategies employed by teachers hold the most promise in increasing students' use of self-regulation processes. How self-regulation instruction impacts student academic achievement, interest in agriculture, motivation to learn, and career aspirations should also be examined. The final research recommendation would be to explore the student transfer of self-regulation strategies to other classes. In order for transfer to take place more often, information needs to be organized into a conceptual framework that allows students "to apply what was learned in new situations and to learn related information more quickly" (National Research Council, 2000, p. 17). Educators should strive to not only produce transfer of subject knowledge, but also the skills related to the process of learning as well.

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