AN ABSTRACT OF THE DISSERTATION OF

Shawn M. Anderson for the degree of Doctor of Philosophy in Science Education

presented on July 21, 2011.

Title: Elementary and Secondary Teachers Use of Agriculture as a Context for Teaching: A Concerns Based Approach.

Abstract approved:_____
Larry G. Enochs

The purpose of this study was to determine the concerns of past participants of the Summer Agriculture Institute regarding the use of agriculture as a context for teaching and to determine how they implement curriculum integration. The study used the Concerns-Based Adoption Model as a theoretical framework, which resulted in proposed action to increase the effectiveness of agricultural literacy treatments similar to Summer Agriculture Institute. This study had two overarching objectives: To determine teachers' concerns about using agriculture as a context for teaching and to clarify how teachers are using agriculture as a context for teaching.

The Stages of Concern Questionnaire was e-mailed to all teachers who participated in Summer Agriculture Institute between 2008 and 2010, a target population of 63. Usable surveys were returned by 18 participants, resulting in a 28.6% response rate.

Data from the Stages of Concern Questionnaire were used to assemble profiles for each of the participants. Profiles were analyzed for peak stage of concern and for trends amongst the demographic characteristics. A purposive sample of 5 participants was selected for interviews. Interview data was used to support analysis of Stages of Concern Profiles.

In collaboration with Summer Agriculture Institute developers and facilitators an innovation configuration map was developed to describe the components of using agriculture as a context for teaching as well as the continuum of variations of each of the components. The interviews with the 2008 SAI participants were used to adapt the innovation configuration map with input from experienced users. The interview data were then analyzed for innovation configurations. The newly developed map was used as a guide for coding and analysis.

Evidence suggested the past participants of Summer Agriculture Institute have high egocentric concerns when considering the use of agriculture as a context for teaching. Despite the high egocentric concerns interview data suggested the purposive sample all had ideal or acceptable variations of the innovation components.

Elementary and Secondary Teachers Use of Agriculture as a Context for Teaching: A Concerns Based Approach.

by
Shawn M. Anderson

A DISSERTATION

Submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Doctor of Philosophy

Presented July 21, 2011
Commencement June 2012

Doctor of Philosophy dissertation of Shawn M. Anderson presented July 21, 2011.

APPROVED:

Major Professor, representing Science Education

Chair of the Department of Science and Mathematics Education

Dean of the Graduate School

I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to an reader upon request.

Shawn M. Anderson, Author

ACKNOWLEDGMENTS

The author would like to acknowledge those who have helped me through the process of graduate school. I thank you all for listening to me, talking me through struggles, and above all encouraging me through this pursuit.

To Larry Enochs, my major professor, your guidance throughout my tenure at Oregon State has been greatly appreciated. I would like to thank you for continually challenging me and encouraging me to continually expand my knowledge. I hope that you can truly enjoy retirement and spend time with your grandchildren.

To Jonathan Velez, words cannot describe what a valuable asset you have been throughout the last three years. Thank you for helping me become a better researcher. You have always been willing to give advice and make numerous corrections. Without your support, I do not think I would have been able to finish the process.

To Larry Flick, Dale Weber, and Rob Harris, thank you for taking the time to serve on my committee. Your support throughout the process has been greatly appreciated. Larry, good luck with your new position as the Dean of the College of Education.

To Greg Thompson, thank you for taking a chance on me and hiring me as an instructor four years ago. This experience has truly made me a better teacher and has

prepared me for a future in the agricultural education profession. I have enjoyed our conversations and I look forward to working with you again in the future.

To my PhD cohorts, Kristin Lesseig, Nancy Staus, Sissi Li, and Henry Gillow-Wiles, thank you for all of the support throughout the entire process. I truly enjoyed the many conversations and game nights. You all have helped to keep me grounded and have given me a different perspective on education and life. Good luck with your future endeavors.

To the rest of Hathaway House, Rocky and Kate, thank you for providing ample entertainment during a very long process for each of us. I have learned so much about myself because of the two of you. My experience in Corvallis would not have been the same without these experiences. You have truly become family.

I would also like to take the time to thank my family for all of their support. At times it has been very difficult to be so far away from home.

To my parents, Tim and Theresa, you have supported in all of my crazy endeavors. Thank you for instilling in me a sense of pride for who I am. You have also taught me the importance of hard work and dedication. Mom, thank you for always lending your ear when I needed someone to just listen, you are truly one of my best friends.

To my brother, Ryan, thank you for serving as a role model. Since I was a young child, I wanted to be like my older brother. You taught me so much about what it means to be a brother, a man, a friend, a teacher, and a researcher. Thank you so much for setting an example for me to live by. I am glad that we are able to spend the countless hours pondering life, I feel blessed to have a brother I can call a friend. However, I will always say that it is equally your fault for distracting me while I had the rosebud tip in my hand.

Thank you to all of the individuals who have assisted me during this process. I am truly appreciative of all of the advice and support you have given me. You all have made this process a little easier and a lot more fun. Thank you.

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DEDICATION

I would like to take this time to dedicate this research to some individuals who were very close to me and are no longer with us. I would first like to thank my Grandpa and Grandma Anderson. Grandpa Dan, although I was young when you passed away, I have many fond memories of running across town to help you in your garden. I would have enjoyed the opportunity to get to know you better as I got older. Grandma Leona, you were an inspiration. I truly appreciate the time I got to live with you. I was able to learn so much from you, be it a crazy 8's or baking a pie. You taught me how to always have trust in myself and you don't need a recipe to be successful. I miss you every day and wish you were here to share in this experience.

I would also like to take the opportunity to thank Grandma Gerry and Grandpa Francis. I enjoyed the weekly chats when Ryan allowed me to tag along. I learned so much about our family and our community. Grandpa, you always had a way of putting things into perspective. I remember the time I wrecked mom and dad's car and you told me the story of when you wrecked your parent's model T. Grandma, you have shown all of us what it means to be strong. I am truly grateful to have been able to get to know my great-grandparents.

I would finally like to dedicate this study to my Uncle Mike. Thank you for being a trailblazer in our family.

Each of you has shaped me into the person that I am today. You have instilled in me the importance of family and believing in myself. You were always willing to lend me a helping hand, tell me a story to help me relate, and always willing to accept me for who I am. I cherish the time that I spent with each of you. Not a day goes by that I don't think of you and miss you dearly.

CHAPTER 1

INTRODUCTION

Agriculture can provide a rich context for students to learn most subjects taught in the public school system. Agriculture as a context allows teachers to piece together the academic concepts which are inherent in our natural surroundings. This would give students the capability to see science and mathematics in a realistic setting. Given that agriculture is such a dynamic field, it can be easily used as a context for teaching any core subject. However, a teacher must also be comfortable applying the concepts to their curriculum.

Summer Agriculture Institute (SAI) at Oregon State University is one such professional development opportunity for in-service teachers to develop their understanding of the agricultural industry. The participants of SAI have the opportunity to experience the diverse world of agriculture and learn how agriculture applies to the curriculum in Oregon. Having such experiences, SAI becomes a valuable research site due to the teachers' experiences with curriculum integration and agriculture as a context for teaching.

The Case for Using Contextual Teaching and Learning Strategies

Employers are not looking for solely "book smart" individuals; workers must possess problem solving and communication skills (Giddens & Stasz, 1999). It is the duty of education to prepare the students for the workforce of tomorrow. Eraut (2004) eloquently describes the preparation of students for the workforce, "Most learning pathways that precede full-time employment comprise mainly subjects, which have potential vocational relevance, but are taught primarily under the auspices of general education (p. 202)." Students are being taught the explicit knowledge outside of a context and are not gaining the know-how to utilize that information adequately. Knowledge that is acquired outside of a relevant contextual problem remains inert (Grabinger & Dunlap, 1995). In other words, students may know the required material but are unable to apply the knowledge to novel situations.

In accordance with the tenets of situated cognition, knowledge is embedded in the context in which it was learned (Robbins & Aydede, 2009). An individual often learns more about an abstract idea by examining the concrete expression of the abstract (Kincheloe J. , 1995; Barsalou, 2009). For example in mathematics, many of the theories are taught using an abstract set of symbols. Mathematical understanding could be enhanced using a context, such as agriculture, to teach the abstract set of symbols and

their interactions with the natural world. However, it is important not to use contrived and uninteresting problem solving techniques to accomplish this task (Cognition and Technology Group at Vanderbilt, 1993). Therefore, a goal of curriculum integration is to teach abstract concepts in a realistic and interesting context in order for the student to better comprehend and retrieve the concept. Thus, agriculture lends itself as a context for teaching abstract concepts.

Integration of academic and vocational education has taken on several forms including, career academies, school-to-work initiative, academics in vocational education, vocational skills in academics, and education through occupations. Each of these forms of curriculum integration have their share of strengths and challenges. Studies have shown mixed results considering student achievement tests with integrated curricula. In Texas, students enrolled in Agricultural Algebraic Extensive Exploration (A^2E^2), an integrated agriculture course in partnership with the mathematics teacher, were found to have no statistically significant differences between A^2E^2 participants and non-A^2E^2 participants on ninth grade mathematics assessment tests (Bednarz, 2007). On the other hand, the National Research Center for Career and Technical Education (NRCCTE) (2008) found, using their seven steps to enhancing mathematics in CTE model students whom received math-enhanced career and technical education lessons scored better on standardized mathematics assessments than students who did not complete the enhanced lessons. The evidence from the NRCCTE reports (2008) suggests that when academic

content is systematically enhanced with a real-world context there have been gains in student achievement.

The Case for Summer Agriculture Institute

Summer Agriculture Institute has been educating teachers about agriculture for the past 21 years. To become a participant of the program, the teacher must have little to no knowledge of the agricultural industry prior to enrollment. The goal of SAI is to help educators use Agriculture as a context for teaching the academic standards. Additionally, educators will receive hands on instruction and complementary materials to incorporate agriculture into their classroom curriculum. SAI provides a working environment for participants to experience current, factual, scientific information about agriculture.

Although the teachers in many agricultural literacy programs, like SAI, are receiving instruction about agriculture, little research has been conducted to determine the major components of the use of agriculture as a context for teaching. For programs that have been teaching teachers about agriculture, it is important for the vitality of the agricultural literacy movement that the components of the use of agriculture as a context for teaching be clearly defined. Summer Agriculture Institute allows the researcher to gather teachers with a common set of experiences to determine the components of using agriculture as a context for teaching and their concerns toward implementation.

Statement of the Problem

Agricultural literacy intervention programs targeted toward training teachers to use agriculture as a context for teaching their curriculum have been around for over 20 years. Although teachers have been receiving instruction about agriculture, little research has been done to determine the major components a teacher should maintain to be considered to effectively use agriculture as a context for teaching.

Additionally, as with any new curriculum innovation, teachers' concerns are going to be a major factor in the implementation process. The Concerns Based Adoption Model measures, describes, and explains the change process experienced by teachers attempting to implement new curriculum and instructional practices (Anderson S. E., 1997). The model will allow the researcher to systematically create an innovation configuration map as well as determine the teachers concerns toward the use of agriculture as a context for teaching.

Purpose

During Summer Agriculture Institute, teachers are given materials and taught about how to integrate agriculture as a context for teaching. There has been a lack of follow-up with these past participants, thus it is the purpose of this study to determine the major components of using agriculture as a context for teaching as well as determine the concerns of past participants of the Summer Agriculture Institute regarding the use of

agriculture as a context for teaching. The study used the Concerns-Based Adoption Model as a theoretical framework, which resulted in a detailed innovation configuration map which outlines the major components and variations along the continuum of unacceptable to ideal. The concerns of the teachers were also determined resulting in proposed action to increase the effectiveness of agricultural literacy treatments similar to Summer Agriculture Institute. This study had two overarching objectives: To determine the major components of using agriculture as a context for teaching and determine teachers' concerns about using agriculture as a context for teaching.

Research Questions

The following are the research questions used to guide this study:

1. How do the demographics of SAI participants compare with demographics of teachers in Oregon?
2. What are the concerns of teachers regarding the use of agriculture as a context for teaching their curriculum?
3. What are the major components and variations of using agriculture as a context for teaching?
4. What are the self-reported behaviors of teachers as shown on an Innovation Configuration Map?

Definition of Terms

Agricultural Literacy- "Possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture. Basic agricultural information includes: the production of plant and animal products, economic impact of agriculture, its societal significance, agriculture's important relationship with natural resources and the environment, the marketing of agricultural products, the processing of agricultural products, public agricultural policies, the global significance of agriculture, and the distribution of agricultural products (Frick, Kahler, & Miller, 1991, p. 52)."

Concerns Based Adoption Model- A model concerned with measuring, describing, and explaining the change process teachers experience during their attempts to implement new curriculum or teaching practices (Anderson S. E., 1997).

Innovation- Innovations can either be new products or processes (Hall & Hord, 2001). By this definition, this study investigated the adoption of using agriculture as a context for teaching taught in the Summer Agriculture Institute professional development intervention.

Innovation Configurations- Teachers rarely implement new innovations in the exact same manner, innovation configurations describe the variations that exist in the practice of teachers (Anderson S. E., 1997).

Intervention- Various actions or events that influence the change process (Hall & Hord, Change in Schools: Facilitating the Process, 2001). This study refers to the Summer Agricultural Institute professional development workshop as the intervention.

Stages of Concern- A framework, consisting of seven stages, used for describing the feelings and motivations a teacher might have about a change in curriculum or instructional practices at different points in the implementation process (Anderson S. E., 1997).

Limitations and Delimitations

The study is limited to the elementary and secondary education teachers who have participated in Summer Agriculture Institute in Oregon from 2008 to 2010. The survey instrument was electronically delivered to each of the participants through the email address provided to the SAI staff. The ability of the teacher to receive the instrument may be limited by the filters imposed on school district's electronic mail accounts. The study is also limited based on the multitude of definitions of agricultural contexts held by the teachers.

Researcher subjectivity and relationship with the study participants deserves notation as a study limitation. Because the researcher was part of the Summer Agriculture Institute staff, interview responses may have been biased in a favorable manner toward the use of agriculture as a context for teaching. To minimize the effect of such limitation, initial data on the stages of concerns were collected prior to sample selection for the follow-up interviews.

The researcher limited this study to examining the components of using agriculture as a context for teaching and teachers' perceptions toward their use of agriculture. The study does not cover the value of contextual teaching and learning, nor does the study examine the value of agriculture as a context. This study is looking through the context to analyze the innovation not examining the appropriateness of agriculture as a context.

Assumptions

For the purpose of this study, the following assumptions were made:

1. All teachers are familiar with using agriculture as a context for teaching due to their participation in Summer Agriculture Institute.
2. Educational change is not a single event. It is an extended process which each teacher progresses at their own speed.
3. Change is a highly personal experience.

Summary

Summer Agriculture Institute has been training teachers to use agriculture as a context for teaching their curriculum for over 20 years. Teachers arrive to the program with little to no knowledge of agriculture and leave with a basic understanding and exposure to the agricultural industry. They are given a vast amount of curriculum materials and guides to help them with the integration of academic and agricultural contexts.

As discussed earlier, teachers concerns are a major factor in the implementation of new curriculum and instructional practices. This study determined teachers' concerns with using agriculture as a context for teaching and explored the variations of the innovation among different teachers. This study may serve to provide a better understanding to why teachers opt to adopt or reject the use of agriculture as a context for teaching.

CHAPTER 2

LITERATURE REVIEW

Introduction

The purpose of this chapter was to present a summation of the related literature and research findings which define the seminal concepts associated with agricultural literacy as an educational innovation. The topics to be included in the literature review include the following: (1) constructivism (2) contextual teaching and learning, (3) educational innovations, (4) agricultural literacy as an educational innovation, (5) review of agricultural literacy research, (6) theoretical framework, and (7) Concerns-Based Adoption Model research.

Literature Selection and Review Process

The most prominent source for literature was the general catalog and ERIC databases at the Oregon State University library. Additionally, professional research journals such as the Journal of Agricultural Education and the Journal of Career and Technical Education Research were hand searched via online formats. Other information came from professional conference publications, internet searches, and graduate coursework.

According to Parnell (1998) the greatest wrongdoing in the teaching of mathematics. The teachers are failing to help students use the full potential of their brain

to make connections. It is the role of the teacher to guide the students toward making the connections between: subject-matter content and context, academic and vocational education, school and life experiences, knowledge and applications, and interdisciplinary connections. This lack of ability to make connections is a crucial dilemma facing the current education system.

The Nation's Report Card issued by the National Assessment of Educational Progress (NAEP) stated 39% of 12th grade students are not performing at a basic level in mathematics and less than one quarter of the students are scoring at a proficient level (Grigg, Donahue, & Dion, 2007). As for science, the 2009 NAEP science assessment showed similar results with 40% of students not performing at a basic level in science (National Center for Education Statistics, 2011). These statistics raise the question, "why are high school seniors not performing well in mathematics and science?"

Considering this information, the case for reform in the way mathematics and science are taught in schools can be made. Dewey (1916, p. 61) argued that teaching needs to be more than just passive lecturing:

> Why is it, in spite of the fact that teaching by pouring in, learning by a passive absorption, are universally condemned, that they are still so entrenched in practice? That education is not an affair of 'telling' and being told, but an active and constructive process, is a principle almost as generally violated in practice as conceded in theory.

Dewey's statements were made nearly 100 years ago; unfortunately the argument for teaching using a real-world context can still be made today.

Given the call for teaching that engages students and allows them to construct their own meanings and knowledge, practice leans toward a pedagogy grounded in the constructivist learning theory. One must understand the roots of constructivism before coming to terms with its implications on pedagogy and research.

Constructivism

Constructivism: Historical Roots

Ernst von Glasersfeld (1989) considered the roots of constructivism to date back to Giambattista Vico, a Neapolitan philosopher, who penned a treatise on the construction of knowledge in the early 18th century. Many of the ideas and principles of constructivism can be traced back even further to Xenophanes, 6th century B.C. and Plato who metaphorically discussed the existence of a "true reality" and that what we know is built upon what we experience. Similarly, John Locke in his treatise, *An Essay Concerning Human Knowledge* (1690), claimed that knowledge is developed through experience and the utilization of our five senses.

Furthermore, the philosophy of John Dewey has also shaped the underpinnings of constructivist learning theories. It was the position of Dewey (1939) position that people

learn by doing; true learning does not happen unless the individual is activating that knowledge in a task. He (1897) also proclaimed that learning takes place in a social environment and education should be about life rather than the preparation for life. His thoughts later shaped the epistemologies of constructivism.

Constructivism: Present Day

Although much thought has been given to the topic of constructivist learning, a unified theoretical position does not exist; the theory can be viewed as having a family resemblance (Doolittle & Camp, 1999; Adams, 2006). Many of the leading constructivist philosophers do not agree upon a single set of epistemologies. Thus, a discussion of the theoretical differences is obligatory for further investigation of the implications the learning theory has on research in education. Constructivism can be viewed from four vantages, radical constructivism, cognitive constructivism, social constructivism, and critical constructivism.

Jean Piaget is considered to be one of the forerunners of radical constructivism as we know it today (von Glasersfeld, 1989). Piaget followed Vico and others in his philosophies on the aspect of "reality." Von Glasersfeld (1989) attempted to summarize Piaget's half of a century worth of work into one theory about learning. His tenets are as follows:

- Knowledge is not passively acquired through our five senses or through social communications.
- Knowledge is constructed within an individual.
- Cognition is an adaptive process.
- Cognition serves as one's organization of an experiential world.

These tenets have served as a basis for much of the constructivist learning theory. It is evident that these tenets have strong ties to the historical roots of constructivism. However, many educational researchers have difficulties aligning themselves with Piaget's thoughts on experiential realities versus an ontological reality (von Glasersfeld, 1989). Von Glasersfeld's philosophies based on with many of the philosophies of Piaget. His work, *Cognition, Construction of Knowledge, and Teaching* (von Glaserfeld, 1988) reaffirms many of Piaget's tenets.

On the conservative end of the constructivist philosophies lies cognitive constructivism. This outlook on constructivism differs from radical constructivism in its position on an ontological reality, whereas the interpretation of said reality lies within the individual (Doolittle & Camp, 1999). Cognitive constructivism can also be viewed to have the dimension of individual versus social construction of meaning, connecting individual knowledge construction on the effects of socially constructed meaning (Derry, 1996). It still remains on the 'black list' due to its weak form of constructivism.

Social constructivism is yet another interpretation of the constructivist learning theory. An essential epistemology of social constructivism is that knowledge is constructed through social interactions and the knowledge created cannot be separated from the social context in which it was created (Adams, 2006). The focal point of social constructivism is the shared social experience and the social negotiation of meaning (Doolittle & Camp, 1999) and learners then build the proper schemas to internalize the social construct (Adams, 2006).

A fourth form of constructivism is critical constructivism. Critical constructivism shares the epistemologies of constructivism, yet Kincheloe (2005) describes one of the principle tenets of critical constructivism as a merger with critical theory:

> "The 'critical' in critical constructivism come from critical theory and its concern with extending human's consciousness of herself as a social being- critical theory promotes self-reflection in relation to social power and its ability to align our self-perceptions and world views with the interests of power blocks (p. 33).

This tenet brings into consideration that the learner's own culture shapes the knowledge which has been socially negotiated (Harrington & Enochs, 2008). History, culture, economics and politics influence a learner's web of reality, thus influences the experiential reality of the learner and how one socially constructs knowledge (Kincheloe J. L., 2005).

It is quite evident that there is a continuum in regards to the views of the constructivist learning theory. The four types of constructivism all have distinct constructs with a common ground of the basic tenets of constructivism proposed by Piaget and refined by von Glasersfeld. From the tenets, stated above, one can examine the practicality of the theory and determine the effects on a pedagogical framework.

Constructivism and pedagogy

As with any theory of learning, constructivism is a theory and not a method of teaching (Fosnot & Perry, 2005). As evidenced by the lack of a unified theory of constructivism, there is also no distinct constructivist pedagogy. However, given the basic tenets of constructivism, a framework can be given for the appearance of a constructivism in the classroom (Doolittle & Camp, 1999):

- Learning should take place in authentic and real-world environments
- Learning should involve social negotiation and mediation
- Content and skills should be made relevant to the learner
- Content and skills should be understood within the framework of the learner's prior knowledge.
- Students should be assessed formatively, serving to inform future learning experiences.
- Students should be encouraged to become self-regulatory, self-mediated, and self aware.

- Teachers serve primarily as guides and facilitators of learning not instructors.
- Teachers should provide for and encourage multiple perspectives and representations of content.

"The belief that all genuine education comes about through experience does not mean that all experiences are genuinely or equally educative" (Dewey, 1939, p. 13). Academic content should be taught in an authentic context with real-world applications, these contexts provide a genuine experience for the student to learn. Hernández and Brendefur (2004) declared that an authentic curriculum engages students in applications that build mathematical knowledge through real and substantive materials. Mathematics and science are part of our everyday life. Teaching those subjects in a context that is relevant to the student's life will aid the student in their comprehension of the curriculum.

Contextual Teaching and Learning

Employers are not looking for solely "book smart" [explicit knowledge] individuals; workers must possess problem solving and communication skills [tacit knowledge] (Giddens & Stasz, 1999). It is the duty of education, be it secondary or post-secondary, to prepare the students for the workforce of tomorrow. Eraut (2004) eloquently describes the preparation of students for the workforce, "Most learning pathways that precede full-time employment comprise mainly subjects, which have potential vocational relevance, but are taught primarily under the auspices of general

education (p. 202)." Students are not receiving the know-how that is needed to be a competent practitioner in any field. Students are being taught the explicit knowledge outside of a context and are not gaining the know-how to utilize that information adequately. Knowledge that is acquired outside of relevant contextual problem solving remains inert (Grabinger & Dunlap, 1995). In other words, students may know the required material but are unable to apply the knowledge to novel situations. If we are not meeting the needs of the stakeholders in education it is time we examine the methods of teaching in order to better prepare the future workforce.

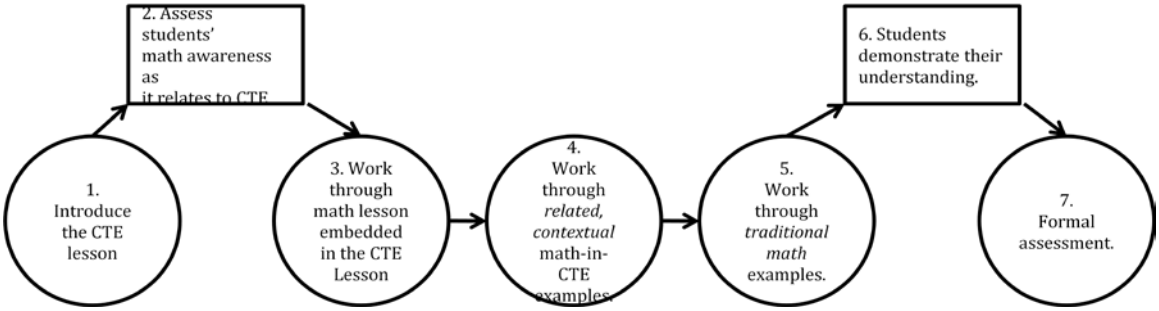
Curriculum reform is not a recent debate. Many educational researchers, philosophers and policymakers all have their own proposal for curriculum reform; however this paper specially focused on curriculum integration reform. The integration of academic and vocational education is the "planned coordination and sequencing of courses, curriculum, and programs so students can develop and achieve both academic and vocational competencies" (Hayward & Benson, 1993). The call for academic and vocational integration has been around since the turn of the 20th century. Dewey recognized the fragmentation of industry and schools were contributing to the problems discussed above (Simon, Dippo, & Schenke, 1991). He envisioned a hands-on and minds-on learning environment where the students took responsibility for their own learning.

In accordance with the tenets of social constructivism, knowledge is embedded in the context in which it was learned (Adams, 2006). An individual often learns more about an abstract idea by examining the concrete expression of the abstract (Kincheloe J. , 1995; Barsalou, 2009). For example in mathematics, many of the theories are taught using an abstract set of symbols. Mathematical understanding could be enhanced using a context, such as agriculture, to teach the abstract set of symbols and their interactions. However, it is important not to use contrived and uninteresting problem solving to accomplish this task (Cognition and Technology Group at Vanderbilt, 1993). Therefore, a goal of curriculum integration is to teach abstract concepts in a realistic and interesting context in order for the student to better comprehend and retrieve the knowledge. Thus, the agricultural industry provide a rich context for teaching abstract concepts.

Integration of academic and vocational education has taken on several forms including, career academies, school-to-work initiative, academics in vocational education, vocational skills in academics, and education through occupations. Each of these forms of curriculum integration has their share of strengths and challenges. Studies have shown mixed results considering student achievement tests with integrated curricula. In Texas, students enrolled in Agricultural Algebraic Extensive Exploration (A^2E^2), an integrated agriculture course in partnership with the mathematics teacher, were found to have no statistically significant differences between A^2E^2 participants and non-A^2E^2 participants on ninth grade mathematics assessment tests (Bednarz, 2007). On the

other hand, the National Research Center for Career and Technical Education (NRCCTE) (2008) found, using their seven steps to enhancing mathematics in CTE model, students received math-enhanced career and technical education lessons scored higher on standardized mathematics assessments than students who did not complete the enhanced lessons.

Figure 2.1. Seven step model for enhancing mathematics into CTE.



In order to assure the context does not become subservient to the academic content or vice versa, integration should be across the entire curriculum. In other words, a mathematics class should not become an agriculture class with mathematics examples. Effective integration would have a mathematics course that utilizes a context that demonstrates the concept in a real-world setting, for example volume can be taught using a greenhouse and determining the amount of potting soil needed for the business. This method of teaching could further the tacit knowledge of the curriculum at hand. As more

courses contain academic and vocational integration, neither the content nor the context becomes the dominant portion of the curriculum.

Although the benefits of an integrated curriculum make it sound appealing, it is nearly absent from secondary schools due to the already overcrowded curriculum (Grubb, 1995). Standardized testing has also become a hinderance to curriculum integration. A true integrated curriculum would blur the lines between disciplines. Teaching activities would be organized in interdisciplinary tasks. However, the education system as a whole continues to test students in the explicit knowledge of separate disciplines (Venville, Wallace, Rennie, & Malone, 2001). Venville, et al. (2001) further their arguments on the difficulty of integration stating that parents also do not fully understand integrated curriculum and are therefore apprehensive. In addition, parents are well aware of the discipline-based college entrance exams required by their college-bound students.

Critics bring valid points to the difficulty of starting and continuing an integrated curriculum, yet something needs to be done about the struggles of the American education system. Educators should want all students to have the explicit and tacit understanding of basic academic skills. However, currently almost 40% of high school seniors are not performing at a basic level in mathematics (National Council of Teachers of Mathematics, 2000). Curriculum integration and the use of agriculture as a context for teaching may be one of the many possible solutions.

Agricultural Literacy as an Educational Innovation

Hall and Hord (2001) describe educational innovations as what is to be changed, be it either a product or a process. Products may include the use of technology or the adoption of new curriculum texts. On the other hand, processes focus more on the "how-to" of teaching, for example team-teaching or communities of practice. Summer Agriculture Institute aims to train teachers to use agriculture as a context for teaching. The use of agriculture as a context for teaching can be defined as a process innovation.

In addition to the type, size is also a significant characteristic of innovations (Hall & Hord, 2001). Educational innovations can range from small and simple to large-scale, systemic reform (Hall & Hord, 2001). In order to aid in the identification of relative size of an innovation the Hall Innovation Category (HiC) Scale was created which rates the effort required for successful implementation of the educational innovation (See Table 2.1). According to the HiC, the use agriculture as a context for teaching would be classified in level seven. Agriculture as a context for teaching would closely align with the integrated curriculum example used for the level. The redesign level falls within the transforming category which is a relatively large sized innovation.

Table 2.1
HiC scale of the relative size of innovations**(Hall & Hord, 2001, p. 9)**.

	Level	Name	Examples
Talking	0	Cruise Control	1950's
			Teacher in the same classroom for many years
	1	Whisper	Pronouncement by officials
			Commission Reports
Thinking	2	Tell	New rules and more regulations of old practices
	3	Yell	Perspective policy mandates
	4	Shake	New text
			Revised curriculum
	5	Rattle	Change principal
			Team teaching
	6	Roll	Change teacher's classroom
			Change grade configurations
Transforming	7	Redesign	Evening kindergarten
			Integrated curriculum
	8	Restructure	Site-based decision making
			Differentied staffing
	9	Mutation	Teachers and principals belong to same union
			Changing the role of school boards
	10	Reconstitution	Local constitution convention
			Glasnot

Review of Agricultural Literacy Research

Agriculture is too important of a subject for only a small minority of American citizens to have an understanding of the impact of the industry (National Research Council, 1988). The National Research Council (NRC) argued everyone should have a basic understanding of agriculture. However, only a few Americans understood the agricultural industry and its impact on our society, economy, environment, and most of

all themselves (National Research Council, 1988). It was also noted that very few efforts were being made to educate individuals about agriculture. The publishing of the NRC position on educating about agriculture led to the start of what is known today as the agricultural literacy movement.

The first steps in the movement demonstrated the importance of having an agriculturally literate society. Many researchers and practitioners called for the agricultural education field to step forward to educate people about agriculture (Zubrick, 1990; Leising, 1990; Traxler, 1990; Pope, 1990; Russel, McCracken, & Miller, 1990). Articles in the Agricultural Education Magazine called for and proposed different models for implementing agricultural literacy. It became clear that agricultural literacy was an important goal for agricultural education. However, Deeds (1991, p. 11) summed up the progression of the movement best with her rhetorical commentary on the professions lack of a definition, "Until we have a definition of agricultural literacy that we can agree on and set as our goal, [literacy] is not likely to be accomplished."

With the establishment of the importance of the agricultural literacy movement a debate began over a common definition. A few journal and magazine articles were published in the Journal of Agricultural Education and the Agricultural Education Magazine aimed to define literacy in agriculture (Frick, Kahler, & Miller, 1991; Trexler

C. , 2000; Meischen & Trexler, 2003). Today the most widely accepted definition of agricultural literacy is:

> Possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture. Basic agricultural information includes: the production of plant and animal products, economic impact of agriculture, its societal significance, agriculture's important relationship with natural resources and the environment, the marketing of agricultural products, the processing of agricultural products, public agricultural policies, the global significance of agriculture, and the distribution of agricultural products (Frick, Kahler, & Miller, 1991, p. 52).

Although this is the most widely accepted definition amongst the agricultural education field, the debate still continues. Other researchers who have looked at agricultural literacy through both a qualitative and quantitative lens have noticed gaps in the definition (Trexler C. , 2000; National Council for Agricultural Education, 2000). Meischen and Trexler (2003) sought to expand the definition:

> Agricultural literacy entails knowledge and understanding of agriculturally related scientific and technologically-based concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity. At a minimum, if a person were literate about agriculture, food, fiber, and natural resource systems, he or she would be able to a) engage in social conversation, b) evaluate the validity of media, c) identify local, national, and international issues, and d) pose and evaluate arguments based on scientific evidence. Because agriculture is a unique culture, an understanding of beliefs and values inherent in agriculture should also be included in a definition of agricultural literacy so people can become engaged in the system. (p.44)

Both proposed definitions have inherent strengths and weaknesses. The earlier definition sets forth the agricultural concepts of which an individual should have a basic understanding. These concepts lead to ease of assessment of an individual's level of

literacy. However, this definition does not explain the role of the individual within the agricultural industry. The later definition truly identifies the role of an individual within the system. The definition sets forth the goals of the movement and lends itself easily to qualitative research methods. However, the definition does not outline the concept areas of which an individual should have knowledge and a basic understanding. For this reason, the study adopts the definition set forth by Frick, et al (1991).

Preliminary research in agricultural literacy explored the agricultural literacy levels of the public. Of all of the research studies conducted between the NRC publication and 2002 61% assess the individual's knowledge of agriculture and 48.8% explored perceptions of the industry (Doefert, 2003). Diverse methods of research were also lacking amongst the research studies conducted, mostly descriptive and casual comparative studies (Doefert, 2003; Trexler & Hess, 2004)

Researchers have examined the knowledge, attitudes and perceptions of homeowners (Byrum & Elliot, 1994), civic leaders (Bell-Ritz & Lockaby, 1996; Ryan & Lockaby, 1996), news media (Howell & White, 1996; Vestal & Biers, 1999), and other members of the community (Elliot & Olson, 1995; Frick, Birkenholz, & Machtemes, 1995; Harper, 2000; Flood & Elliot, 1994; Birkenholz, 1993). The findings of the research found that a majority of respondents were not agriculturally literate. Researchers used similar methods to evaluate the knowledge, attitudes and perceptions of

rural and urban students (Meischen & Trexler, 2003; Birkenholz, 1993; Brown & Stewart, 1992; Dyers, Lacey, & Osbourne, 1995; Frick, Birkenholz, & Machtemes, 1994; Frick & Wilson, 1996; Osbourne & Dyer, 1995; Swortzel, 1996). Comparable to adult levels of literacy, research found that many of the K-12 students were also not agriculturally literate.

Early agricultural literacy studies sought to examine the knowledge and attitudes of the general public toward the agricultural industry. Byrum and Elliot (1994) determined homeowners' attitudes toward chemicals used in lawn care. The study concluded the participants in the study had neutral attitudes toward lawn chemical use. Research also showed the homeowners were getting most of their information regarding chemicals from the newspaper and television. This study is important due to the fact the respondents were directly involved with a small portion of the agricultural industry. The survey sought to elicit their attitudes toward the use and restriction of chemicals used to better their landscaping. Although there was a direct link to the agricultural industry, the homeowners were still far enough removed to have only neutral attitudes toward the industry.

In her Masters thesis, Bell (1995) developed baseline data for the agricultural literacy levels of civic leaders. The study examined the attitudes and perceptions of civic leaders in Lubbock, Texas. Overall, the participants were not very knowledgeable about

agriculture, scoring 4.1 out of 15. However, these same participants had a high awareness level of the agricultural industry with a mean score of 28.7 out of 35. Bell concluded there is a need for educating civic leaders about agriculture. Although the civic leaders had an awareness of the agricultural industry, it is important that our civic leaders who set policy about agricultural practices be knowledgeable about how their decisions affect the agricultural industry. Ryan and Lockaby (1996) confirmed similar results with another group of city and government officials.

Considering many adults were obtaining their agricultural information from news outlets, it is vital to the success of agricultural literacy to also determine the knowledge and attitudes of the news media professionals. Howell and White (1996) surveyed 126 AM/FM radio stations in Oklahoma on their knowledge and attitudes toward the agricultural industry. Based on the findings, it was evident that the reporters were knowledgeable about the basics of agriculture, but had little understanding of technical agriculture and policy issues affecting the industry.

Vestal and Biers (1999) surveyed metropolitan newspaper journalists regarding food biotechnology. The study showed that a majority, 75%, of the respondents assessed their scientific knowledge at average or high, but only scored an average of 30% on an instrument designed to assess their knowledge of food biotechnology. This demonstrated

that individuals may assess their knowledge levels to be high, however when tested, knowledge levels are much lower than self-reported levels.

By the late 1990s it was evident the general public had an awareness of the agricultural industry, but lacked a basic understanding of agriculture. With the charge from the National Research Council (1988), which stated agriculture is too important of a subject not to educate all American consumers, the agricultural education field sought to increase the exposure of K-12 youth to the agricultural industry.

Many studies have been conducted assessing the knowledge and attitudes of youth. In a study comparing rural and inner-city high school youth it was shown that 35% of the rural students answered questions about the agricultural industry incorrectly whereas the inner-city counterparts answered 52.1% of the questions incorrectly. This study shows that it is very important to be teaching about agriculture in urban schools as well as in rural schools. Swortzel (1996) determined that if a student were to receive instruction about agriculture, their perception of the importance of the industry would increase regardless of type of school or community. Brown and Stewart (1992) determined there was an increase in knowledge and attitudes toward the agricultural industry after receiving 6 to 18 weeks of instruction using the Exploring Agriculture in America curriculum.

In a qualitative study, Hess and Trexler (2011) compared 18 elementary students' understanding of agriculture to grade-specific benchmarks for agricultural literacy. The researchers used semi-structured interviews to elicit the respondents understanding of the agricultural industry by examining the components of a cheeseburger. Responses were examined using three benchmarks appropriate for the grade-level:

- Identify a variety of farms and their products;
- Describe the basic needs farms provide; and
- Describe local agriculture

The researchers found that the students involved with this study lacked the background information to adequately address the question, "what is agriculture?" The findings from this study echo the findings from earlier studies by the same researchers (Meischen & Trexler, 2003; Trexler C. J., 2000). The authors concluded that educational approaches can be developed to assist learners in developing the understanding of the modern agricultural industry.

In a quasi-experimental study of the effect of an Agriculture in the Classroom program on the students understanding of agriculture conducted with a group of trained teachers from Arizona, Montana, Oklahoma, and Utah (Pense, Leising, Portillo, & Igo, 2005). The study included 1,734 students from 52 treatment classrooms and 48 control classrooms. A pre-test and post-test was conducted with both the treatment and control classrooms. Little differences were shown in the pre-test scores of the treatment and

control groups. Findings from the post-test indicated that Ag in the Classroom programs made a positive difference in students' understanding of the agricultural industry. It is evident that with instruction in and about agriculture, knowledge and attitudes toward the agricultural industry will increase. However, a teacher cannot educate students without having knowledgeable teachers in the classroom.

Research conducted in Illinois assessed the beliefs of elementary and junior high teachers toward integrating agriculture into the curriculum (Knobloch, Ball, & Allen, 2007). This study was part of a larger study. The researchers survey 452 elementary and junior high teachers. The respondents were asked to answer three open-ended questions targeted at establishing the teachers' beliefs about the benefits and needs of teaching and learning agriculture. Three themes emerged from the data. Teachers felt that agriculture provided situatedness, connectedness, and authenticity to their content areas. The study also noted that some teachers were not using agriculture in their classrooms at all. The study also concluded that teachers had concerns regarding instructional resources and general knowledge about agriculture.

Two studies have been conducted with the past participants of the Oregon State University Summer Agriculture Institute. Balschweid, Thompson, and Cole (1998) sought to examine the effectiveness of SAI. The goals of the study were to determine if the past participants were using agricultural information, perceptions toward the use of

agriculture as a context for teaching, teacher perceptions of their students' interest toward agriculture, and determine if barriers exist in curriculum implementation.

The researchers found that only 5 of the 52 respondents (9.6%) were not using any agriculture in their curriculum and 12 (22.9%) were utilizing agriculture in less than 5 lessons annually. Regarding the teachers perceptions toward the use of agriculture as a context for teaching, the overall mean score on a 5-point Likert-type survey was 4.27. Which translates to teachers having a positive perception of the use of agriculture as a context of teaching. Teachers had diverse responses about students' interest in agricultural topics. Mean scores ranged from 3.1 for agricultural economics to 4.48 for topics related to animals.

Respondents were also asked to identify the element which created the largest barrier for integrating agriculture into their curriculum. Out of the 18 different responses generated, lack of preparation time was the most frequent. This supports the findings from a survey where the respondents were asked to rate the common barriers to implementations; time was rated 3.71 out of 5.

This study concluded that teachers were utilizing the information and materials gained from their participation in Summer Agriculture Institute. The teachers also agreed that the content, structure, and usability of the agricultural information from SAI were

effective and useful. The researchers recommended future research to identify the needs of the teachers to increase the likelihood of them utilizing the materials from SAI and how instruction during SAI could be changed to aid in overcoming the barriers to implementation.

Anderson, Thompson, and Velez (2010) sought to examine the change in teachers' conceptions from their participation in SAI. This qualitative study used participants' application materials, questionnaires, interviews, and reflective journals to ascertain teachers' conceptions of agriculture prior to SAI and changes which occurred during their participation in the program. Prior to enrolling in SAI, teachers had very limited knowledge of the agricultural industry. Most teachers associated agriculture solely with the production of plant and animal products, in other words "the farm."

Throughout their participation in SAI, teachers began to understand the diversity of the agricultural industry and further developing their initial conceptions. Data from the reflective journals suggested teachers were gaining an awareness level of the global significance of agriculture, the relationship with the environment, economic impact, societal significance of agriculture, marketing, and relationship with natural resources. Additionally, a few teachers were rated as having a basic understanding of plant production, relationship with environment, and global significance.

The researchers concluded that SAI had a positive impact on the teachers' understanding of the agricultural industry. It was recommended to continue to follow the teachers to explore their use of agriculture as a context for teaching and determine if they continue to learn about agriculture after their participation in SAI.

Theoretical Framework

The theoretical framework that guided this study was Rogers' (1995) Diffusion of Innovations theory and the Concerns Based Adoption Model (Hall & Hord, 2006). Diffusion research primarily began with Ryan and Gross in the 1940's and 50's studying the diffusion of hybrid seed corn throughout Iowa (Rogers, 1995). The Diffusion of Innovations theory was first introduced in 1962. Since its inception there has been a significant amount of research using this theory.

Rogers (1995) demarcated five characteristics of an innovation which include: relative advantage, compatibility, complexity, trialability, and observability. Relative advantage can be defined at the degree to which the innovation is perceived to be superior to the concept in which it replaces. The teacher must see that infusing agricultural contexts into their curriculum is better than teaching the curriculum without a context.

Compatibility is the degree to which the innovation is perceived as being in line with current values, past experiences, and needs of the adopter (Rogers, 1995). A teacher will examine any new curriculum concept to determine if it will work for their students and if it fits with their educational values. Additionally, if the teacher does not perceive a need for change it is likely that they will not see the need to infuse agricultural contexts into their curriculum. It should be apparent to the teacher that using agriculture as a context for teaching is not only beneficial to them but their students as well.

The third characteristic of an innovation is complexity, the degree to which the innovation is perceived as difficult to understand or use (Rogers, 1995). Simply put, a teacher is going to teach what they know. A teacher will be more likely to use a curriculum innovation that is easy for them to understand and teach. If a teacher has limited knowledge of agriculture it will be difficult for them to use it effectively as a context for teaching.

Trialability is the ability of the innovation to be experimented with on a limited basis (Rogers, 1995). A teacher needs to be able to use a few small lessons to determine if it will work in the classroom before changing her entire curriculum. Previously developed lessons are an easy way for a teacher to be able to sample the curriculum innovation without making a commitment of time or money.

Finally, observability is the degree to which the results are visible to others (Rogers, 1995). In order for teachers to change their practices, they need to see that the innovation is working in the classroom and it can be successful. A teacher may be more likely to continue using a curriculum innovation if the school administration and parents see a difference in the students' learning.

Concerns-Based Adoption Model

As diffusion research has progressed many researchers have drawn upon the theory to adapt models. Hall and Hord (2006) have used diffusion research as a framework for the Concerns Based Adoption Model (CBAM). Whereas diffusion of innovations research is general in nature, the CBAM was developed specifically for use in education innovations.

CBAM is an empirically grounded theoretical model for measuring, describing, and explaining the change process teachers experience when implementing new curriculum or instructional practices (Anderson S. E., 1997). The model was developed by researchers at the University of Texas Research and Development Center for Teacher Education beginning in the early 1970s and continued until the mid-80s (Anderson S. E., 1997). CBAM developers make some assumptions about educational change that frame the theory (Anderson S. E., 1997, p. 333):

- Change is a process, not an event;
- Change is accomplished by individuals;

- Change is a highly personal experience;
- Change involves developmental growth in feelings and skills; and
- Change can be facilitated by interventions directed toward the individuals, innovations, and contexts involved.

The key constructs to the CBAM are Stages of Concern (SoC), Levels of Use (LoU) and Innovation Configurations (IC). This study embodies two of the CBAM constructs; stages of concern and innovation configuration. The stages of concern allow the researcher to examine individuals' feelings and perceptions toward an innovation at different points during the implementation process (Anderson S. E., 1997). The SoC consists of seven stages: *awareness, informational, personal, management consequence, collaboration* and *refocusing*. Table 2.2 shows the definition of each stage and example of expression of each stage of concern.

Anderson (1997) suggests that SoC is a representation of the developmental progression in which the teachers implementing the change will have varying degrees of concern within the seven stages at different points during the implementation process. Teachers who have just begun to implement the change process will have high intensity concerns within the *Awareness*, *Informational* and *Personal* concerns. As they progress *Management* concerns will intensify as they begin to implement the innovation in the classroom. Eventually, those concerns will wane and give rise to *Consequence* concern about the potential effect of the innovation on student achievement and progress. The

final two concerns areas, *Collaboration* and *Refocusing*, will be intensified as the teacher begins to improve the innovation. It is important to note that not all teachers will reach the *Collaboration* and *Refocusing* stages of the change process (Anderson S. E., 1997).

The second construct of the CBAM is Innovation Configurations which aims to answer questions regarding the appearance of the innovation in classrooms. Teachers have a tendency to adapt or modify aspects of the innovation(Hall & Hord, 2001). This adaptation is a natural part of the chance process (Hall & Hord, 2001). Different teachers will operationalize the innovation along a continuum ranging from being very close to ideas of the developers to something that is completely unrecognizable(Anderson S. E., 1997). In the case of using agriculture as a context for teaching, classrooms could range from a seamless integration of using agriculture to teach cohesive units to the use of a random agriculture lesson with no discernable connection to the curriculum.

Table 2.2
Stages of Concern: Definition and Expression of Concern (Hall & Hord, 2006, pp. 139-140).

	Stage	Definition of Stage	Expression of Concern
Impact	Refocusing	The focus is on the exploration of more universal benefits from the innovation, including the possibility of major changes or replacement with a more powerful alternative. Individual has definite ideas about alternatives to the proposed or existing form of the innovation.	I have some ideas about something that would work even better for my students?
Impact	Collaboration	The focus is on coordination and cooperation with others regarding the innovation.	I am concerned about relating what I am doing with what my fellow teachers are doing?
Impact	Consequence	Attention focuses on impact of the innovation on students in his or her immediate sphere of influence. The focus is on relevance of the innovation for students evaluation of outcome including performance and competencies, and change needed to increase student outcomes	How is my use of agricultural contexts affecting my students?
Task	Management	Attention is focused on the processes and tasks of using the innovation and the best use of information and resources. Issues related to efficiency, organizing, managing, scheduling, and time demands are utmost.	I seem to be spending all of my time getting materials ready.

Table 2.2.
Continued

	Stage	Definition of Stage	Expression of Concern
Egocentric	Personal	Individual is uncertain about the demands of the innovation, his/her inadequacy to meet those demands, and his/her role with the innovation. This includes his/her relation to the reward structure of the organization, decision-making, and consideration of potential conflicts with existing structures or personal commitment. Financial or status implications of the program for self and colleagues may also be reflected.	How will infusing agricultural contexts in my curriculum affect me?
Egocentric	Informational	A general awareness of the innovation and interest in learning more detail about it is indicated. The person seems to be unworried about himself/herself in relation to the innovation. She/he is interested in substansive aspects of the innovation in a selfless manner, such as general characteristic, effects, and requirements for use.	I would like to know more about how to infuse agricultural contexts into my curriculum.
Unrelated	Awareness	Little concern about or involvement with the innovation is indicated.	I am not concerned about infusing agricultural contexts into my curriculum.

The key to measuring an IC is through the use of an Innovation Configuration Map. IC Maps can be used to chart participants' use of an innovation and the degree to which it aligns with the developers' concepts. "The purpose of the innovation configuration map is to present carefully developed descriptions of different ways of doing the innovation" (Hall & Hord, 2001, p. 41). IC maps can range in the number of components and vary depending on the complexity of the innovation. Specific procedures exist for developing the IC map, which will be described in subsequent chapters.

Concerns-Based Adoption Model Research

The Concerns-Based Adoption Model has been used to measure, determine, and explain the concerns of teachers implementing a new innovation. The innovations have varied greatly between innovative products and processes. Many of the articles found also varied from the prescribed analysis method set forth by the creators of the model.

Rakes and Casey (2002) analyzed the Stages of Concern regarding the use of instructional technology among pre-kindergarten through 12th grade teachers. This national study of 659 teachers took the mean raw scores of the entire population to describe the concerns of the teachers as a whole. The researchers found this group to

have high *informational* concerns with a secondary peak score within the *collaboration* stage. The study purported the importance of providing a clear demonstration regarding the use of instructional technology to assist in alleviating the egocentric concerns of the teachers.

Filling the Gap with Innovations was a professional development program designed to infuse the teacher education program in Arizona with instructional technology innovations. The content specialists in each of the six teacher education programs were to work collaboratively with instructional technologists to demonstrate the use of technology in a content specific context. Researchers developed an innovation configuration map to assess the manner in which the innovation was being implemented in the classrooms of the university instructors (Williams & Foulger, 2006). Pre and post tests of the program showed a progression from faculty familiarity of the innovation to criteria being met at the individual and program level.

The results from the Stages of Concern showed the individual concerns of the four instructors remained high in the egocentric stages for both the pre and the post tests, whereas the other stages all remained relatively low. The interview data were also used to determine the levels of use of the participants. Two of the four participants demonstrated significant growth throughout the tenure of the study. The researchers concluded that the collaborative practices between the instructional technologists and the

content specialty instructors had a direct impact on the degree to which the innovation was used and adopted by the participants.

The CBAM has also been used in many process innovations. A study conducted by Dobbs (2004) analyzed the effects of various training methods on faculty and administrators concerns toward teaching a distance education course. Dobbs examined the Stages of Concern of faculty who were trained in one of three manners; classroom training, classroom and laboratory training, or no training in distance education. The study concluded classroom training with laboratory experience was the most effective at addressing the egocentric concern of the faculty. As the faculty gained more experience, concerns moved from basic *informational* concerns about the technology to more student-focused concerns.

Crawford, Chamblee, and Rowlett (1998) assessed the concerns of algebra teachers during curriculum reform. In 1991, North Carolina redefined the statewide algebra curriculum to align with the curriculum and evaluation standards of the National Council of Teachers of Mathematics. A series of workshops were delivered during the summer of 1992 to retrain the teachers. The study analyzed data collected from the 376 participants.

The study reported the concerns of the teachers regarding the use of the new curriculum. The Stages of Concern data produced the following mean relative intensity

scores for the group of teachers: *awareness* = 77, *informational* = 84, *personal* = 80, *management* = 65, *consequences* = 54, *collaboration* = 59, and *refocusing* = 65. The researchers went on to statistically compare groups based on their reported demographics. Only one demographic produced significant differences in the *collaboration* stage among teachers who had no previous in-service training and those who had minor training.

After a year, percentiles for the teachers who attended both sessions were: *awareness* = 60, *informational*, = 69, *personal* = 78, *management* = 73, *consequences* = 54, *collaboration* = 59, and *refocusing* = 73. Statistical differences between pretest and posttest concerns existed for the *awareness*, *informational*, and *refocusing* stages.

The study concluded that curriculum change professional development needs to support teachers throughout the implementation process. Additionally, developers and researchers should follow teachers for three to five years to provide a description on how teachers progress through the implementation of the innovation. Finally, qualitative methods should be used to further explicate the nature of the concerns.

Within the field of agricultural education, there have been two recent studies involving the CBAM. Shoulders and Myers (2011) examined the concerns of the past participants of the National Agriscience Teacher Ambassador Academy (NATAA) regarding the use of inquiry-based instructional methods. The NATAA has been in place since 2002. When the program originally started, the goal was to train high school

agricultural science teachers on the integration of science using LabAids brand kits. In 2007, the program shifted its focus to the use of inquiry-based methods to improve students' understanding of science curriculum through agricultural contexts.

The researchers surveyed 57 NATAA participants using the new version of the Stages of Concern questionnaire (Hall & Hord, 2011). The study compared the mean relative intensity scores of the participants based on the reported demographics. A comparison of the teachers who participated in NATAA for two years with those who only participated for one year found that the more experienced teachers had higher *collaboration* concerns whereas the first year participants were unconcerned with the innovation. Similar results from a comparison of the teachers who attended the two different formats were also found.

Shoulders and Myers (2011) concluded that the longer the teacher was associated with NATAA the greater the chance they would have progressed through the Stages of Concern. The study recommended to maximize utility and efficacy of professional development, efforts should be made to increase the opportunities for teachers to participate in NATAA for more than two years, which is currently the maximum. Additionally, the program should continue to focus on inquiry-based methods. Furthermore, it appears the professional development is less effective with teachers with less than 6 years of teaching experience. To have a greater impact on the implementation

of inquiry-based instructional methods in the agriscience classroom, NATAA should focus on recruiting teachers with more teaching experience.

In an agricultural literacy related study, Bellah and Dyer (2009) assessed the concerns of elementary teachers toward the use of agriculture as a context for teaching across the grade levels. The population for the study included teachers who attended a 5-week agricultural literacy course in California, a total of 46 participants over a two year period. A purposive sample of 10 teachers was selected based on their use or nonuse of agriculture.

The researchers used the Stages of Concern questionnaire to describe the mean, relative intensity scores for curriculum users and nonusers. The study reported that the highest stage of concern for users was the *informational* stage, followed by *personal* concerns. Whereas, the nonusers highest stage of concern was within the *awareness* stage, followed by *informational*.

The study concluded additional follow-up with the teachers after in-service activities was needed to guide the teachers through the implementation process. The researchers also recommended that future research be conducted following the teacher through the implementation process to document progression through the stages of concern. Additionally, they recommended conducting similar research with similar populations to solidify the result of this study.

Summary

In reviewing the literature the following areas were examined: (1) constructivism (2) contextual teaching and learning, (3) educational innovations, (4) agricultural literacy as an educational innovation, (5) review of agricultural literacy research, (6) theoretical framework, and (7) Concerns-Based Adoption Model research.

Evidence was found in the literature that it was necessary for a change in the delivery of traditional academic curriculum. With increased standards posed on the educational system and chronic low performance of students the need for educational reform is ever present. Research has shown that teaching abstract ideas in a realistic and authentic context assists students in building a strong knowledge base; a knowledge base which consists of both explicit and tacit knowledge.

In addition to low student performance in mathematics and science, the general public is becoming further removed from the agricultural industry. Many people do not fully understand where their food comes from. Although the masses are removed from the production of food, agriculture still affects their daily life. All people should have a basic understanding of how food arrives on their plate on the dinner table. Education about agriculture is not a new topic; however the agricultural literacy movement has not made significant changes in consumers' understanding of the agricultural industry.

Agriculture lends itself well to being a context for teaching and core academic subject. Students who have received instruction using agriculture as a context for teaching have outperformed their counterparts on standardized tests. Evidence suggests the use of agriculture as a context for teaching is a viable option to meet the goals set forth by our educational system. In order for successful implementation of the use of agriculture as a context for teaching, teachers themselves need to be educated about agriculture and trained in its use as a context for teaching.

Summer Agriculture Institute at Oregon State University has been training teachers to use agriculture as a context for teaching for over 20 years. Previous research has shown that after participation, teachers have a positive perception of agriculture. In addition it has been demonstrated that teachers' understanding of agriculture has also matured after completion of the program. However, studies have failed to show the concerns teachers have when trying to implement the curriculum change or how the curriculum chage appears in the classroom.

It conclusion, the literature provided a basis and theoretical framework for the study of concerns on the use of agriculture as a context for teaching. The literature also played a significant role in determining the theoretical model and research design used in evaluating curriculum change.

CHAPTER 3

DESIGN AND METHODOLOGY

The purpose of this chapter is to detail the design of this study. To that end, it presents the research design, methodology, the population and sample, instrumentation, and data analysis.

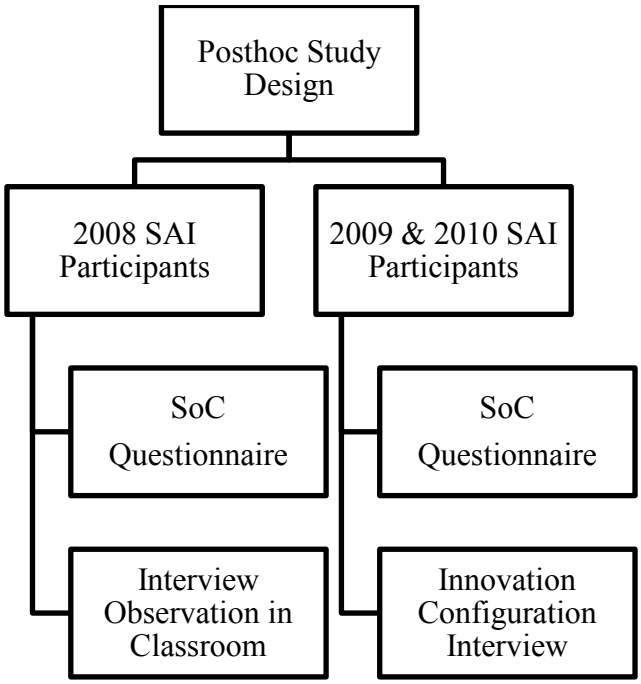
Design of the Study

Teacher concerns are a critical component of the implementation of new curriculum. In order to address teacher concerns and to obtain an accurate portrait of how they use agriculture as a context for teaching, the design of this posthoc study includes one posttest observation and interviews of participants who experienced a summer program (see Figure 3.1). Given the study design, many threats to internal validity exist; selection, history, and maturation.

Due to the nature of the treatment being a voluntary program, no random sampling can occur. Teachers enrolled in the program may already differ from the average teacher (Shadish, Cook, & Campbell, 2002). The average teacher may not know anything about the use of agriculture as a context for teaching. However, the population for this study has a common experience, each participated in Summer Agriculture Institute at Oregon State University. The institute was designed to give teachers a basic

understanding of how to use agriculture as a context for teaching. Due to this experience, the population of the study already differs from the average teacher in Oregon.

Figure 3.1. Research schematic of the use of agriculture as a context for teaching study



Additionally, because of the posttest only design, a history threat can occur (Shadish, Cook, & Campbell, 2002). For some of the participants it has been three years since the beginning of the treatment; however in this case, it is improbable to have experimental isolation in educational field research (Shadish, Cook, & Campbell, 2002). Other concurrent events may have taken place that would also produce the desired effect. Due to the length of time since Summer Agriculture Institute, it is difficult to determine that the effects were a direct response to their participation in the program.

Along the same lines as the history threat, there could also have been a natural maturation of the study participants. Maturation is the naturally occurring changes over time that could be confused with the effects of the treatment (Shadish, Cook, & Campbell, 2002). It is difficult to determine if the data reflects changes due to the participants' enrollment in SAI or natural changes in developing as a teacher.

Methodology

To attend to the research objectives, a mixed method research design was used. The study used both qualitative data and quantitative data to frame the study. As noted in previous chapters, the Concerns Based Adoption Model (CBAM) was used to guide the researcher in this study. "The model is concerned with measuring, describing, and explaining the process of change experienced by teachers involved in attempts to implement new curriculum materials and instructional practices" (Anderson S. E., 1997, p. 331). CBAM theory best describes the Stages of Concern as a developmental process in which teachers who are implementing new curriculum have concerns varying in intensity across the seven stages (Anderson S. E., 1997). The 7 Stages of Concern, as detailed in chapter 2, can give the researcher an initial picture of the concerns teachers have with using agriculture as a context for teaching their curriculum.

The professional development course entitled *Summer Agriculture Institute* was offered during the summer sessions of 2008, 2009, and 2010. Twenty-five students were enrolled in the course during 2008, 24 students were enrolled during the summer of 2009,

and 23 teachers during 2010. The participants were contacted during the spring of 2011 and asked to complete an electronic version of the Stages of Concerns Questionnaire. Following the data collection period, a purposive sample of respondents were interviewed to support the data collected in the electronic surveys and to gather data regarding teachers use of agriculture as a context for teaching.

Research Questions

The following were the research questions used to guide this study:

1. What are the demographic characteristics of past participants of Summer Agriculture Institute?
2. What are the concerns of teachers regarding the use of agriculture as a context for teaching their curriculum?
3. How are teachers using agriculture as a context for teaching in their classrooms?
4. What does the innovation look like when it is in use?

Population and Sample

The target population for this study was elementary and secondary teachers who participated in a week-long, professional development program introducing them to the diversity of agriculture and how to use it as a context for teaching across the curriculum. Enrollment for the course was completely voluntary. Total enrollment for the combined three years was 72 teachers. These teachers represented various grade levels and subject matter. A purposive sample of 5 teachers, from the respondents, was then selected based

on Stages of Concerns profile, grade level, and content area to obtain data to answer the questions regarding innovation configurations via interviews. Due to the nature of this study, the results cannot be generalized to a larger population.

Instrumentation

In order to obtain data to answer the aforementioned research questions, the study has been divided into two parts. The first portion of the study will gather data regarding the concerns of the teachers regarding the use of agriculture as a context for teaching and the demographics of the population. The second portion consisted of semi-structured interviews to gather a rich description of the Stages of Concern and Innovation Configurations.

The Stages of Concern Questionnaire (SoCQ) was used to collect data regarding participants' concerns of using agriculture as a context for teaching, see appendix A. The SoCQ is a 35-item survey, which correlates to the seven stages of concern. Original testing of the instrument resulted in coefficients of internal reliability scores ranging from 0.64 to 0.83. Additionally, 171 individuals were asked to complete the survey again to determine the test-retest correlations. Pearson's r coefficients ranged from 0.65 to 0.86 for the seven stages. Table 3.1 shows the Cronbach's alpha scores and the Pearson-r correlation data for each of the seven stages. The 35-item questionnaire was validated through a series of validity tests comparing open-ended statements and in-depth interviews with the SoCQ scores (Hall, George, & Rutherford, 1977).

Table 3.1
Coefficient of Internal Reliability for the SoCQ, N=830 (Hall, George, & Rutherford, 1979).

Stage	0	1	2	3	4	5	6
Alphas	0.64	0.78	0.83	0.75	0.76	0.82	0.71
Pearson-r	0.65	0.86	0.82	0.81	0.76	0.84	0.71

The second portion of the study consisted of a two-part semi-structured interviews aimed to gather a rich set of data regarding SoC and Innovation Configurations- see appendix B. The interviews were conducted in person at the school of the participating teacher and recorded for transcription and further analysis. The follow-up open-ended question was used to verify the results from the SoCQ. "When you think of using agriculture as a context for teaching your curriculum what concerns do you have? Please be frank."

The final portion of the interview was aimed at gathering data regarding the individual's use of the innovation and to describe how agriculture is being used in classrooms. Participants were selected to be interviewed based on the grade level, core subject taught, and SoC profile.

Data Collection

Data collection followed the principles set forth by Dillman, Smyth, and Christian (2009) regarding the implementation of electronic surveys. The guidelines this study followed were:

- Personalize all contacts to respondents;
- Use multiple contacts and vary responses across;
- Carefully and strategically time all contacts with the population in mind;
- Keep email contacts short and to the point;
- Take steps to ensure that emails are not flagged as spam;
- Carefully select the sender name and subject line text for emails;
- Provide clear instructions on how to access the survey;
- Assign each sample member a unique ID number;
- Establish a procedure for dealing with bounced emails; and
- Establish a procedure for monitoring progress and evaluating early completes.

The survey instrument was hosted on SurveyMonkey. This platform uses a direct mail system internally on the website. However, it does allow for customization so it appears that all email messages are coming directly from the researcher. Using the direct mail options in SurveyMonkey will automatically tag all respondents, thus allowing the researcher to send subsequent communications to only the non-responders. Additionally, the platform will create a unique identification number for each of the respondents.

The survey instrument and cover letter (appendix C) were electronically mailed to the 72 teachers who participated in Summer Agriculture Institute between 2008 and 2010. Personalization occurred for each of the emails sent to the participants. Each email was tagged to include the respondents' first name in the email. Additionally, the subject line of the first set of emails included the name, Summer Agriculture Institute.

The original cover letter and survey were electronically mailed on May 10, 2011. After the first round of surveys, all bounced email addresses were examined to determine if any were entered incorrectly or an alternate address could be used. After careful examination of the addresses provided, nine email addresses were deemed unusable, resulting in a useable frame of 63 participants.

The original notification was sent out to the teachers toward the end of the school year, which can be a very busy and inconvenient time for many teachers. The subsequent follow-up emails were more carefully timed to elicit a response from the participants. The second copy of the cover letter and survey was sent on May 23, 2011 followed by a more personal letter sent out on June 6, 2011. The personal follow-up (Appendix D) was sent toward the very end of the school year during the last week or week after school ended for many of the teachers. All responses were returned by June 13, 2011. Twenty-three total teachers responded, however five of the surveys were incomplete and deemed unusable, thus giving 18 respondents for a 28.6% response rate.

Data Analysis

Data analysis- Stages of Concerns

Scoring of the SoCQ is a relatively simple process. An excel application has been developed to score each of the responses. All seven stages have five corresponding items on the questionnaire, see Table 3.2. Responses from the five questions are added together to obtain the raw score for each of the constructs. The raw score is then compared to a percentile table to obtain the percentile scores (Hall & Hord, 2001; Hall, George, & Rutherford, 1979), see appendix F. The seven percentile scores are then plotted on a graph to visually represent the participants SoC profile to allow for ease of interpretation, see figure 3.2 for example profile.

Table 3.2
Stages of Concern with associated items

Stage	Item	Stage	Item	Stage	Item	Stage	Item
Awareness	3	Personal	7	Consequence	1	Refocusing	2
	12		13		11		9
	21		17		19		20
	23		28		24		22
	30		33		32		31
Informational	6	Management	4	Collaboration	5		
	14		8		10		
	15		16		18		
	26		25		27		
	35		34		29		

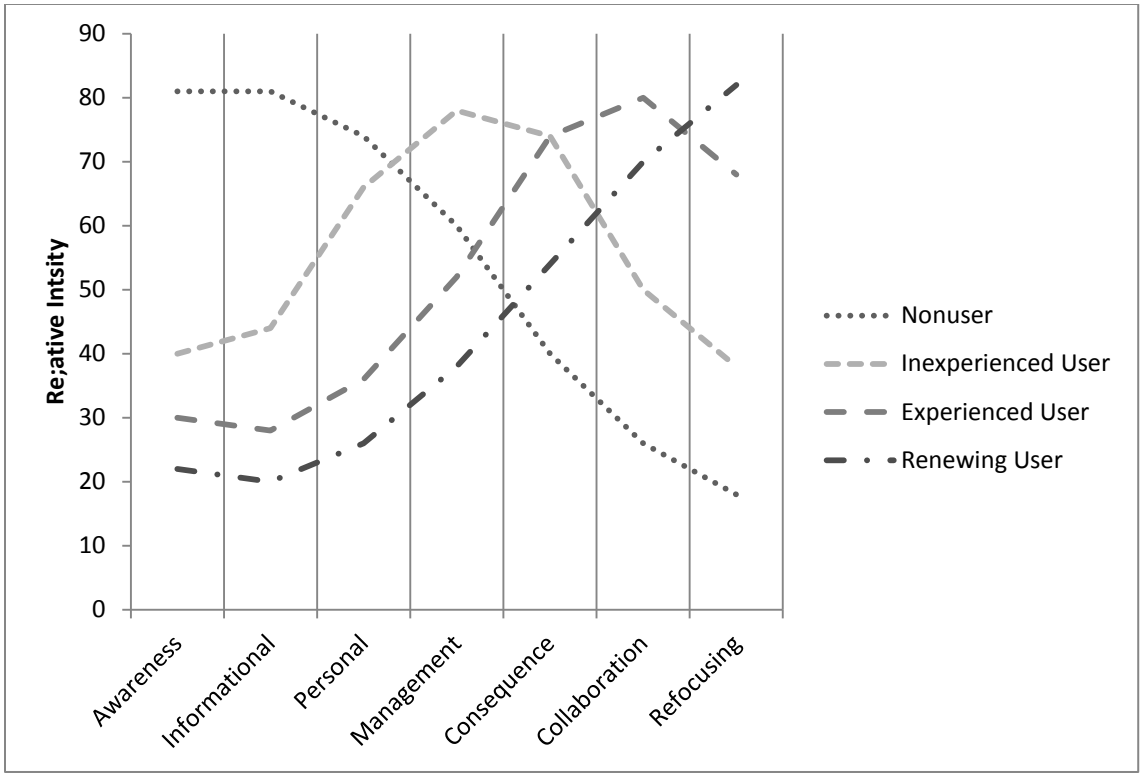
After the creation of the profile for each of the respondents the following procedures, outlined by Hall, George, and Rutherford (1979), were used to interpret each of the profiles. Peak and secondary scores were analyzed on an individual and group

basis. Groups were assigned based on demographic data; grade level, time since completion of SAI, and self-reported level of expertise. Data were analyzed for trends and outliers to explain the teachers concerns with using agriculture as a context for teaching.

The first method of data analysis is to analyze the peak profile scores for each of the participants. Peak scores represent the stage with the greatest relative intensity of concern. Figure 3.2 shows the hypothesized progression of SoC percentile scores (Hall, George, & Rutherford, 1979). As an example, in Figure 3.2, an inexperienced user may have a peak score in the *management* stage, signaling the participant is most concerned about managing the time and resources needed to implement the innovation.

When analyzing peak scores it is vital to understand indications of high scores in each of the stages. High scores in stage 1 are indicative of intense concerns about what the innovation is and how the innovation works in the classroom. This stage is usually descriptive of individuals who desire more information about the innovation. Stage 2 deals with self concerns about the innovation. Individuals are primarily concerned with how the innovation affects them: status, reward, and other personal incentives. Stage 3 scores represent concerns dealing with the management of the innovation, extra time and other logistical concerns. Similar interpretations can be made for stages 4, 5, and 6 using the stages of concerns definitions as guidelines.

Figure 3.2. Hypothesized Development of Stages of Concern (Hall, George, & Rutherford)



Stage 0, *awareness*, has had some controversy surrounding its use as an interpretive measure. In personal communication with the developer of the CBAM, it was recommended to discard the *awareness* level from data analysis (Hall, G. E., personal communication, June 15, 2011). Hall stated an inherent problem with the SoC questionnaire and all participants will score high in the *awareness* stage.

Data from the five interviews were also used to support the findings from the SoC questionnaire. Interview transcripts were transcribed and topically coded for concerns.

Following the coding procedures outlined by Newlove and Hall (1976), each statement, representative of only one idea or thought, was assigned a number based on the appropriate Stage of Concern. Interview data were then compared to the profile scores of the participants to confirm the SoCQ data. Additionally, interview data were used to provide a description of the trends found in the SoCQ data.

Data analysis- Innovation Configurations

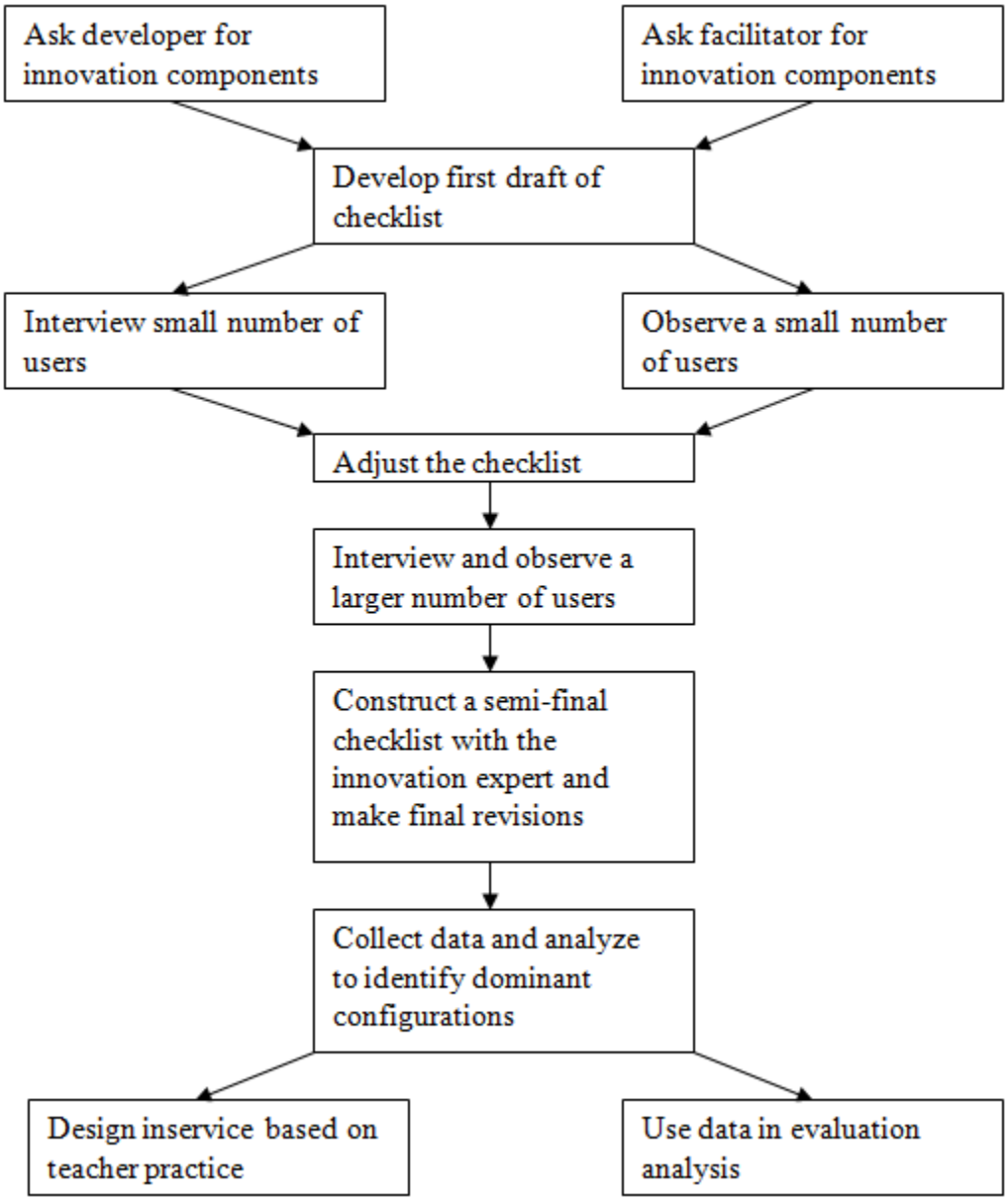
An innovation configuration map, has been developed in conjunction with faculty of the Summer Agriculture Institute. An innovation configuration map is developed to outline the major components and acceptable variations of each component for an innovation. According to CBAM developers, there is an eight-step process in the development of Innovation Configuration Maps (Hall & Hord, 1984). This process, shown in Figure 3.3, was used for the development of the instrument and the collection of data for the study.

The interviews of the 2008 SAI participants were used to assist in the development of the innovation configurations map. The participants were asked about their use of agriculture as a context for teaching, and were then asked to examine the innovation configuration map to determine if it adequately describes the variables associated with this innovation. Data from the two interviews were used to make

adjustments to the checklist and produce a final Innovation Configuration map, found in Appendix F.

After the production of the final IC Map, interviews with 2009 and 2010 participants were conducted. Qualitative data collected in the interviews were coded and analyzed. The trends found in the data may shed light on what using agriculture as a context for teaching looks like at the classroom level.

Figure 3.3. A Procedure for Identifying Innovation Configurations (Hall & Hord, 1984, p. 124).



Summary

Chapter 3 presented the basic design of the study. This chapter also brought forth the methodology and population involved in the research. The two methods of data collection were also discussed, in addition to the data analysis procedures. Chapter four presents the finding of this research study.

CHAPTER 4

FINDINGS

Chapter 4 presents the findings which emerged from this study. The results address the objectives and research questions about teachers' concerns in regards to using agriculture as a context for teaching as well as the innovation configurations found after participation in Summer Agriculture Institute. This study yielded two types of data. The first set of data was the Stages of Concern (SoC) Questionnaire. The survey instrument was designed to measure and describe teachers' concerns toward an innovation (Hall & Hord, 1984). Data from the surveys were collected and transformed into SoC profiles of each of the participants. Profiles were analyzed in accordance to the procedures defined in Chapter 3.

Along with the SoC profiles, the study contained interview data from five of the participants. The first part of the interview was designed to piece out further information regarding the SoC profiles. Interviewees were asked to elaborate on their concerns regarding the use of agriculture as a context for teaching. This data was used to confirm the profile analysis from the SoC questionnaire as well as potentially explain the trends seen in profiles.

The study also produced qualitative data that revealed the diverse innovation configurations of five of the participating teachers. Interview transcripts were analyzed

and coded for the innovation components of using agriculture as a context for teaching; accurate agricultural knowledge, integration of agricultural contexts with curriculum, hands-on activities, teachers' perception of agriculture, and interaction with local agricultural producers. Each coded item was them analyzed for ideal, acceptable and unacceptable variations.

Research Question 1: Demographics

Of the 18 usable surveys, 1 participant did not respond to the demographics section of the SoCQ. Thus, 17 participants were used to examine the demographics of the population. Eighty-eight percent (n = 15) of the respondents were female. The average respondent reported just over 11 years of teaching at the present school. Twelve (70.6%) of the teachers reported teaching in elementary level classrooms, the remaining taught in high school classrooms. Table 4.1 shows the distribution of classroom subjects listed by grade level. It is important to note that respondents were instructed to check all school subjects they taught. Of the other subjects at the elementary level, teachers reported: (1) Title 1 reading; (1) physical education and health; (1) art; and (1) library skills. Within the high school teachers, two of the teachers reported family and consumer sciences and the third teacher reported having a crafts course.

Table 4.1 Distribution of classroom subjects by grade level.

	Math	Science	Social Studies	English	Other
Elementary	9	7	9	9	4
High School	2	2	1	1	3

n = 17

Population characteristics revealed that all respondents currently had teaching responsibilities as part of their assigned duties. The respondents reported 93% (*n* = 17) of assigned duties were teaching related. Each of the teachers was asked to self-rate their level of expertise in using agriculture as a context for teaching and was given the categories: nonuser, novice, intermediate, old hand, and past user as descriptors to select. The following is the breakdown of participants by descriptor; (2) nonusers, (7) novices, (7) intermediates, (1) old hand, and (0) past user.

Research Question 2: Stages of Concern

Scoring of the SoCQ is a relatively simple process. An excel application was developed to score each of the responses. All seven stages have five corresponding items on the questionnaire. Responses from the five questions were added together to obtain the raw score for each of the constructs. The raw score is then compared to a percentile table to obtain the relative intensity scores for each of the concern areas (Hall, George, & Rutherford, 1979), see appendix F. The seven percentile scores are then plotted on a graph to visually represent the participants SoC profile to allow for ease of interpretation.

The following interpretation procedure, outlined by Hall, George, and Rutherford (1979) was used to analyze SoC profiles. Peak and secondary peak scores were analyzed on an individual and group basis. Groups were assigned based on demographic data, self-reported level of expertise and time since completion of SAI. Data were analyzed for trends and outliers to explain the teachers concerns with using agriculture as a context for teaching.

Individual SoC Profile Analysis

Individual peak and secondary peak scores were identified for each participant in the sample. Figures 4.1 through 4.18 illustrate the relative intensity of the SoC for each of the participants. In the initial analysis of the SoC profiles, the *awareness* concern area was the high peak score for nearly all of the participants. After personal communication with Gene Hall (June 15, 2001), he recommended discarding the *awareness* data due to the fact everyone will score high in the *awareness* stage.

Figure 4.1 shows the profile score for Participant A, a full-time high school teacher at a public charter school. Participant A teaches all core subjects within the school system. Participant A holds a doctoral degree and has been teaching for 16 years at the present school. Additionally, this teacher went through SAI in 2010. The highest stage of concern, with a relative intensity score of 71% for self-reported novice use was

management. The second highest stage of concern, with a relative intensity score of 51%, was *informational*.

Figure 4.1. Stages of Concern profile for Participant A.

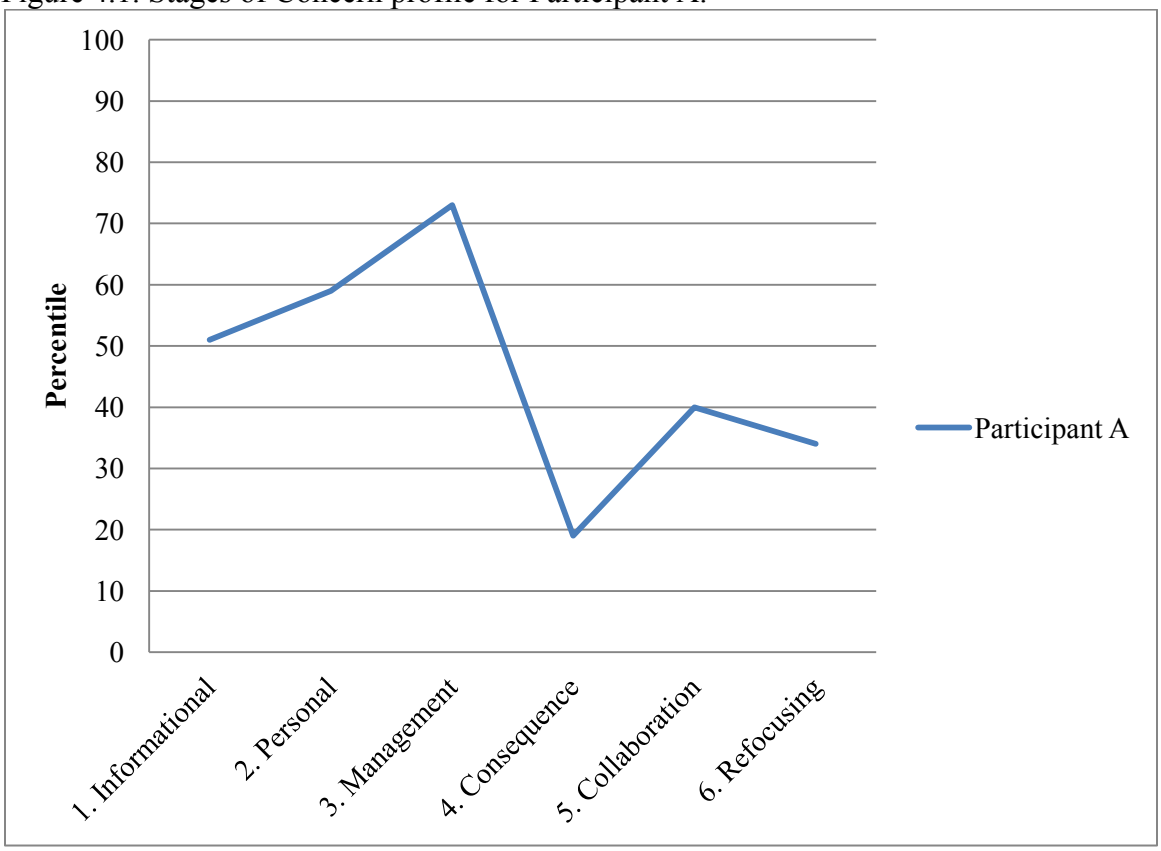
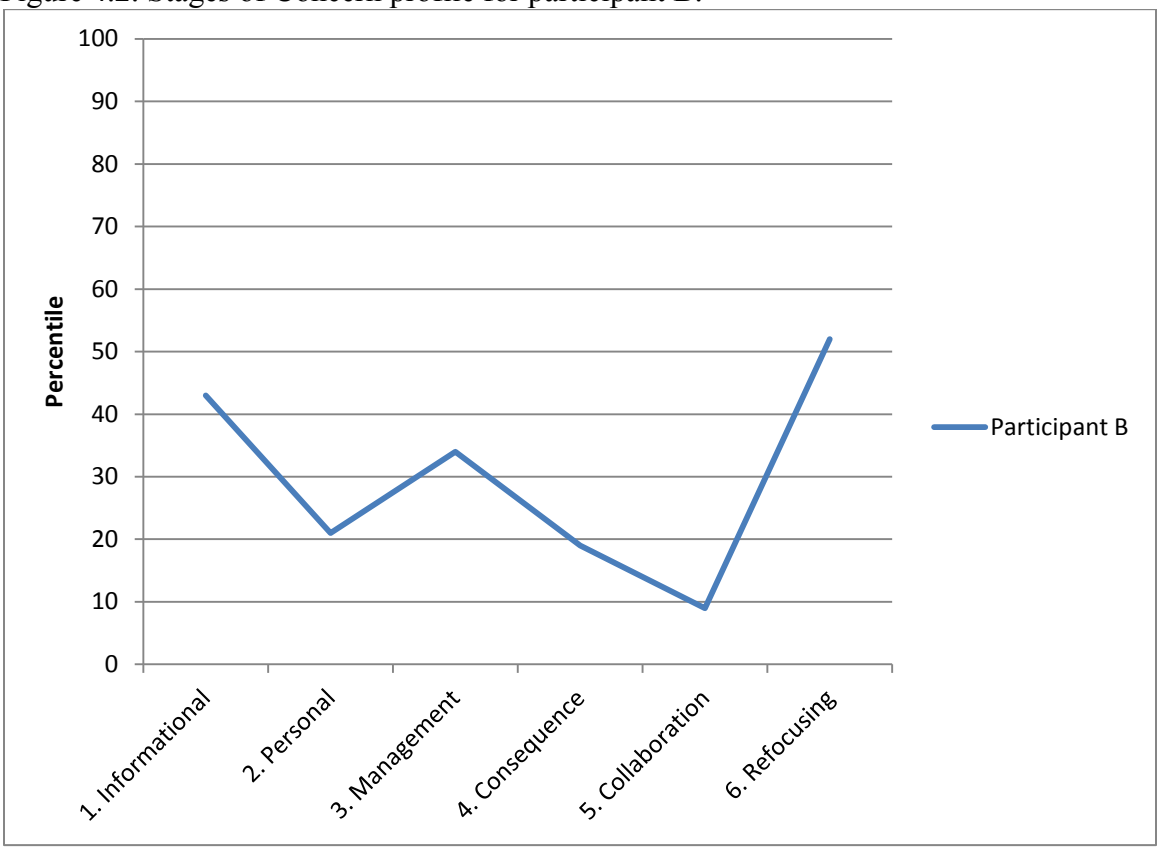


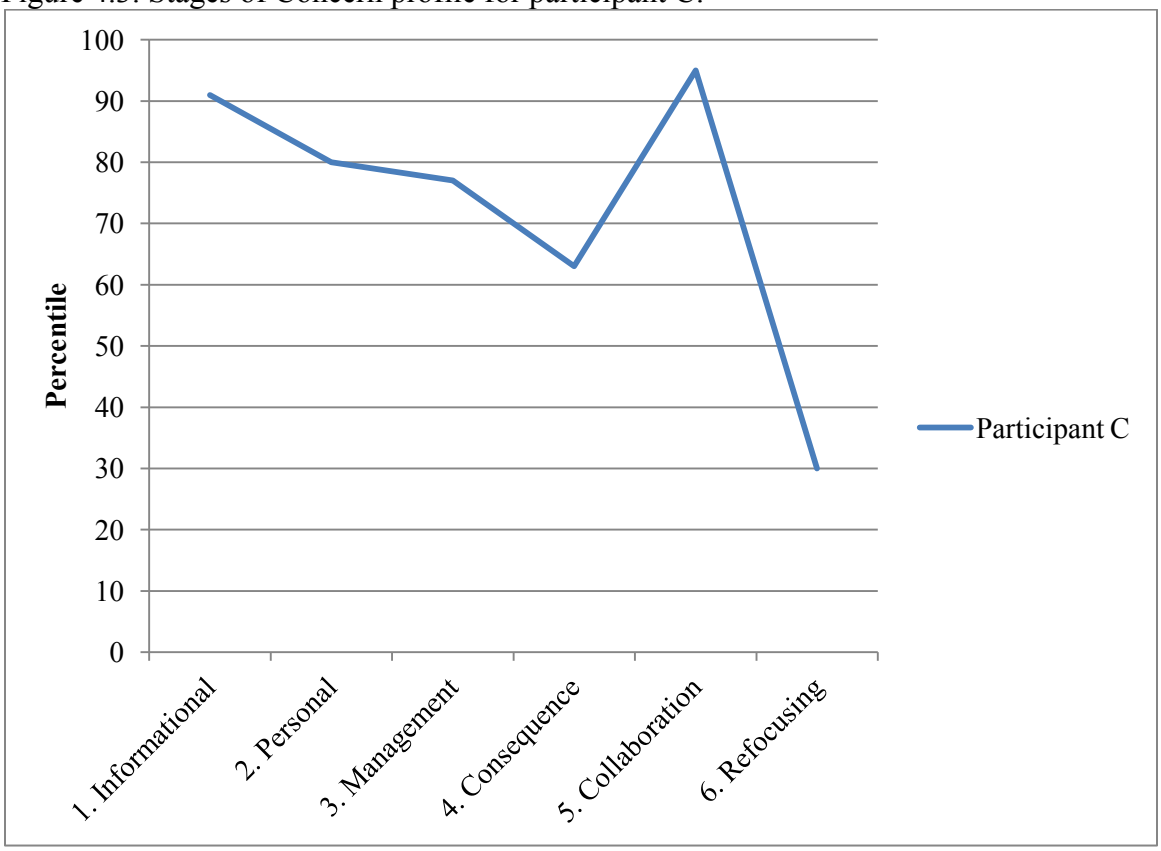
Figure 4.2 illustrates the SoC profile for Participant B. Participant B is a full-time elementary, Title I reading teacher. The teacher holds a masters degree and has been teaching at the present elementary school for 9 years. Additionally, this teacher went through SAI in 2010. The highest stage of concern, with a relative intensity score of 52% for self-reported nonuser use was *refocusing*. The second highest stage of concern, with a relative intensity score of 43%, was *informational*.

Figure 4.2. Stages of Concern profile for participant B.



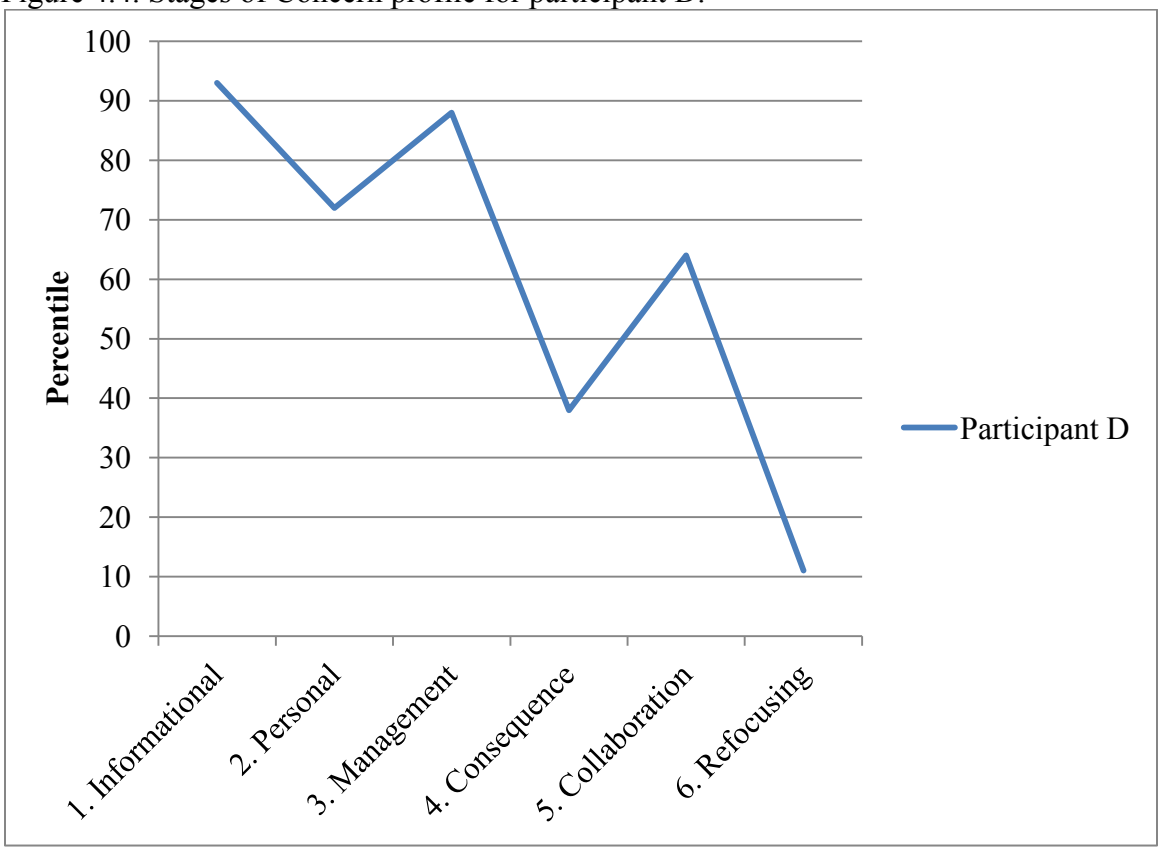
The SoC profile for Participant C is illustrated in Figure 4.3. Participant C is a full-time elementary teacher, responsible for all core subjects. The participant has a master's degree and has been teaching at the present elementary school for five years. The highest stage of concern for this 2009 SAI participant and novice user was *collaboration* with a 95% intensity score. Her secondary peak was *informational* with an intensity score of 91%.

Figure 4.3. Stages of Concern profile for participant C.



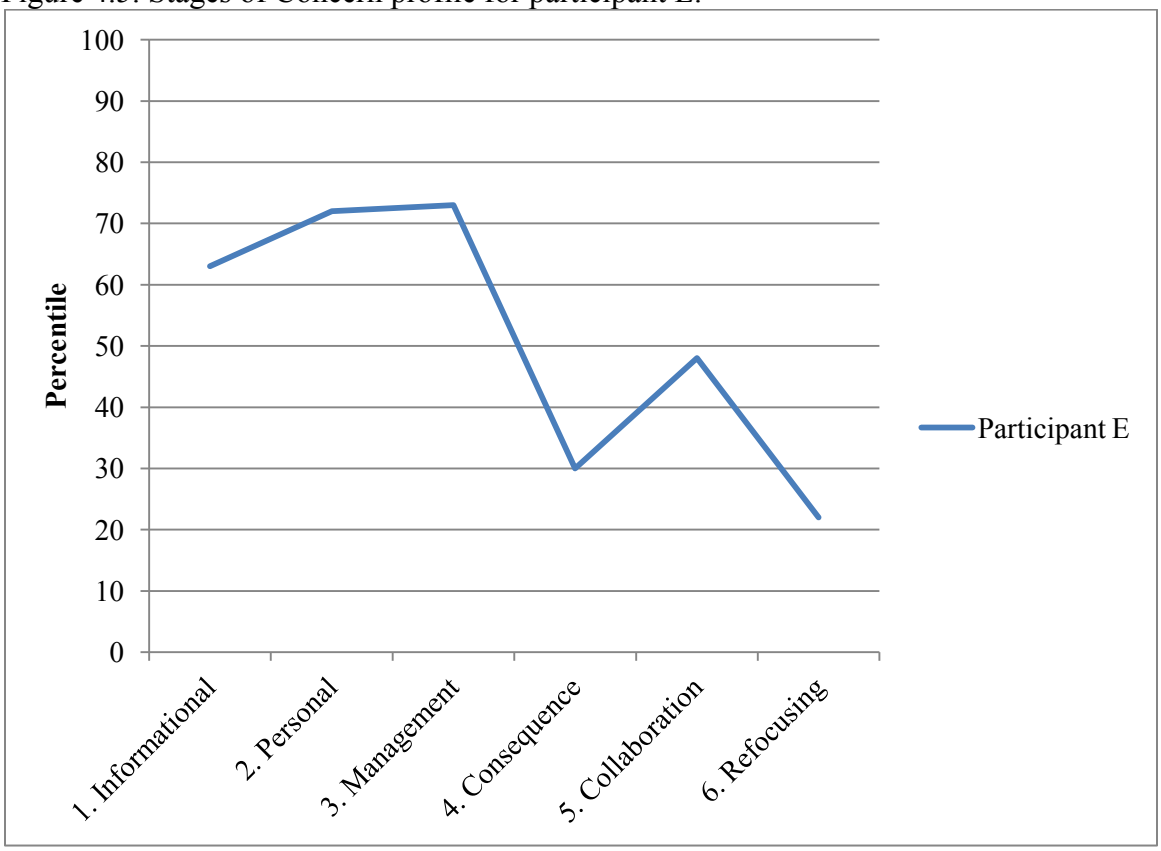
Illustrated in Figure 4.4 is the SoC profile for Participant D, a high school mathematics teacher who participated in SAI in 2009. Participant D has a master's degree and has been teaching at the present high school for 4 years. The peak score for this self-reported nonuser was *informational* with an intensity score of 93%. The secondary peak was *management* with an intensity score of 88%.

Figure 4.4. Stages of Concern profile for participant D.



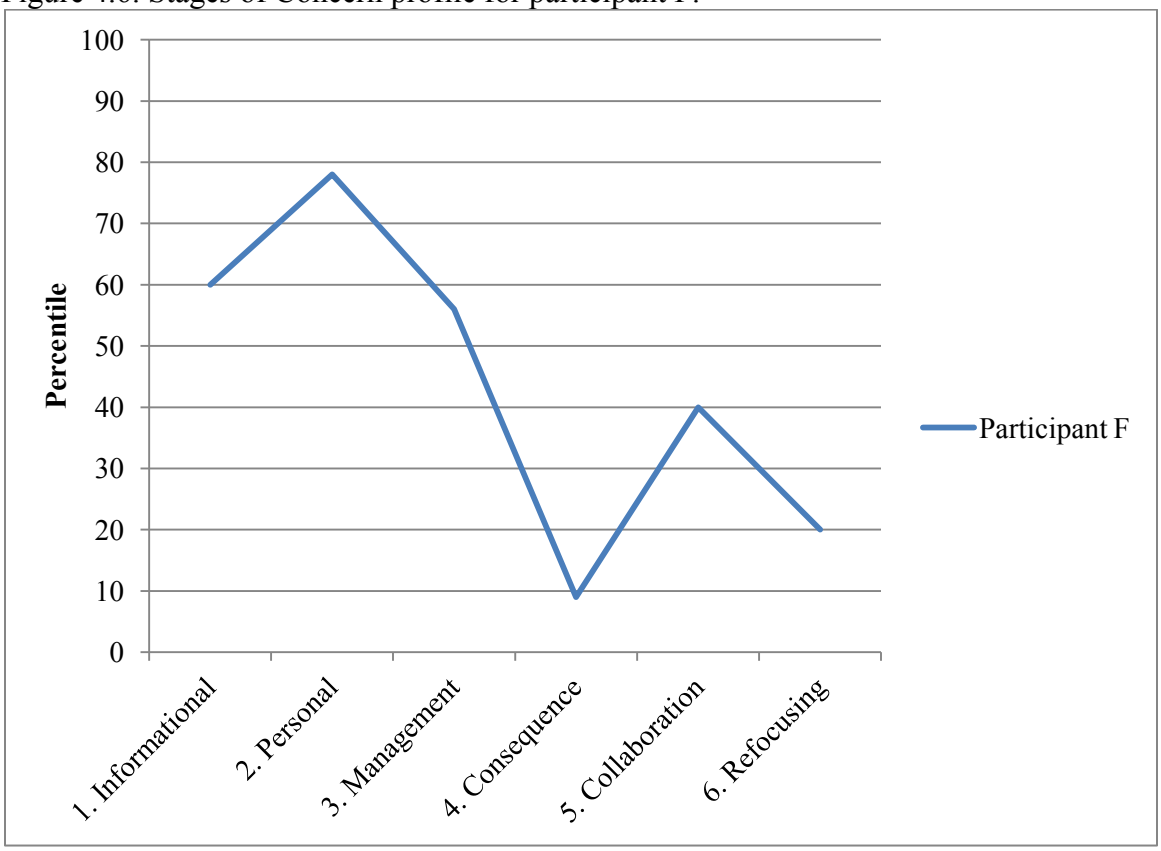
Participant E is a full-time elementary teacher, responsible for all core subjects in a fifth grade classroom. The participant has a bachelor's degree and has been teaching at the present elementary school for four years. The highest stage of concern for this 2010 SAI participant and novice user was *management* with a 73% intensity score. Her secondary peak was *personal* with an intensity score of 72%.

Figure 4.5. Stages of Concern profile for participant E.



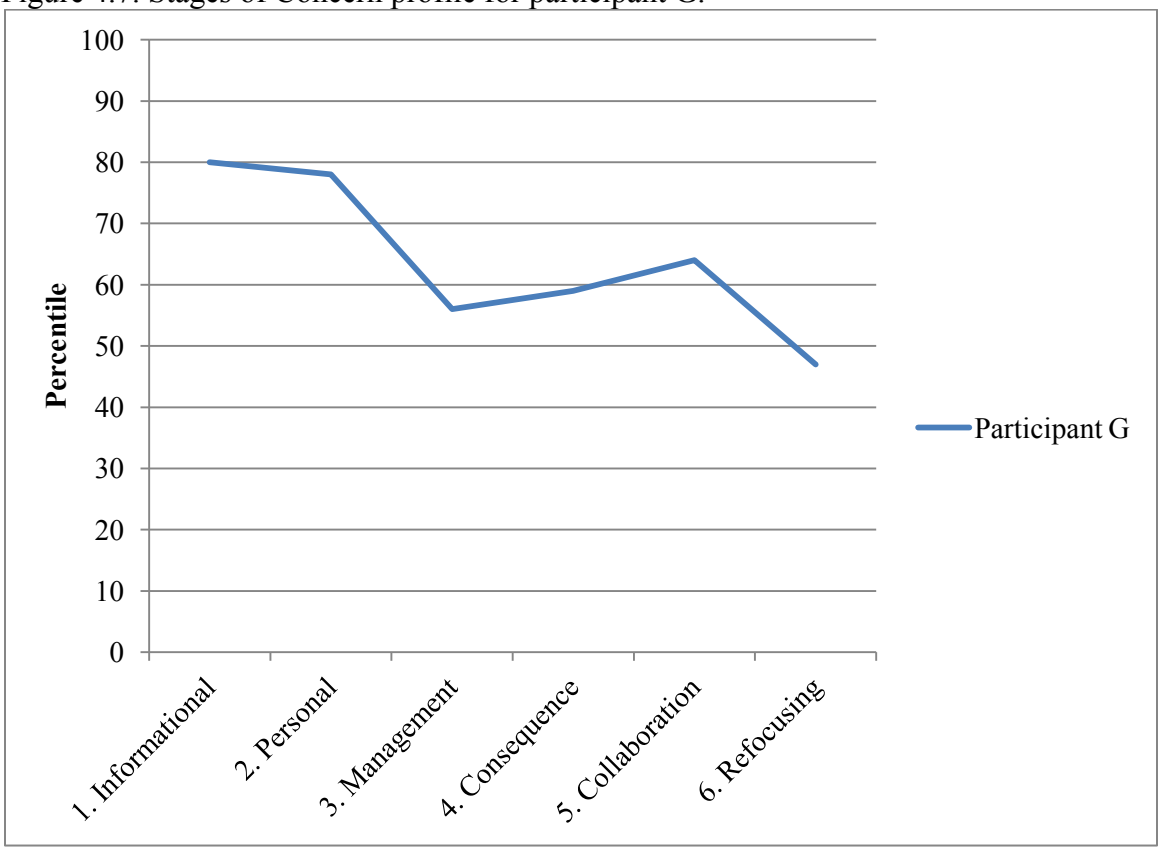
Participant F is a full-time elementary teacher who teaches all core subjects at the fourth grade level. She earned her master's degree and has been teaching at the present elementary school for 9 years. The highest stage of concern for this self-reported novice user and 2008 participant in SAI was *personal* with an intensity score of 78%. Her secondary peak score was *informational* with an intensity score of 60%. Shown in Figure 4.6 is the profile for Participant F.

Figure 4.6. Stages of Concern profile for participant F.



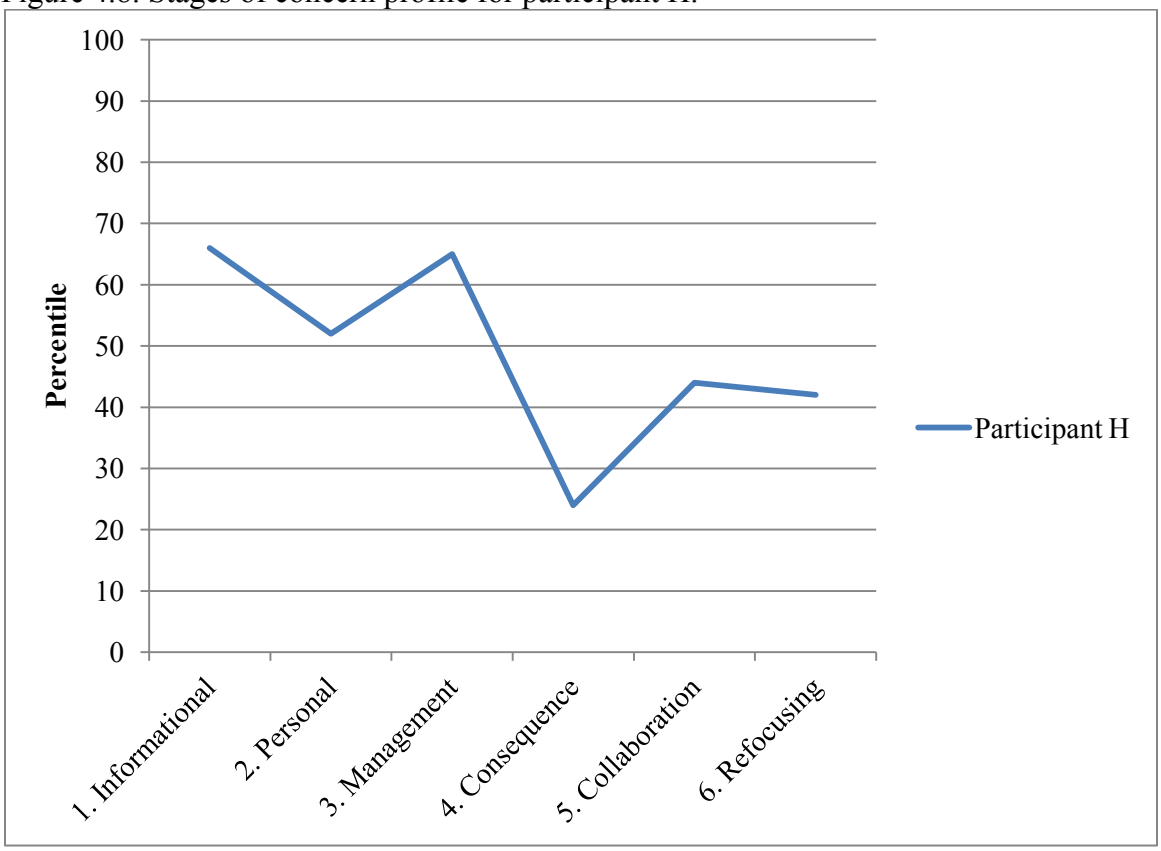
Participant G is a full-time elementary teacher, responsible for all core subjects. The participant has a master's degree and has been teaching at the present elementary school for 5 years. The highest stage of concern for this 2008 and 2009 SAI participant and intermediate user was *informational* with an 80% intensity score. Her secondary peak was *personal* with an intensity score of 78%. Full profile can be seen in Figure 4.7.

Figure 4.7. Stages of Concern profile for participant G.



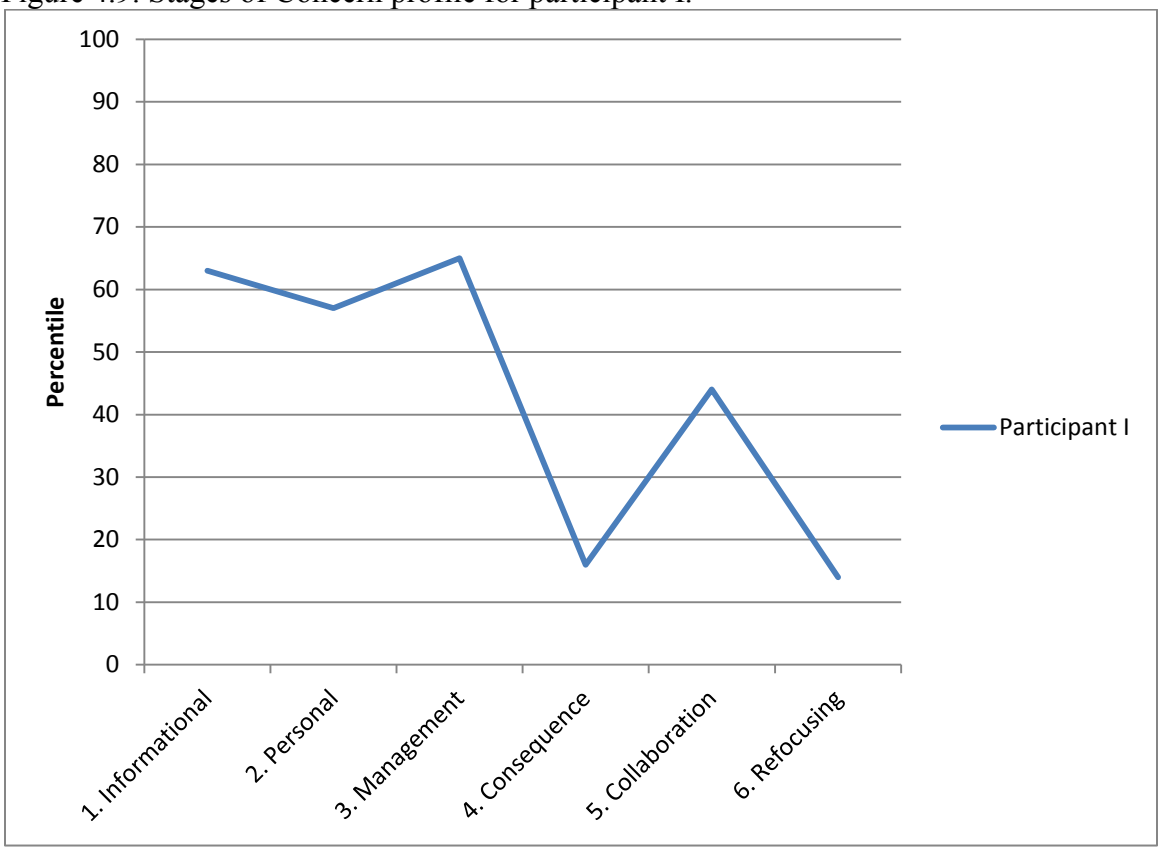
Participant H is a full-time elementary teacher who teaches all core subjects at the first, second, and third grade levels. She earned her master's degree and has been teaching at the present elementary school for 10 years. The highest stage of concern for this self-reported intermediate user and both 2006 and 2009 participant in SAI was *personal* with an intensity score of 66%. Her secondary peak score was *management* with an intensity score of 65%. Shown in Figure 4.8 is the SoC profile for Participant H.

Figure 4.8. Stages of concern profile for participant H.



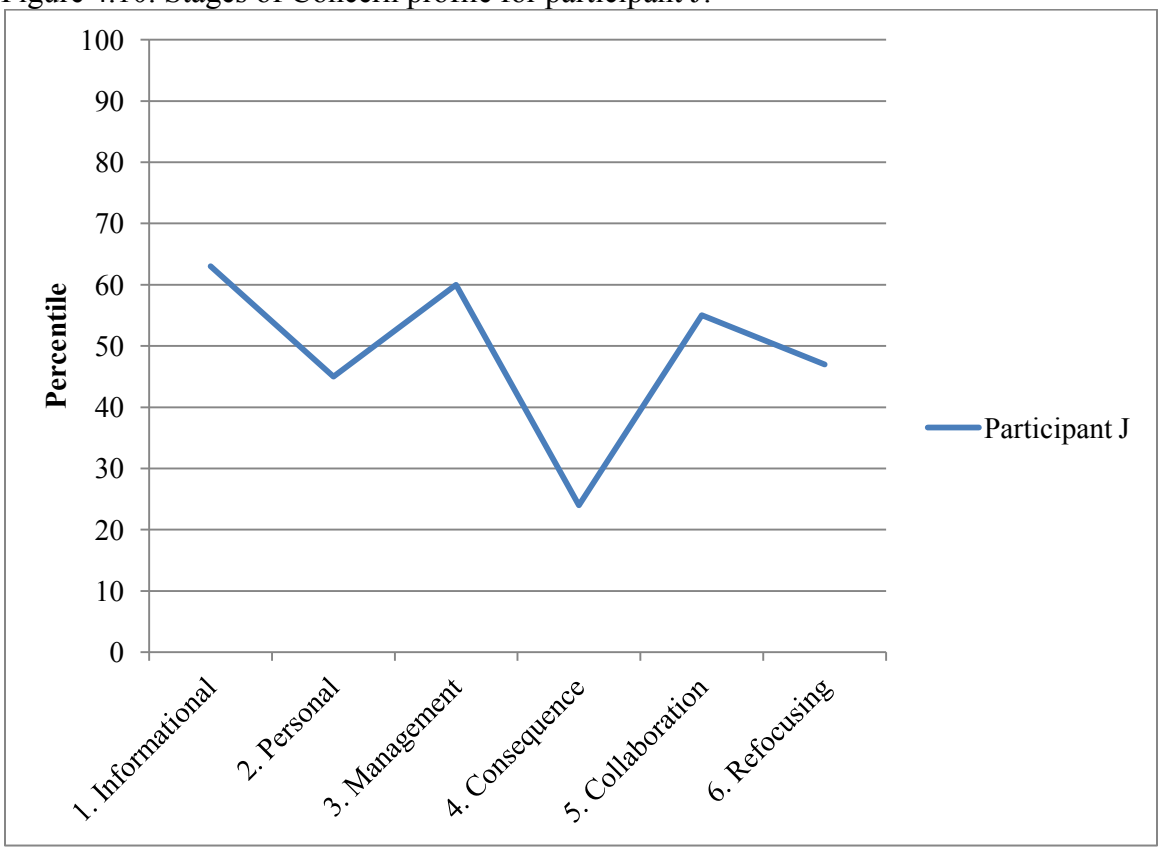
Participant I is a full-time elementary teacher who teaches all core subjects in a third through fifth, special education classroom. She earned her master's degree and has been teaching at the present elementary school for 16 years. The highest stage of concern for this self-reported novice user and 2010 participant in SAI was *management* with an intensity score of 65%. Her secondary peak score was *personal* with an intensity score of 63%. Shown in Figure 4.9 is the stages of concern profile for Participant I.

Figure 4.9. Stages of Concern profile for participant I.



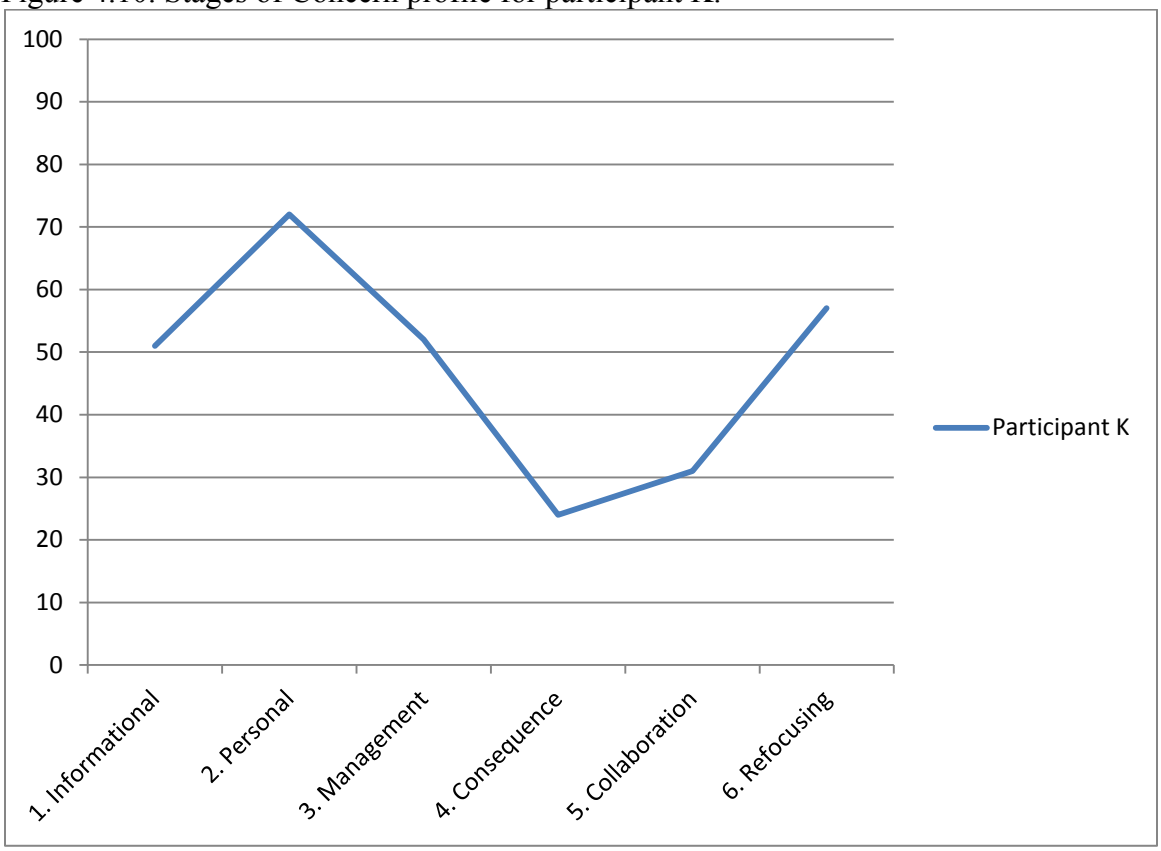
Illustrated in Figure 4.10 is the SoC profile for Participant J, a high school family and consumer sciences teacher who participated in SAI in 2010. Participant J has a master's degree and has been teaching at the present high school for 33 years. The peak score for this self-reported novice user was *informational* with an intensity score of 63%. The secondary peak was *management* with an intensity score of 60%. It is also worth noting the tertiary peak score *collaboration* with a relative intensity score of 55%, *refocusing*.

Figure 4.10. Stages of Concern profile for participant J.



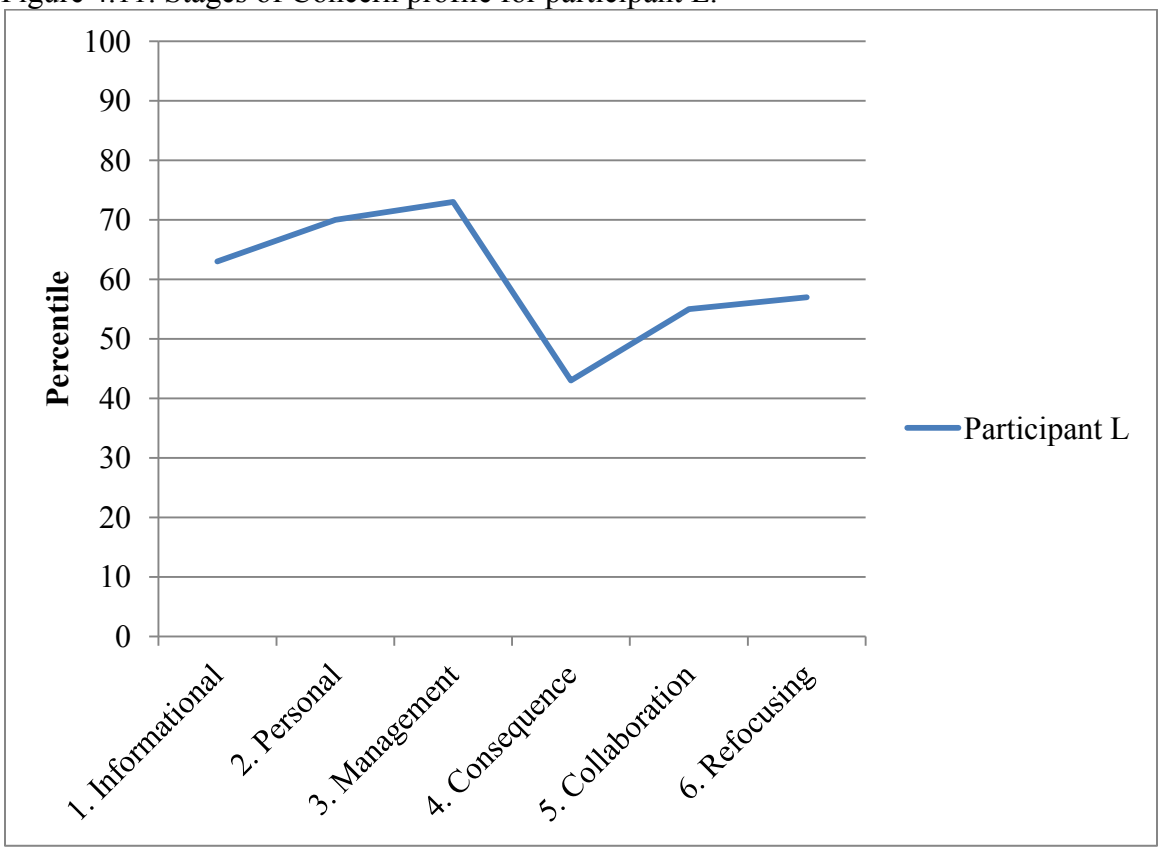
Participant K is an elementary teacher. The teacher did not respond to any of the remaining demographic questions. Participant K's peak score was *personal* with a relative intensity of 72%. The secondary peak score was *refocusing* with a relative intensity of 57%. The full SoC profile is illustrated in Figure 4.11.

Figure 4.10. Stages of Concern profile for participant K.



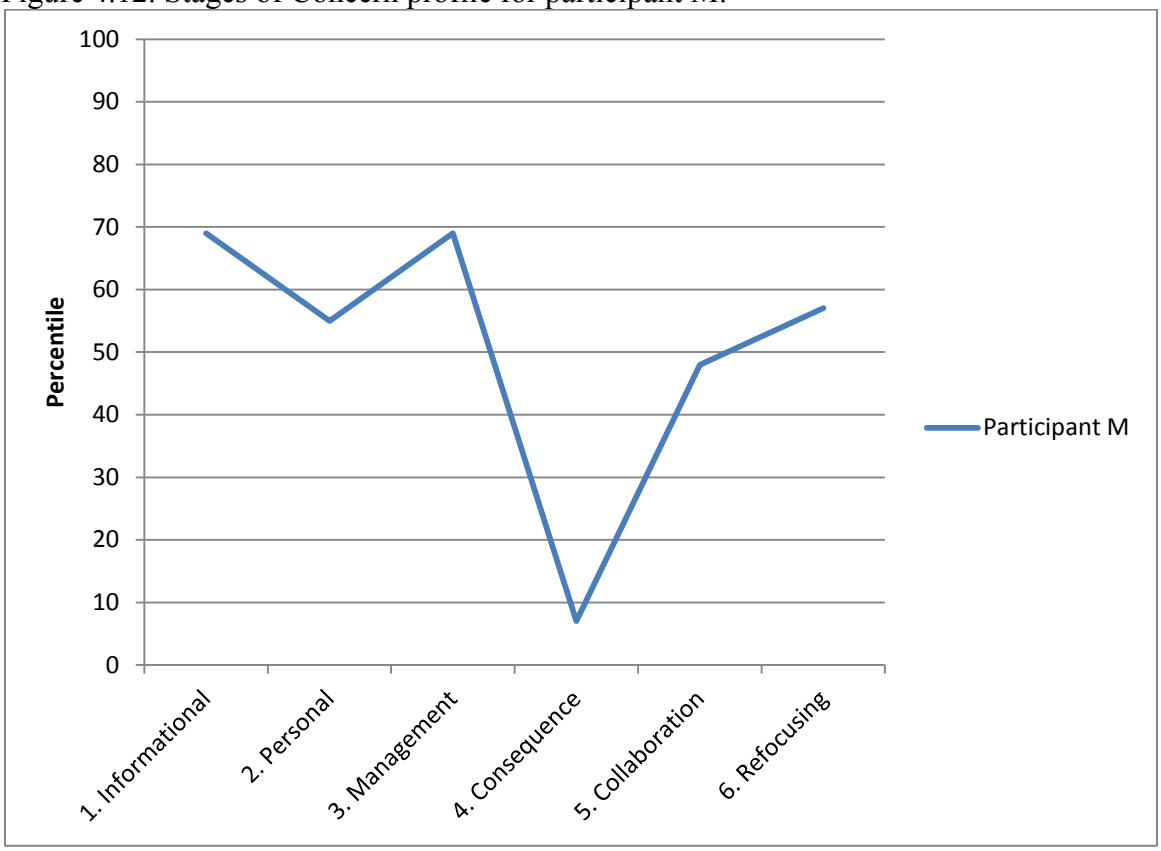
Illustrated in Figure 4.11 is the SoC profile for Participant L, a high school family and consumer sciences teacher who participated in SAI in 2008. Participant L has a bachelor's degree and has been teaching at the present high school for 13 years. The peak score for this self-reported "old hand" user was *management* with an intensity score of 73%. The secondary peak was *personal* with and intensity score of 70%.

Figure 4.11. Stages of Concern profile for participant L.



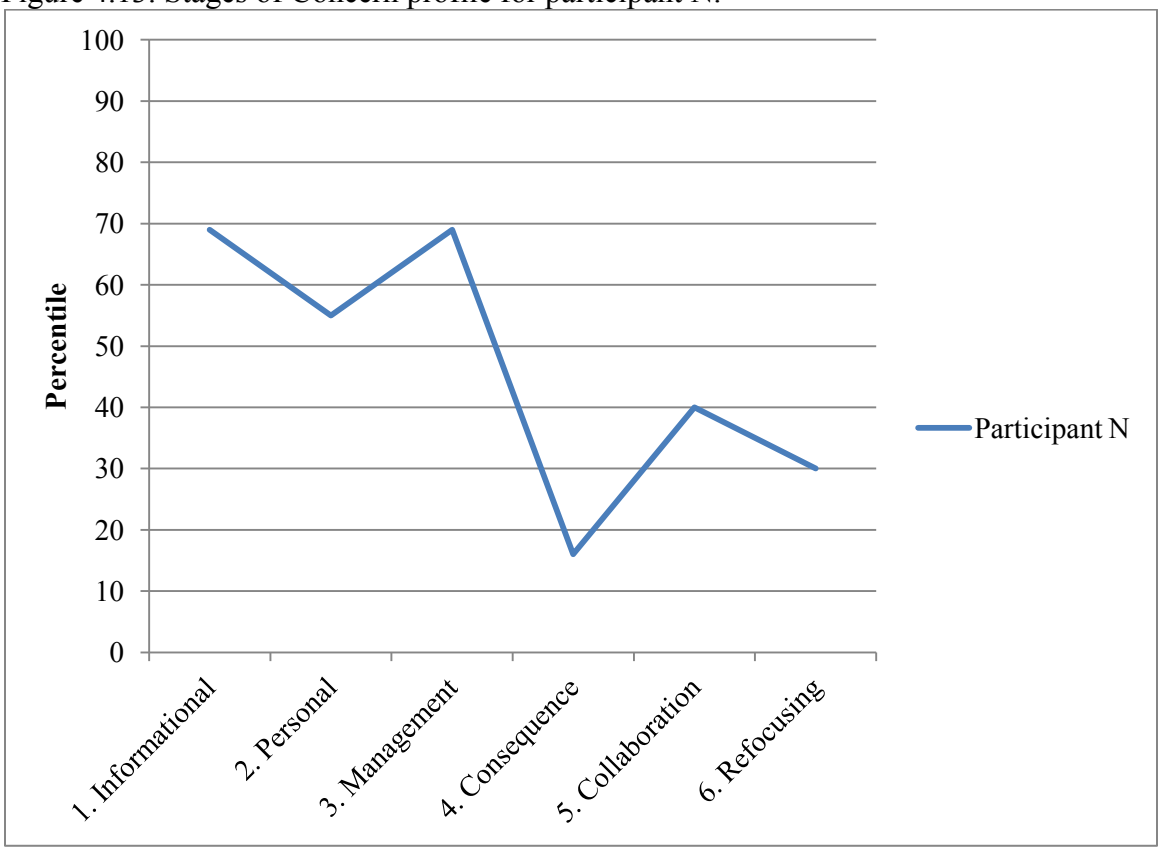
Participant M is a full-time elementary teacher who teaches all core subjects in a fourth grade classroom. He earned his bachelor's degree and has been teaching at the present elementary school for 11 years. The highest stage of concern for this self-reported intermediate user and 2010 participant in SAI was tied between *informational* and *management* with an intensity score of 69%. Shown in Figure 4.12 is the profile for Participant M.

Figure 4.12. Stages of Concern profile for participant M.



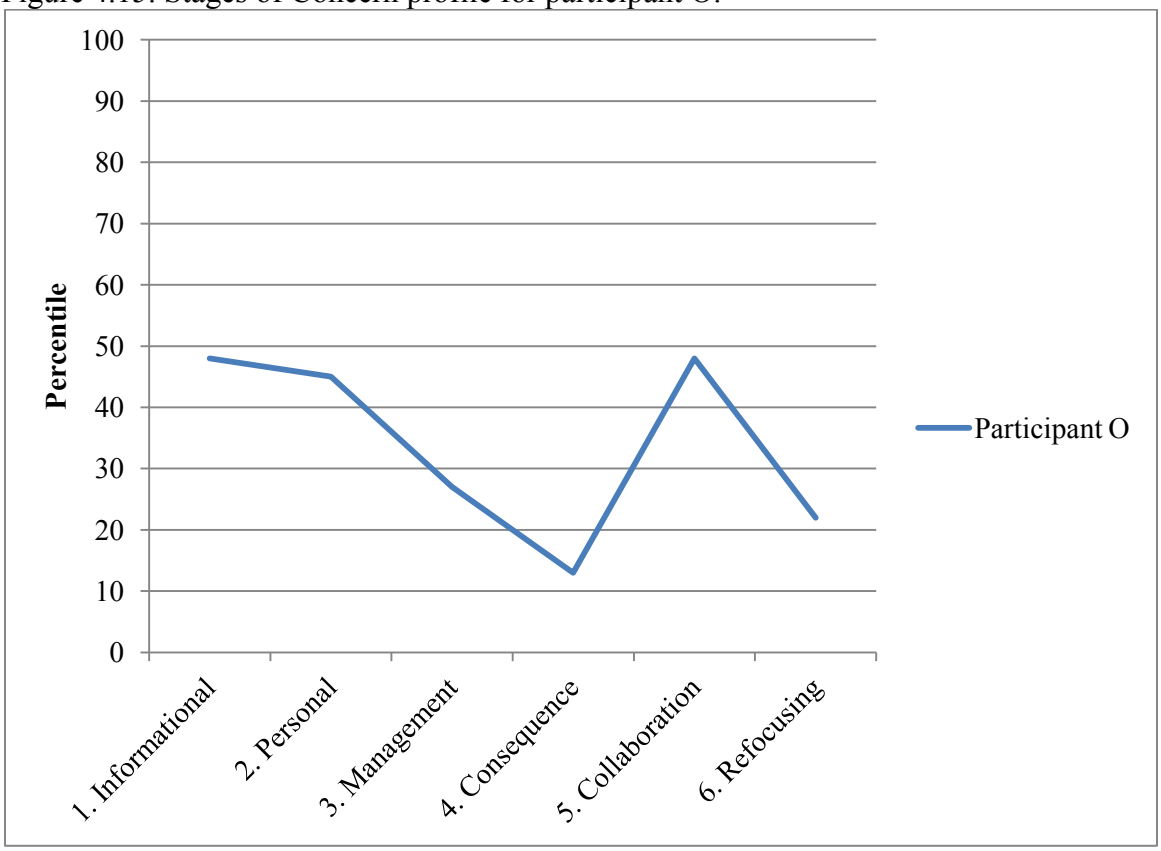
Participant N is a full-time elementary teacher who teaches all core subjects in a first through third grade classroom at a place-based charter school. She earned her master's degree and has been teaching at the present elementary school for 2 years. The highest stage of concern for this self-reported intermediate user and 2010 participant in SAI was tied between *informational* and *management* with an intensity score of 69%. Shown in Figure 4.13 is profile for Participant N.

Figure 4.13. Stages of Concern profile for participant N.



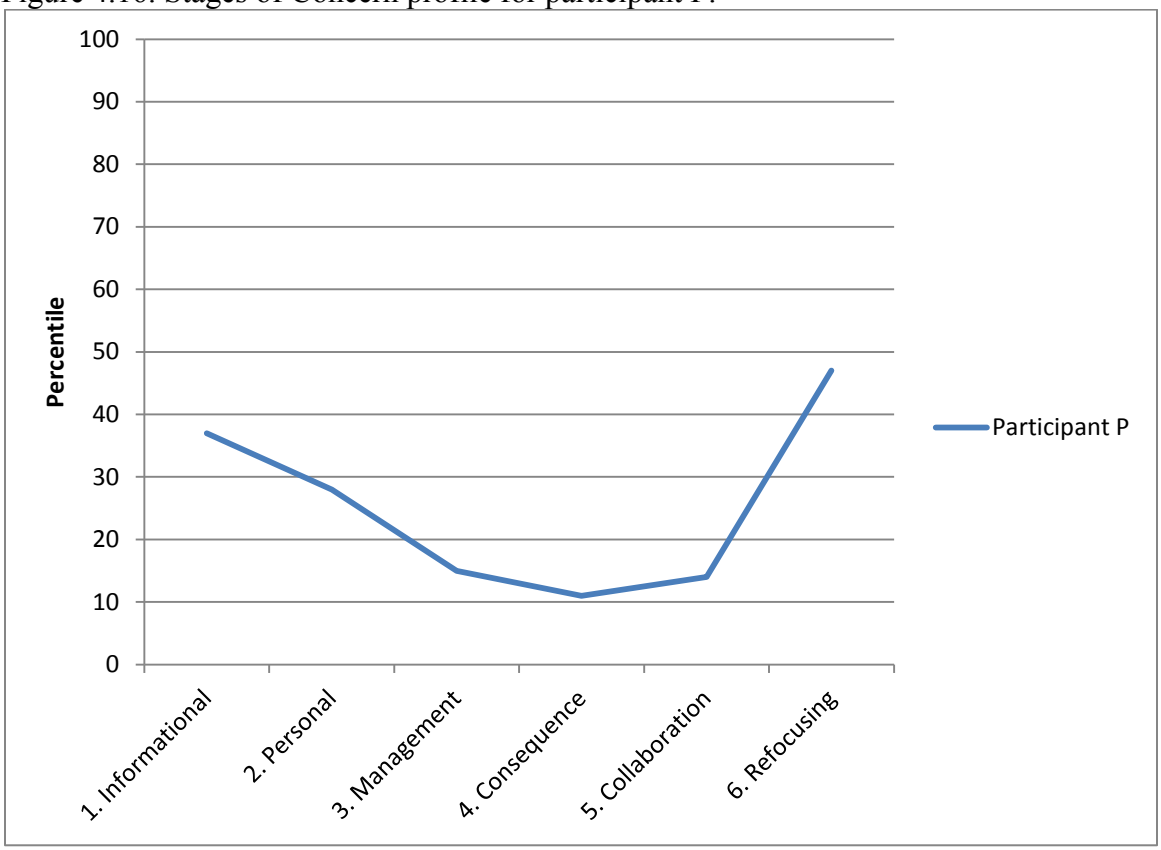
Illustrated in Figure 4.11 is the SoC profile for Participant O, an elementary librarian and library skills teacher who participated in SAI in 2009. Participant O has a bachelor's degree and has been teaching at the present elementary school for 11 years. The highest stage of concern for this self-reported novice user was tied between *informational* and *collaboration* with an intensity score of 48%.

Figure 4.15. Stages of Concern profile for participant O.



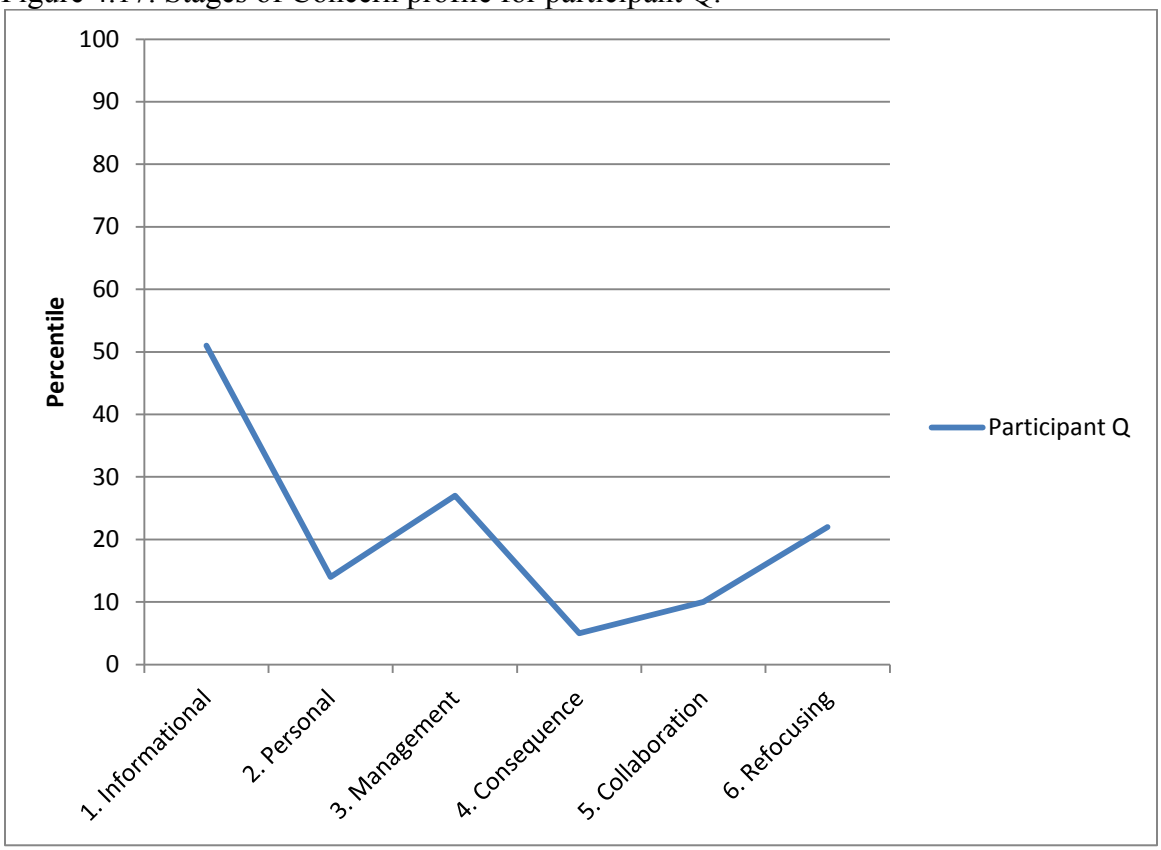
Illustrated in Figure 4.16 is the SoC profile for Participant P, a high school science teacher who participated in SAI in 2010. Participant P has a master's degree and has been teaching at the present high school for 7 years. The peak score for this self-reported intermediate user was *refocusing* with an intensity score of 47%. The secondary peak is *informational* with an intensity score of 37%.

Figure 4.16. Stages of Concern profile for participant P.



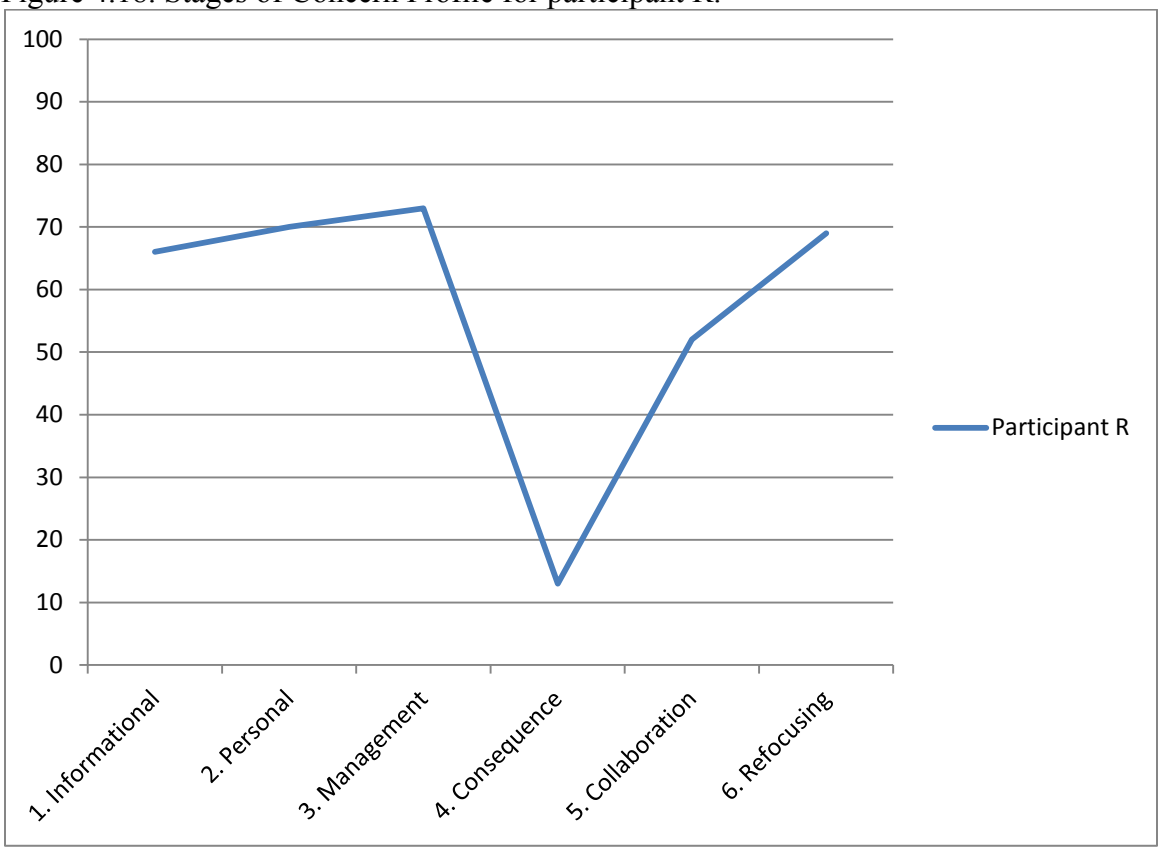
Participant Q is a full-time elementary teacher who teaches all core subjects in a kindergarten classroom. She earned her master's degree and has been teaching at the present elementary school for 5 years. The highest stage of concern for this self-reported intermediate user and 2009 participant in SAI was *informational* with relative intensity score in the 51st percentile. Her secondary peak score was *management* with a 27% relative intensity score. Shown in Figure 4.17 is the profile for Participant Q.

Figure 4.17. Stages of Concern profile for participant Q.



Participant R is a full-time elementary teacher who teaches Mathematics, Social Studies, and English in a fourth grade classroom. She earned her bachelor's degree and has been teaching at the present elementary school for 30 years. The highest stage of concern for this self-reported intermediate user and 2009 participant in SAI was *management* with relative intensity score in the 73rd percentile. Her secondary peak score was *personal* with a 70% relative intensity score. Shown in Figure 4.18 is profile for Participant R.

Figure 4.18. Stages of Concern Profile for participant R.



An aggregated report of data across all participants is shown in Table 4.2. The table shows the frequency highest stage of concern for each of the participants. It should be noted three of the participants had tied scores for their peak stage of concern.

Table 4.2. Frequency of highest stage of concern for individual users of the innovation.

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Nonusers	1	0	0	0	0	1
Novice	2	1	3	0	2	0
Intermediate	4	0	2	0	0	1
Old hand	0	0	1	0	0	0

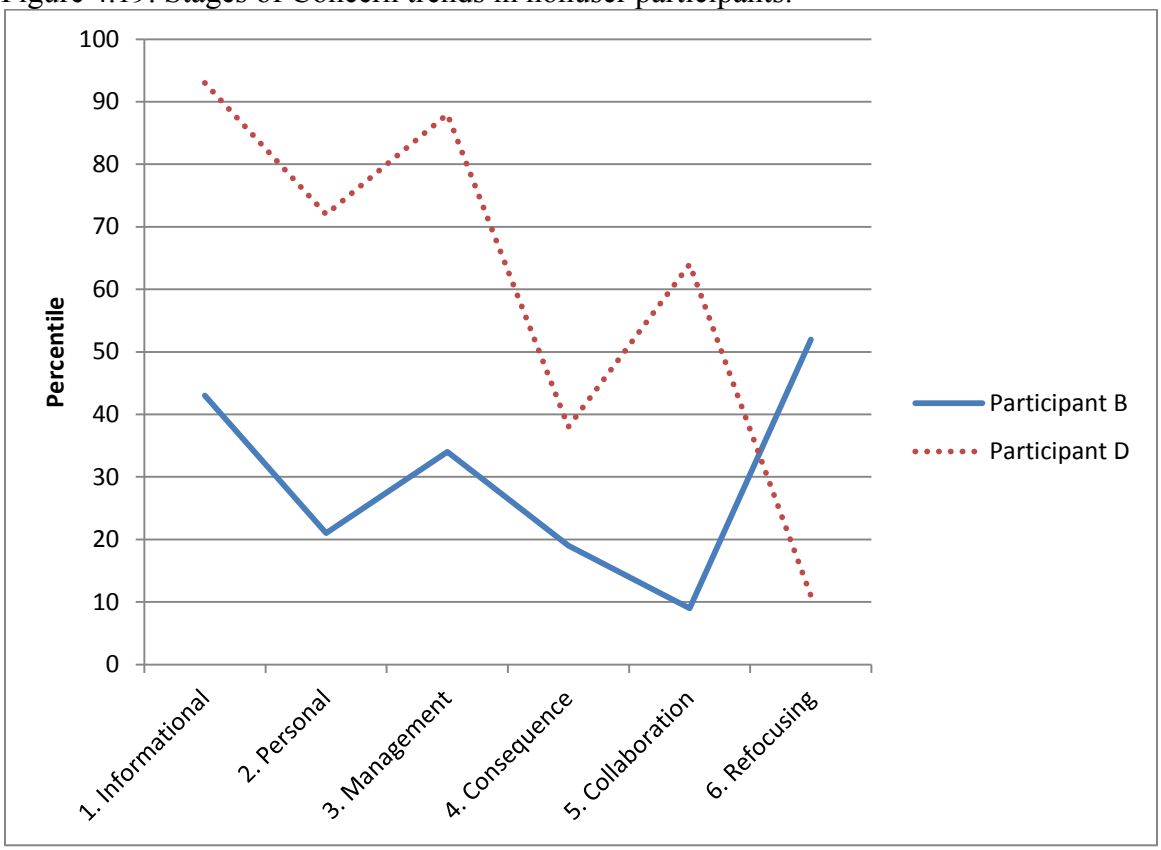
n = 17

Trends in SoC profiles

No trend can be seen in the two nonuser participants, Figure 4.19. However, there are important differences between the two profiles. Participant B has a relatively low *informational* intensity score and a spike in the *refocusing* stage of concern. The opposite appears with participant D, a relatively high intensity score in the *informational* concern with a dramatic drop in the *refocusing* stage. It appears participant D desires more information about using agriculture as a context for teaching and with coaching could become a user of the innovation. On the other hand, participant B does not have high concerns in the *informational* stage but has high concerns in the *refocusing* stage. This is an indication that participant B has found a different method of teaching believed to be better than the innovation described in this study.

A definite trend existed between the novice users of the innovation. Figure 4.20, illustrates that the seven novice users had relatively high *management* concerns, low *consequence* concerns, and a rise in *collaboration* concerns. This trend is interesting insofar as it differentiates from the natural progression outlined by Hall and Hord (2006). The developers of the model suggest an inexperienced user would have higher concerns in the *personal* and *management* stages and concerns for *collaboration* and *refocusing* would be relatively lower. Interviews of the participants should be able to explain the trend developing with the novice users of the innovation.

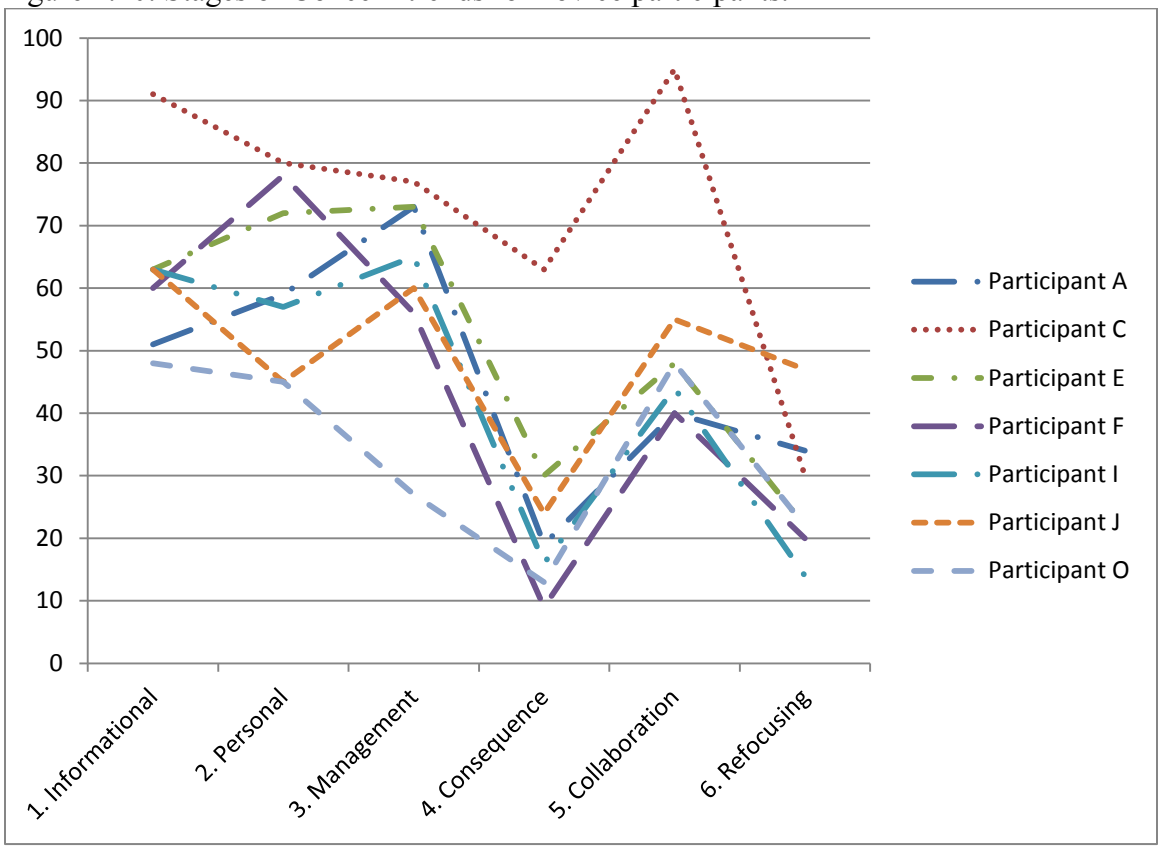
Figure 4.19. Stages of Concern trends in nonuser participants.



Amongst the intermediate users of the innovation, it is clear there is a trend with four of the participants (Figure 4.21). Participant H, Participant M, Participant N, and Participant R have almost identical SoC profiles. The participants experienced high *informational* concerns with a drop in *personal* concerns and a spike in *management* concerns. These four users also had the same low *consequences* concerns with a high *collaboration* stage score which appears amongst the novice users. The profile for Participant Q is similar in shape, however is much lower in relative intensity. The other two profiles are interesting. The profile for participant G is more reminiscent of a

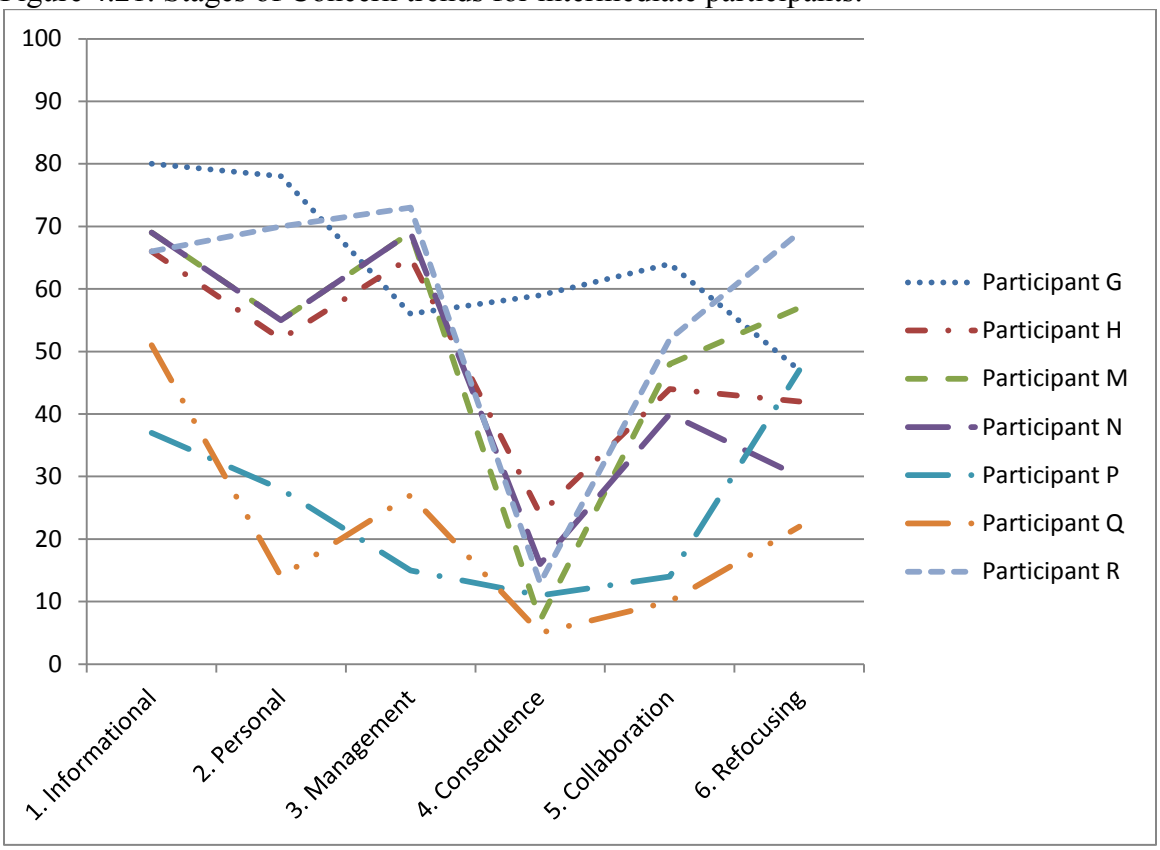
nonuser profile. The profile for participant P shows that the teacher is beginning to adapt the innovation in his classroom.

Figure 4.20. Stages of Concern trends for novice participants.



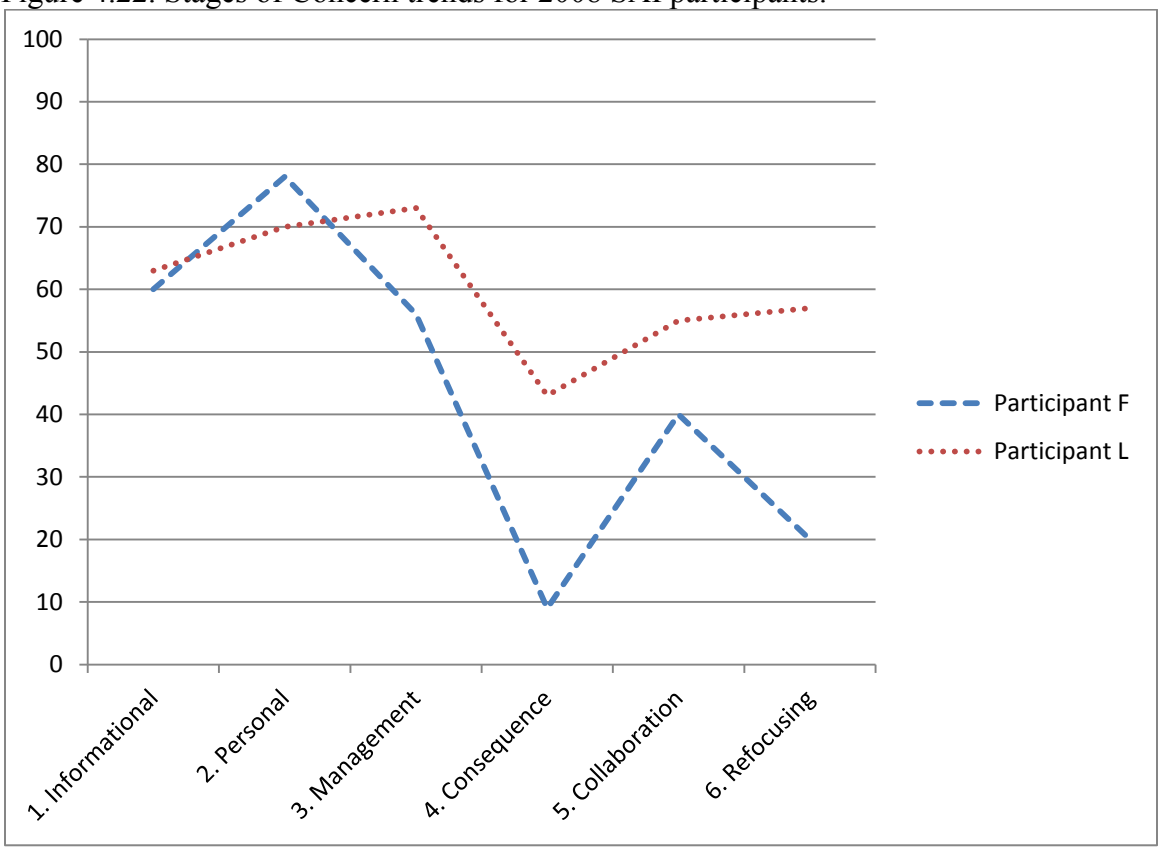
Due to the lack of self-reported "old hand" users, no trend analysis was conducted for this group. Only one user considered themselves to be an old hand at using agriculture as a context for teaching. To further examine this group, refer back to the analysis of participant L on page 78. The peak score was *management* with an intensity score of 73%. The secondary peak was *personal* with an intensity score of 70%.

Figure 4.21. Stages of Concern trends for intermediate participants.



According to the literature, concerns change over time. As a teacher progresses through the implementation process, one would expect to see a shift from egocentric concerns toward more impact related concerns. Following is the examination of the SoC based upon the year the individual participated in SAI. In Figure 4.22 and Figure 4.23 no definite trends exist for participants based upon the year they participated in SAI. The two 2008 participants both show a drop in *consequence* concerns.

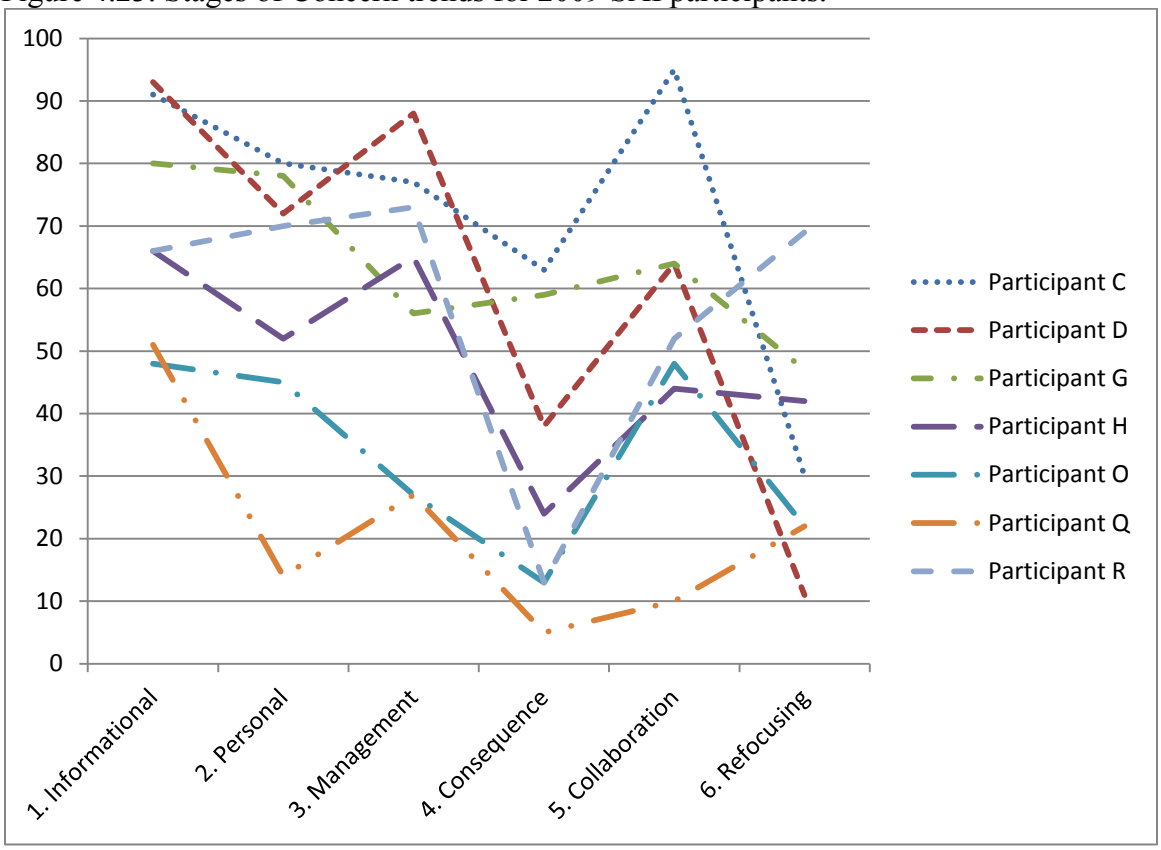
Figure 4.22. Stages of Concern trends for 2008 SAI participants.



The concerns for the 2009 participants were scattered. No trends exist in the data for this group of participants. The data shows a wide spread of concerns for the 2009 participants. On the other hand, the data for the 2010 participants shows a definite trend. Six out of the eight 2010 respondents show an almost identical profile score. The same trend as discussed earlier with the novice and intermediate users was also prevalent amongst the 2010 participants. Once again, the data showed a spike in *management* concerns with low *consequence* score with another peak in the *collaboration* stage.

However, it is important to note, 7 of the 8 participants from the 2010 Summer Agriculture Institute were also self-rated novice and intermediate users.

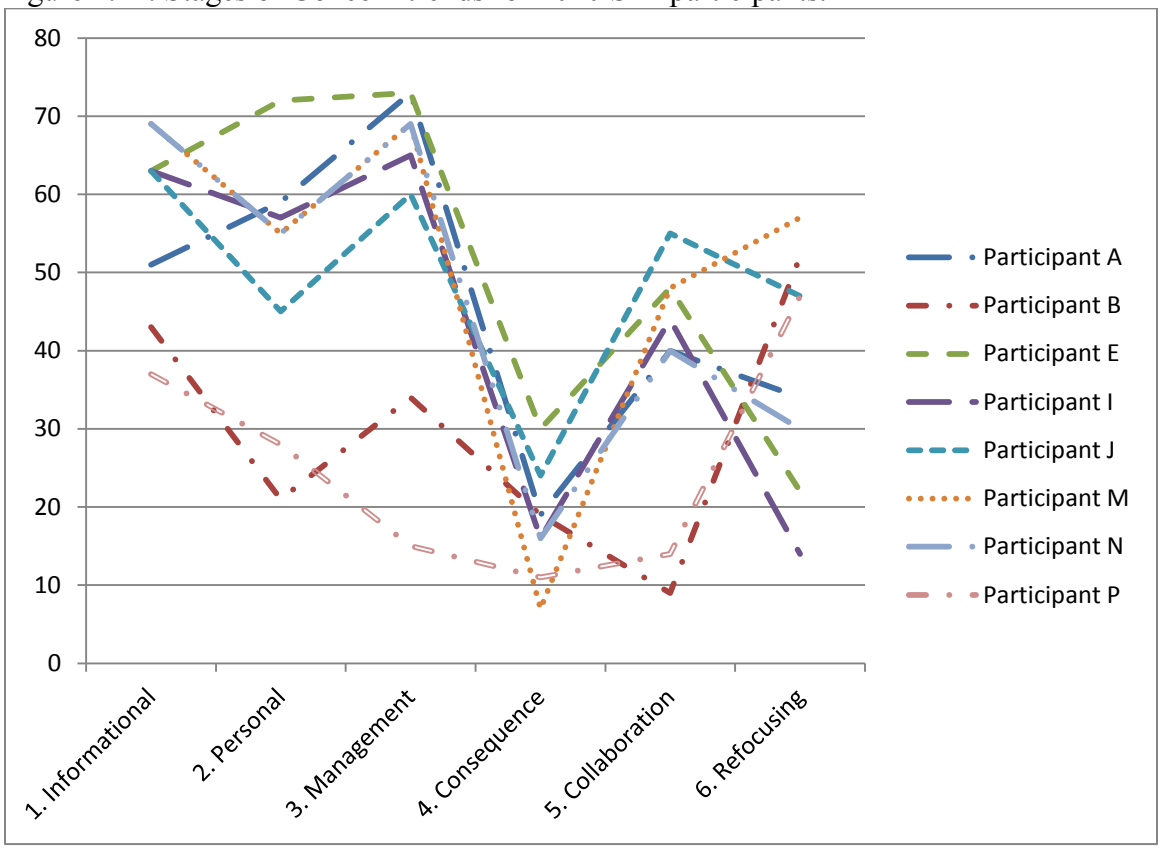
Figure 4.23. Stages of Concern trends for 2009 SAI participants.



Participants grouped by year, the respondent participated in Summer Agriculture Institute, were not adequate groupings for analyzing trends. This corresponds with the assumptions of this study. In Chapter 1, it was stated that change is a highly personal experience and that educational change is not a single event. All teachers are going to progress through the implementation process at a different rate. It is evident the amount

of time since completing SAI was not a good indicator of the progress through the implementation process.

Figure 4.24. Stages of Concern trends for 2010 SAI participants.



Stages of Concern Interviews

Five participants were selected, based on their profiles and demographics, to be interviewed to obtain a better understanding of the stages of concern questionnaire data. Participant F and Participant N were both selected for interviews based on grade level and subject. Both teachers are elementary teachers who were responsible for all core

subjects. The other three participants were all high school teachers and were selected on the basis of subject matter. Participant L was a 2008 SAI participant and was a family and consumer sciences teacher. Participant P was a high school science teacher and Participant A was a multiple subject teacher, responsible for both mathematics and science.

Each of the participants were asked about their concerns with using agriculture as a context for teaching. This line of questioning was intended to gather information to support the participants' profile scores. Participant F was an elementary teacher and novice user of the innovation. Reponses to the questions supported the primary (*personal*) and secondary (*informational*) peak scores. Data suggested the teacher is continually concerned about having accurate agricultural information for her students.

> *I'm always trying to make sure that the information that I'm giving them is accurate for current time, you know? Like 2008 it was this, but maybe 2011 it's a little bit different and numbers changed… And so I just want to make sure that my information is accurate and that I have lesson plans that are meaty.*

Be it noted, participant F just finished a battle with cancer and is still recovering from the chemotherapy. This was not recorded in the interview conversation, but was mentioned prior to the interview. The researcher believes that the SoC questionnaire's sensitivity has picked up on the participant's *personal* concerns.

Responses throughout the interview also help describe the spike in *collaboration* concerns amongst many of the participants. Participant F expressed her concerns for having a source where teachers could collaborate with other past SAI participants.

> *You know what would have really nice…a way to share lessons. Like if you have been through SAI and to create a web ring or something where you can submit lessons, like we had to submit a lesson to get credit at the end, to be able to get a copy for all of those lessons and to let people continually put in new lessons*

The interview with Participant N also supported the findings from the SoC questionnaire. The SoC profile for Participant N showed high concerns in the *informational* and *management* stages. During the interview Participant N, expressed her concerns with the management of using agriculture as a context for teaching.

> *The biggest [concern] is just the time and the materials to organize it*
>
> *We've wanted to do a garden but because of our water situation. It's not possible at this point, unless we have to have some kind of catchment system, but the current water well would not support any kind of garden.*

Neither of the two elementary school teachers mentioned any concerns regarding the use of agriculture as a context for teaching and the consequences such curriculum has on their students. The data suggested each of the participants viewed the use of agriculture as beneficial for their students.

> *It is part of our charter to teach kids about the place we live in and the way people live in this area and the farms are a big part of it. Agriculture is a big part of it*. (Participant N)
>
> *I want them to realize what a huge part of Oregon economy is agriculture because a lot these kids are 4-H kids and we are kind of out here and rural. And*

> *so some of them have a fairly good grip on it and other kids have no idea, and so I want to realize how big agriculture is in Oregon.* (Participant F)

The Stages of Concern profile for Participant A, showed a primary peak score in *management* with a secondary peak score in the *personal* stage. The interview data supported and provided a different view of the profile for this participant. Participant A was a teacher at a charter school for at-risk high school students. Her classroom was a combination of all high school grade levels, the age of the students ranged from 15 to 26 years old. Participant A did not run a normal classroom. The students either completed packets or were engaged in an online learning environment. Participant A wanted to use agriculture as a way to tie in the curriculum with the surroundings of the students.

> *Because of the type of program this is, I don't write lesson plans, so when I integrate something into it, I just grab something.*

However, due to the nature of her classroom it became difficult at times.

> *It's harder for me to integrate things, unless I grab a group of kids because everybody is doing something different*

Inside the classroom it became difficult to manage a lesson with an agricultural context because the students were at different points in the curriculum.

The interviews also pieced out information that did not support the findings from the Stages of Concern Questionnaire. Participant A scored relatively low in the

consequences stage, after analyzing the interview data it became apparent that Participant A was concerned about her students' understanding of agriculture.

> *This [wool] is an Oregon product, and then…we go through the whole thing [spinning]. And they have no understanding that it goes from this to something on your back. That's been a kind of interesting journey teaching them about [raw animal products].*

Participant A also had concerns about the impact her teaching had on her students. She expressed the importance of her students understanding where their food and fiber originated.

> *So it is important for them to understand that agriculture is where all of this stuff comes from and because of the other program [school garden] that we have at the school.*

Participant L had a peak score of *management* and secondary peak score of *personal* concerns. The profile scores for participant L were not reflected in the interview data. The concerns expressed in the interview reflected the *consequence* stage of concern. The teacher was concerned the impact her teaching had on her students understanding of the agricultural industry.

> *My biggest concern is that they [students] get a realistic understanding of agriculture and how products are produced and the challenges that farmers and ranchers face.*

This concern for students' understanding of the agricultural industry could be linked to the background of the teacher. Participant L grew up on a ranch and has a personal connection to the industry.

> *Well, for me, it [the use of agriculture as a context for teaching] means a lot because that is the roots of my family.*

Results from the SoC questionnaire indicated participant P had relatively low concerns across the board. For this high school science teacher, his two highest stages of concern were *refocusing* and *informational*. The interview data could support the relatively low concerns for participant P.

> *Concerns. No major concerns. I mean just in general biology I use an example all the time as a tie in to us humans and then all of its [agriculture] ties into the natural environment and the ecology.*

This supports the relatively low scores for the stages of concern for participant P. Interview data revealed he used his past experiences and personal relationships with agriculturalists to gain more information about agriculture. It would appear participant P uses agriculture as a context for teaching well in his classroom.

> *Biology is all about living things and agriculture is about living things. It's a direct tie in.*

Data from the interviews supported the stages of concern profiles for the participants. The interviews may have also shed some light onto the trends found in the Stages of Concern Questionnaire data.

Research Question 3: Innovation Configuration Map Development

In accordance with the guidelines put forth by Hall and Hord (1984) an innovation configuration map was developed for use with Summer Agriculture Institute and other like programs. The first step in identifying innovation configurations was to determine the innovation components in collaboration with developers and facilitators of SAI. Based on Summer Agriculture Institute, the developers and facilitators identified 6 components to successful use of agriculture as a context for teaching: balanced coverage of the agricultural literacy concept areas, accurate agricultural content, integration of agriculture with existing curriculum, hands-on activities, positive perceptions of agriculture, and interaction with local agricultural professionals. Based on the literature review, the researcher also added balanced coverage of the agricultural literacy concept areas.

Based on the components of using agriculture as a context for teaching, the team consisting of the developers, facilitators, and researcher, developed the ideal, acceptable, and unacceptable variations of the components. The panel agreed with four levels of demarcation for each of the component areas. Table 4.3 shows each of the component areas and the possible variations. It is important to note the use of different lines in the table. Everything to the left of the dashed lines represents variations which were deemed unacceptable. Variations in between the dashed and double line represent the acceptable

level, whereas variations to the right of the double line were for ideal variations of the components.

The innovation configuration map was given to two teachers who participated in Summer Agriculture Institute in 2008 and the teachers were asked to compare the components listed with what they took away from SAI and their use of agriculture as a context for teaching. Participant F noted the distinction between the acceptable and ideal variations of the integration component were not clearly defined.

> *I think these [variations of integrations, levels C and D] are very close. Throughout a lesson tied to academic standards and multiple.*

The variation was further defined to note the difference between the two variations. The tertiary level was changed to, agriculture is integrated as a context throughout a single academic lesson. Participant L also examined the innovation configuration map during her interview. After explanation of the instrument and how it is used, participant L agreed with the components and variations.

Table 4.3. Innovation components and variations.

	(A)	(B)	(C)	(D)
Accurate agricultural content	Do not use agricultural content	Teacher uses some examples from SAI	Teacher adequately uses content from SAI	Teacher has moved beyond what was taught in SAI
Integration of agriculture w/ curriculum	No integration of agriculture with existing curriculum	Stand alone agricultural lessons	Agriculture is integrated as a context throughout a lesson tied to academic standards	Agriculture is used as a context for multiple lessons/units of instruction; all tied to academic standards.
Hands-on activities	No hands-on agricultural activities	A few hands-on agricultural activities are used	Most lessons with agriculture have hands-on activities	All lessons using agriculture have a hands-on component
Teachers perception of agriculture	Teacher has a negative perception of agriculture	Teacher has a somewhat positive perception of agriculture	Teacher has a positive perception of agriculture	Teacher communicates agriculture in a positive manner with students
Interaction w/ local agricultural professionals	No teacher interaction with local agricultural professionals	Teacher brings personal examples of interaction with agricultural professionals	Local agricultural professionals are invited into classroom; interaction with students	Students visit agricultural professionals on location

Research Question 4: Innovation Configurations

All five of the purposively selected individuals were users of the innovation. The transcripts from all interviews were analyzed in combination with the innovation

configuration map to classify each of the participants' use of agriculture as a context for teaching.

Analysis of the interview data revealed the participants' coverage of the agricultural literacy concept areas. Each of the participants was asked which topic areas were covered when they used agriculture as a context for teaching. Table 4.4 shows the distribution of the content throughout the curriculum for each of the participants. Be it noted that the responses from the teachers ranged from mentioning the concept area to full units of instruction.

Table 4.4. Participants' coverage of agricultural literacy concept areas.

Concept Area	Participant A	Participant F	Participant L	Participant N	Participant P
Plant/Animal Production	x	x	x	x	x
Processing, Marketing, and Distribution	x	x	x	x	
Global Significance		x	x	x	x
Societal Impact	x		x	x	x
Economic Impact			x	x	
Relationship with Environment	x	x	x	x	x
Public Policy			x		x

The use of agriculture as a context for teaching took on different forms in each of the teachers' classrooms. The innovation configuration map components and variations were cross-examined with the participants' interview transcripts. The interviews were

coded for components and then further examined for classification as ideal, acceptable, and unacceptable use. Table 4.5 shows the distribution of participants' variations within each of the components for using agriculture as a context for teaching.

Table 4.5. Distribution of participants' variations of the innovation.

	Unacceptable	Acceptable	Ideal
Accurate agricultural content	0	0	5
Integration of agricultural contexts with curriculum	0	1	4
Hands-on activities	0	4	1
Teachers perception of agriculture	0	0	5
Interaction with local agricultural professionals	0	2	3

Accurate agricultural content.

All five of the purposively selected interviews provided supporting statements to classify them as ideal variations of accurate agricultural content. Three of the five participants provided statements that classified them as moving beyond the content of SAI. Participant F used the history and development of the agricultural industry to convey the importance of agriculture in the Willamette Valley and how this has impacted the consumers' choice in food.

> *I was just doing a sustainability piece talking about the Willamette Valley being incredibly sustainable. Just trying to help them understand what it means and the impact that it has to bring products from all over and how it's changed over the years from when I was a kid. Like, there used to be two kinds of apples, and now there are fifty two different varieties and part of that has to do with just the breeding of apples if that is the right word.*

Participant F is also adequately using the materials from SAI. One of the seminars during SAI was wheat production and the different uses of wheat products.

> *When I do a base unit for like my Culinary I class, I start with baking and wheat. So we talk about wheat production in Oregon and the Northwest compared to the Midwest and the different types of wheat and having them both and the protein factor and still I guess that's for the younger class. The biggest link is the wheat and we talk about other wheat products and their roles.*

Participant N also demonstrated an ideal variation in the accurate agricultural content component

> *We are in rural Corvallis among farms so it is part of our charter to teach kids about the place we live in and the way people live in this area and the farms are a big part of it. Agriculture is a big part of it.*

> *For my 1st grade math; I always do the farm unit…It takes a full month to do. So I at least do that every year…then depending on what's going on, and there is usually something that relates. This year we did some pumpkins things and a few things here and there. We just [had a] pumpkin patch, but we also did a big sort of day about pumpkin things.*

Participant N has been using the surrounding farms to assist her in teaching her curriculum as well promoting new food products to the students. The school district started a tasting table program, where once a month a local producer donates products to the schools for the students to try.

> *Every month there is a product from a local farm that gets brought to school and there are volunteers that prepare it and get to taste whatever it is. This is what we've had this year; corn, apples, black beans, mushrooms, winter squash, turnips, carrots, …spinach and rhubarb.*

Participant P was also rated as ideal for the use of accurate agricultural content. This participant brought agricultural examples into his biology class. Most of the

examples extend beyond the scope of SAI. He indicated that he enjoyed letting the students use controversial agricultural topics to develop debates.

> We look at Jared Diamond stuff about collapse which of course ties into agriculture. At some point, we tie into agriculture about our food system, which one kind of depends, but we look at, again, looking at our effects on the environment and food comes into it. We usually have some debates about vegetarians and non-vegetarians, food and where it comes from.

Participant P also indicated that he had concerns about the accurateness of the agricultural content he uses. He utilized his personal experiences with SAI, an internship on an organic farm, as well as the Oregon State University Cooperative Extension Service for information.

Participant A and participant F were both rated ideal for their variations of the innovation, however when looking at the data both participants were not moving beyond the information taught in SAI. Observations of participant A showed the teachers' use of the hydroponics kit made during SAI. However, the teacher had just begun using the kit for the first time. Additionally, participant A had just recently tried the lesson she created for SAI in which the students made bread using different types of flour followed by students conducting a taste test of the different flours used.

> *My final project I wrote a thing about trying three types of bread, one with wheat flour, one with white flour, and one with bread flour just to see which one people like the best, and frankly it turned out that they pretty much the same… I made up forms and we had a, b, and c, and then they taste tested for texture and taste and for color. There was no definitive answer. It didn't seem to matter what type of flour was used.*

However, the school did have an extensive garden, greenhouse, and orchard. Participant A did not utilize the garden for her instruction. However, her students were able to utilize the garden space for lessons with other teachers in the school.

Participant F only used the information from SAI in her two-month agricultural unit.

> I don't really have time as a teacher that teaches six subjects to search all over the place for information and lesson plans stuff… I bring in the agriculture update thing from the newspaper so the kids can see that it is part of our community and you know most everything that I have is from the SAI trip.

As part of the classroom observation for participant F, the researcher noted the curriculum binder for the farm unit contained the participant's notebook and other resources from SAI.

Integration of agricultural contexts with curriculum.

Four out of the five participants had ideal variations of the integration of agricultural contexts with curriculum. These participants used agriculture throughout their curriculum or as a theme for a unit of instruction. Participant F had a farms unit that was tied to academic standards. Similarly, participant N had a math unit with an agriculture theme throughout. Participant L and P both used agricultural contexts throughout their courses, whenever possible.

The variation for participant A was acceptable. This participant used a lot of agricultural lessons; however each were stand alone lessons. Due to the nature of participant A's classroom, she was unable to incorporate agriculture into the premade lessons. She would pull a group of students together to teach them about agriculture and other life skills.

Hands-on activities.

Two of the participants, A and L, had ideal variations of the hands-on activities component to using agricultural contexts for teaching. Each of the stand-alone lessons for participant A included hands-on activities. Examples of past lessons include canning jams, spinning wool, and dehydrating produce. Participant L was a family and consumer science teacher. She indicated that all of her lessons had some hands-on component.

Three of the participants all had acceptable variations of the hands-on component. The data from the interview transcripts revealed a great variance in the amount of hands-on activities used by each of the participants.

> *Most of my lessons are hands-on activity components, leaning towards all lessons I would say 80% of them had a hands-on component (Participant F).*

On the opposite end of the spectrum, participant P indicated the agricultural examples were mentioned in his biology class, however not all of the examples had a hands-on activity associated with the lesson. Participant P also had a horticulture class, which used

many hands-on agricultural activities. Participant N had a few hands-on activities associated with the agricultural context.

> When we did pumpkins, we did weighing and measuring and went to the pumpkin patch... They [students] do potato trials every year. They grow peas and corn in planter boxes, and measured them and watched them grow.

Teachers' perception of agriculture.

All participants indicated that they had a positive perception of agriculture. Additionally, they stated when teaching, they always conveyed a positive image of the agricultural industry to the students. All participants were categorized in the ideal variation of the perception component.

Interaction with local agricultural professionals.

Three out of the five participants had ideal variations with their interactions with local agricultural professionals. Each of these teachers were able to conduct field trips with their students to local farms or other agricultural operations. Participants F and N were able to take their elementary students to local farms. Participant F visited one of the farms, which was part of the Summer Agriculture Institute tours. Whereas, participant N went to the farms that were within walking distance from the school.

Participant P brought his horticulture students to Oregon State University for a tour of the horticulture department facilities. While on campus, the students met with researchers to discuss vermicomposting and its impact on the environment and soil conditions.

The other two teachers cited the funding issues surrounding field trips. However, the participants also indicated their desire to have that component in their curriculum. Participant L wanted to know the local producers who would be willing to come to the school and speak to the students

> *...would any of the people that we visited and talked with, if any of them were willing to become speakers? You know to be able to travel and how far they are willing to travel and what kind of time length would they need, having these kinds of people speak would be cool.*

Participant A, also did not utilize local agricultural producers in her classroom. However, the students were able to interact with local agricultural producers in other programs throughout the school. The students who help with the garden also get a chance to be on the producer side and sell their produce at the local farmer's market.

Summary

This study produced two types of data. The first set of data was the Stages of Concern Questionnaire. The survey instrument was designed to measure and describe teachers' concerns toward an innovation (Hall & Hord, 1984). Data from the surveys

were collected and transformed into profiles of each of the participants. Profiles were analyzed in accordance to the procedures defined in Chapter 3.

Along with the SoC profiles, the study also contained interview data from five of the participants. The first part of the interview was designed to piece out information regarding the SoC profiles. Interviewees were asked to elaborate on their concerns regarding the use of agriculture as a context for teaching. These data were used to confirm the profile analysis from the SoC questionnaire as well as potentially explain the trends seen in profiles.

The study also produced qualitative data that revealed the diverse innovation configurations of five of the participating teachers. Interview transcripts were analyzed and coded for the components of using agriculture as a context for teaching; accurate agricultural knowledge, integration of agricultural contexts with curriculum, hands-on activities, teachers' perception of agriculture, and interaction with local agricultural producers. Each coded item was them analyzed for ideal, acceptable and unacceptable variations.

CHAPTER 5

SUMMARY OF FINDINGS, DISCUSSION, AND CONCLUSIONS

The purpose of this posthoc study was to determine the concerns of past participants of the Summer Agriculture Institute regarding the use of agriculture as a context for teaching and to determine how they implement the innovation. The study used the Concerns-Based Adoption Model as a theoretical framework, which resulted in proposed action to increase the effectiveness of agricultural literacy treatments similar to Summer Agriculture Institute. This study had two overarching objectives: To determine teachers' concerns about using agriculture as a context for teaching and to clarify how teachers are using agriculture as a context for teaching.

Research Questions

The following are the research questions used to guide this study:

1. What are the demographic characteristics of past participants of Summer Agriculture Institute?
2. What are the concerns of teachers regarding the use of agriculture as a context for teaching their curriculum?
3. How can teachers use agriculture as a context for teaching in their classrooms?
4. What does the innovation look like when it is in use?

Methods

The guiding research questions were addressed via an integrated method of the Stages of Concern Questionnaire and participant interviews. The target populations for this study was all teachers who enrolled in Summer Agriculture Institute between 2008 and 2010 (n = 72). The initial mailing resulted in 9 email addresses being bounced back to the sender, thus resulting in a useable frame of 63 participants. After the Stages of Concern Questionnaire, 18 surveys were returned complete (28.6% response rate). From the respondents, a purposive sample of 5 teachers was selected based on self-reported concerns, grade level, and subjects taught. The purposive sample was interviewed to garner data regarding teachers' concerns and use of agriculture as a context for teaching.

Summary of Findings

The findings of this study were summarized using the research questions as a guide.

Demographics

The first research question sought to describe the demographics of the research participants. Demographic results indicated the accessible population was made up of 88% female respondents (n = 15) with an average of just over 11 years of teaching at the present school. Twelve of the respondents taught at the elementary level. The

participants were asked to self-rate their expertise regarding the use of agriculture as a context for teaching, two reported to be nonusers, 7 novice users, 7 intermediate users, and 1 old hand user.

Stages of Concern

This research question sought to describe the teachers' current stages of concern in connection with using agriculture as a context for teaching. All research participants were asked to complete the Stages of Concern Questionnaire. Survey data were analyzed using the Stages of Concern quick scoring device (2001). Following the survey, a purposive sample of participants were selected for interviews. The first portion of the interview was intended to further explain the concerns of the teachers.

Individual peak stages of concern with relative intensity were identified for each participating teacher. As a group, 7 teachers registered in the *informational* stage, 1 in the *personal* stage, 6 in the *management* stage, 0 in the *consequence* stage, 2 in the *collaboration* stage, and 2 in the *refocusing* stage.

Trends were also analyzed based on the demographic data. Participants were first grouped by self-reported level of expertise. A trend existed between the novice users of the innovation. The profile scores illustrated a high *management* concerns, low *consequence* concerns, with a spike in *collaboration* concerns. A similar trend was also found with a portion of the intermediate users. Research participants were also grouped

based on the year they participated in Summer Agriculture Institute. The groups based on year participated did not show trends as focused as the expertise level.

Additionally, interviews of the 5 purposively selected participants were analyzed for stages of concern. Interview data supported the profile scores for each of the participants. Also, the data shed some light on the trends found in the stages of concern questionnaire data.

Innovation Configurations

This study sought to develop an innovation configuration map which delineated the vital components and variations for the implementation of using agriculture as a context for teaching. In accordance with the procedures outlined in Chapter 3, the researcher met with the developers and facilitators of SAI to develop the essential components: (1) balanced coverage of agricultural literacy concept areas, (2) accurate agricultural content, (3) integration of agriculture with curriculum, (4) hands-on activities, (5) teachers perception of agriculture, and (6) interaction with local agricultural professionals. Descriptors were added to each of the components to identify ideal, acceptable, and unacceptable variations of the use of agriculture as a context for teaching.

Interviews with the 2008 SAI participants were used to further examine the innovation configuration map. Minor adjustments were made to the map after interviews

with the participants. A unanimous approval of the final IC map was obtained and subsequently used to determine the variations between the purposively selected sample.

The transcripts from all interviews were analyzed in combination with the finalized innovation configuration map to classify each of the participants' use of agriculture as a context for teaching. All 5 of the participants were self-rated users of the innovation and therefore were able to provide detailed information regarding the use of agriculture as a context for teaching. Each of the participants covered at least four of the agricultural literacy concept areas. Only one teacher indicated the coverage off all concept areas. Public policy and economic impact were the two areas with the least amount of coverage with two participants; whereas, plant and animal production was covered by all five interviewees.

All five participants had ideal variations of accurate agricultural content. Each of the participants was seeking reputable sources for more information regarding agricultural content. Many of the participants cited Agriculture in the Classroom as a primary source for information.

With respect to the integration of agricultural contexts with the curriculum, four out of the five scored in the ideal variations. However, one teacher only used agriculture as a stand-alone unit of instruction separate from the intended curriculum. The other four

teachers were tying all agricultural contexts to the intended curriculum and the state standards.

Only one user scored an ideal variation within the hands-on component of the innovation. Due to the nature of the participant's curriculum, each lesson had a hands-on component regardless of the use of agriculture as a context. Four of the participants scored acceptable for their variations. Many had hands-on lessons but were not consistent throughout the curriculum.

All five teachers score with ideal variations of teachers' perception of agriculture. Each of the participants indicated they always conveyed a positive perception of the agricultural industry when using agriculture as a context for teaching.

Three of the five participants provided statements relative to the ideal variations with local agricultural professionals. The students in each of these classrooms were able to interact with a local agricultural professional either on a field trip or a farmer was brought into the classroom as a guest speaker. Two of the teachers indicated money was a severe issue with the district and field trips were very few and far between. Both teachers had past experiences in agriculture; either grew up on ranch or had an internship with an organic farm, and were able to bring their experiences into their classroom.

Conclusions

The conclusions of this study were based on the responses from teachers who participated in SAI between 2008 and 2010. Although other agricultural literacy treatments emphasize the use of agriculture as a context for teaching caution must be advised when generalizing the results beyond the population of this study. The following conclusions were drawn:

1. The sample used in this study does not accurately reflect the demographics of Oregon teachers nor does the sample adequately represent the population of SAI participants between 2008 and 2010.
2. Regardless of year of participation in Summer Agriculture Institute, teachers have expressed relatively high egocentric concerns toward the use of agriculture as a context for teaching.
3. Self-reported level of expertise presented better-defined trends in stages of concern profiles as when compared to groups based on year participated in Summer Agriculture Institute.
4. Novice users of the innovation had a defined trend consisting of high *management* concerns, low *consequence* concerns, and a rise in *collaboration* concerns.
5. When considering variations of the use of agriculture as a context for teaching, six components outlined by the developers, facilitators, and innovation users were (1) balanced coverage of agricultural literacy concept areas, (2) accurate agricultural knowledge, (3) integration of agricultural contexts with curriculum, (4) hands-on

activities, (5) teachers' perception of agriculture, and (6) interaction with local agricultural professionals.

6. All self-defined users of agriculture as a context for teaching employed a variation of the innovation consistent with the acceptable to ideal categories within each component of the innovation configuration.
7. Past participants of SAI hold positive perceptions of the agricultural industry and convey that image with their students.

Discussion and Implications

Conclusion: The sample used in this study does not accurately reflect the demographics of Oregon teachers nor does the sample adequately represent the population of SAI participants between 2008 and 2010.

According to the 2009-10 Oregon state report card (Oregon Department of Education, 2010), the workforce in education was comprised of 69.9 percent female teachers with an average of 12.7 years of teaching. The sample for this study was comprised of 88 percent females. With regards to gender distribution, the sample matches the targeted population. Between 2008 and 2010, 59 (82%) females participated in the program in comparison to 13 males.

Although the sample population closely aligns with the gender distribution of past Summer Agriculture Institute participants, the grade level representation does not. The target population consisted of 36 (50%) elementary teachers, 17 (24%) middle school

teachers, and 19 (26%) high school teachers. The sample population consisted of 12 (70.6%) elementary teachers and 5 (29.4%) high school teachers, no middle school teachers were represented in the study. Due to the differences in sample population to target population be it noted the remaining conclusions have been drawn from the sample and are not generalizable to the target population.

An interesting discussion point can be brought forth from the distribution of grade levels of the sample population. Many of the resources available on using agriculture as a context for teaching, have been developed for elementary students. Participant L commented that she occasionally used the Agriculture in Classroom website as a source for information on agriculture, but felt the site was geared primarily toward younger grades.

> *Ag in the classroom, I do look it up every once in awhile. They are really geared for the younger so they don't really fit.*

Did this study attract more elementary teachers, due to the ease of access of agricultural lessons and information geared toward their grade levels?

Conclusion: Regardless of year of participation in Summer Agriculture Institute, teachers have expressed relatively high egocentric concerns toward the use of agriculture as a context for teaching.

It was evident many of the respondents had high egocentric concerns, *informational*, *personal*, and *management*. This may be due to the nature of Summer Agriculture Institute. SAI is a week-long course about agriculture and its use as a context

for teaching. A majority of the time in the program is dedicated to understanding the diversity of the agricultural industry. Teachers were able to see a wide variety of farms and agribusinesses to get a better understanding of the vastness of the industry.

Throughout the six days of SAI, only 5 hours of instructional time was dedicated to teaching the participants on how to use agriculture as a context for teaching. In comparison to the amount of time spent on educating the teachers about agriculture, very little time is spent on using the information in the classroom. As a final assignment, all teachers must create a lesson using agriculture as a context for teaching. For the facilitators of the program, this is the only assessment to determine if a teacher understands how to adequately use agriculture as a context for teaching.

In order to alleviate the egocentric concerns of the past participants, more must be done to address how agriculture can be used as a context for teaching. It is important for the teachers to see the diversity of the agricultural industry. However if the teacher does not understand how to implement the innovation, they may terminate use. If educating teachers to be able to use agriculture as a context for teaching is a goal of the agricultural literacy movement, it is also vital teachers feel comfortable and confident to be able to implement the innovation in the classroom.

Conclusion: Self-reported level of expertise presented better-defined trends in stages of concern profiles as when compared to groups based on year participated in Summer Agriculture Institute.

When examining the trends in the stages of concerns profiles, defined trends existed amongst the self-reported level of expertise. The level of expertise seemed to be an accurate measurement to predict the participants' stages of concern. Whereas when participants were grouped according to year participated in SAI, no defined trends existed.

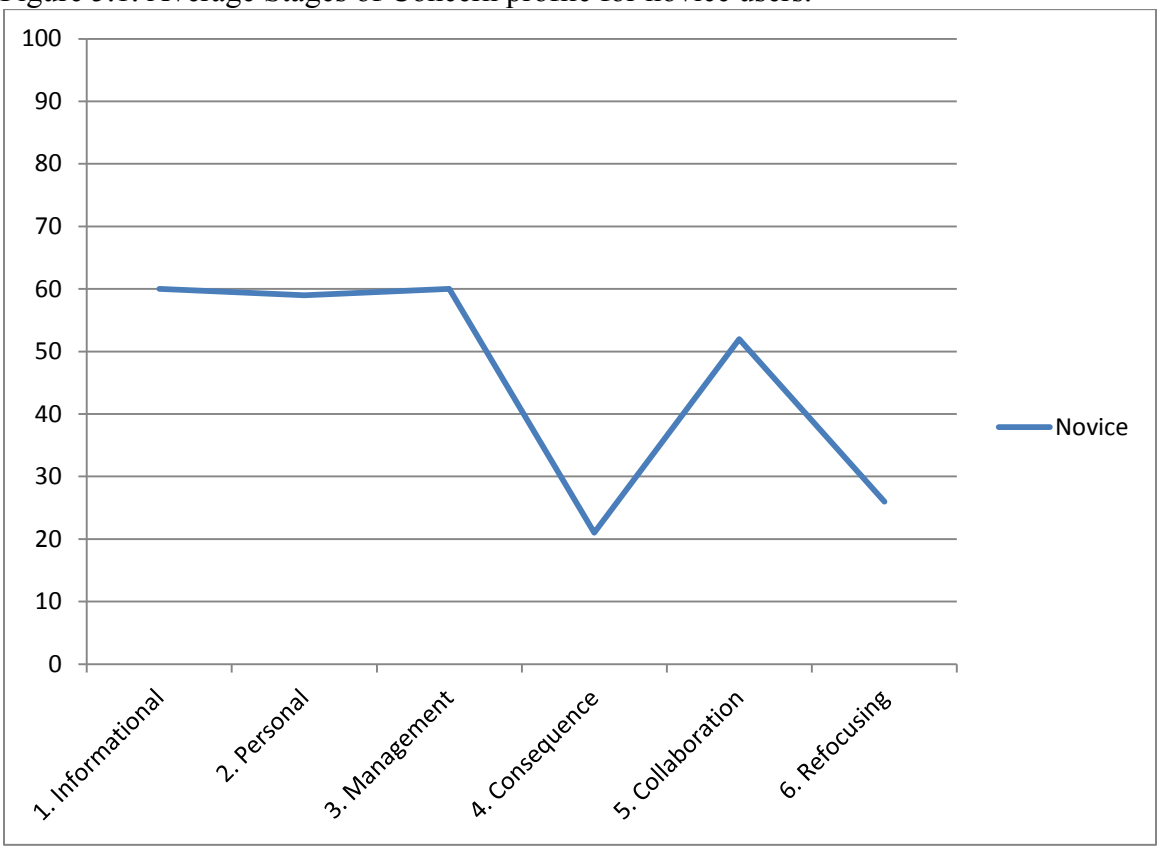
An assumption of the CBAM is that concerns shift over time (Hall & Hord, 2001; Anderson S. E., 1997). However, in this study there is a lack of evidence to suggest the participants concerns have shifted toward impact concerns over the course of the implementation. If this were present in the study, the data would have shown participants from 2008 and 2009 with higher impact concerns whereas the 2010 participants would have been higher in the egocentric concerns. This could be due to the lack of follow-up with the past participants. The project facilitator should follow-up with the participants to assist them in implementing the innovation in their classroom.

Conclusion: Novice users of the innovation had a defined trend consisting of high *management* concerns, low *consequence* concerns, and a rise in *collaboration* concerns.

This trend presents an interesting discussion point. The figure below illustrates the profile for the average novice user, utilizing the average raw score of users to form the profile. It shows the relatively higher egocentric scores mentioned earlier along with

the dip in *consequence* concerns and spike in *collaboration* concerns. This trend could have a couple of different interpretations. First, the low *consequence* scores could demonstrate the teachers' high positive perception of the use of agriculture as a context for teaching. Teachers' may not be concerned with the impact of the innovation on their students because they felt the innovation is beneficial and students should have an understanding of agriculture.

Figure 5.1. Average Stages of Concern profile for novice users.



However, looking at the profile as a whole tells a different story. Due to the high egocentric scores and the high *collaboration* scores, it appears the participants desire to know how other teachers are using the innovation. If the *informational* and *personal*

concerns were lower it would show a progression toward full implementation of the innovation. This could be associated with the amount of time spent during SAI on the use of agriculture as a context for teaching. Due to a limited amount of time during the program, options should be examined for post-SAI support of the teachers.

Conclusion: When considering variations of the use of agriculture as a context for teaching, six components outlined by the developers, facilitators, and innovation users were (1) balanced coverage of agricultural literacy concept areas, (2) accurate agricultural knowledge, (3) integration of agricultural contexts with curriculum, (4) hands-on activities, (5) teachers' perception of agriculture, and (6) interaction with local agricultural professionals.

A significant scholarly contribution of this study is the development of the innovation configuration map for Summer Agricultural Institute. The IC map can be very easily adapted to other agricultural literacy interventions with similar goals and structure. The map is supported by past agricultural literacy research and constructivist learning theory.

The definition for agricultural literacy, penned in the early 1990's (Frick, Kahler, & Miller, 1991), noted the concept areas in which an individual should have a basic understanding to be considered agriculturally literate. The IC map contains a section to assess the teachers' coverage of all aspects of the agricultural industry. This is important to be able to adapt agricultural literacy interventions to cover topics which are often excluded.

Additionally, much of the agricultural literacy research has been conducted to assess the public's understanding and perceptions of the agricultural industry. This study concluded that both accurate agricultural content and positive perceptions of the industry were important components to the proper use of agriculture as a context for teaching. The ideal variation of the accurate agricultural content component is important to the success of agricultural literacy interventions. Due to the vastness of the agricultural industry, it is impossible to cover the entire industry in a short amount of time. A measure of success of a program can be that the teachers' interest in agriculture has been sparked and they continue to learn about agriculture on their own.

The IC map also falls within the scope of the constructivist learning theory. One tenet of the theory suggests that all content should be given a context which is both realistic and relevant to the learner. The integration of agricultural contexts within the curriculum component is striving to measure the teachers' usage of a realistic and relevant context. Also, within the framework of the constructivist learning theory and Dewey's philosophies is the hands-on activities component. Developers and facilitators of the Summer Agriculture Institute stress the importance of hands-on activities with the teachers during the program. Throughout SAI, teachers experience hands-on activities that could be used within their curriculum.

The final component of the IC Map is the interaction with local agricultural professionals. During SAI, teachers visit local farms, food processors, wineries, golf

courses, and meet with researchers and conversationalists. This gives a face to the agricultural industry when each teacher makes a personal connection with agriculture. The researcher along with the facilitators felt it was important for the teachers to understand that agriculture is more than a corporation controlling all production. Giving students the same opportunity to make this same connection is vital to the success of the agricultural industry.

Conclusion: All self-defined users of agriculture as a context for teaching demonstrated a variation of the innovation consistent with the acceptable to ideal categories within each component of the innovation configuration.

The innovation configuration map was developed as part of the research process. Thus, it was impossible to predict where teachers' use of agriculture as a context for teaching would fall in relation to the IC map components. Five of the responding teachers were interviewed to assess their usage of the innovation. Data from the transcripts were analyzed using the IC map components and variations as a guide for coding.

The findings of the research found all participating teachers had acceptable and ideal variations amongst all innovation configuration components. Although each was highly rated, the variations amongst the teachers were diverse. In accordance with the CBAM theory, different teachers will operationalize the innovation along a continuum being very close to the ideas of the developers to something completely unrecognizable (Anderson S. E., 1997).

On the Stages of Concern Questionnaire, teachers were asked if they were willing to participate in an interview about their use of agriculture as a context for teaching. Given this voluntary approach to the interview process, the data may have been skewed due to all interviewees being self-reported users of the innovation. To get a more accurate portrayal of the innovation configurations amongst the participants and random sample should have been selected. Two participants indicated they were nonusers of the innovation, however declined to be interviewed.

Conclusion: Past participants of SAI hold positive perceptions of the agricultural industry and convey that image with their students

Much of the past research in agricultural literacy has ascertained public perception of the agricultural industry. As an outcome of Summer Agriculture Institute, teachers hold a positive perception of the industry. It is important to note SAI is also continuing the impact to the students of past participants.

The five teachers in the purposive sample mentioned having a positive perception of the agricultural industry and conveying that perception with their students. One teacher noted the importance of seeing both conventional and organic production in order to explain to her students why we have both methods of production.

> There are definitely positives about organic. You know the one thing that always stuck with me, the organic farm movement. His [local organic farmer] comment

> was pretty interesting. He said "this is an ideal operation for us and I love the product that we produced, but we could learn more to feed the world this way than fighting." I guess it's was nice to hear somebody in the heart of that to love what he was doing, but realize that he was limited in what he could do. So I try to portray that, like, you know you can't be on the idealistic thing. You may love the way they are grown, and all of these things are awesome, but there's a reason why we got here from there.

It remains important that teachers are able to see both sides of the agricultural industry and are able to make the connections themselves.

Recommendations for Practice

1. To address the high egocentric concerns of the past SAI participants, a follow-up to SAI should be implemented. A website with forum options should be developed to allow teachers to easily communicate with each other and SAI facilitators. This website would allow teachers to share curriculum materials and other ideas easily.
2. Increased emphasis should be placed on the mechanics of using agriculture as a context for teaching during SAI.
3. Teachers need to practice using agriculture as a context for teaching in a safe environment. A portion of SAI could be used for teachers to share curriculum ideas with other teachers in their own discipline and grade level.
4. With a variety of grade level and core subject teachers participating each year, a database of all past participants should be created to connect teachers with other past participants in their respective subject and grade level to foster collaboration.
5. SAI developers and facilitators should survey local agricultural professionals on their willingness to serve as a resource for teachers. Professionals should be categorized

by their willingness to serve as a potential field trip site or their willingness to be a guest speaker in a classroom.

6. SAI facilitators should observe SAI participants in their classrooms throughout the year, using the innovation configuration map, to get a better understanding of how agriculture is being utilized in the classroom to be able to adapt the content of SAI.
7. SAI facilitators should encourage the past participants to further their understanding of the agricultural industry. Those participants still interested in learning more about agriculture should be encouraged to attend the Eastern Oregon Summer Agriculture Institute or enroll in an agricultural literacy online course.
8. SAI developers and facilitators should examine the feasibility of offering a section of SAI to pre-service core subject teachers and offer the opportunity to collaborate with the pre-service agricultural education teachers.
9. Both conventional and organic production methods should be included in agricultural literacy interventions. This will allow teachers to see the difference between the two methods. Also may demonstrate why agriculture cannot adopt complete organic production methods and continue to maintain production rates to feed the world.

Recommendations for Future Research

1. This study should be replicated with other agricultural literacy intervention programs currently being conducted across the nation.

2. A cross-examination of multiple agricultural literacy interventions should be conducted utilizing the Concerns Based Adoption Model as a framework to get a better understanding of the effectiveness of each of the interventions and addressing the concerns of the teachers.
3. A longitudinal study should be conducted following a cohort of SAI participants through the entire implementation process. This study should use a combination of quantitative and qualitative methods to get an accurate description of the implementation process.
4. Classroom observations should be conducted in conjunction with the innovation configuration map of users and nonusers of the innovation to get a more accurate description of the variations of the innovation amongst past participants.
5. Research should be conducted regarding the support of agricultural professionals when a local teacher participates in SAI.

BIBLIOGRAPHY

Adams, P. (2006). Exploring social constructivism: theories and practices. *Education* , 243-257.

Anderson, S. E. (1997). Understanding teacher change: Revisting the concerns based adoption model. *Curriculum Inquiry , 27* (3), 331-367.

Anderson, S. M., Thompson, G. W., & Velez, J. J. (2010). A qualitative analysis of teachers' conceptions of agriculture. *Western AAAE Research Conference Proceedings* (pp. 213-227). Great Falls, MT: American Association for Agricultural Education.

Balschweid, M. A., Thompson, G. W., & Cole, R. L. (1998). The effects of an agricultural literacy treatment on participating teachers and their curriculum. *Journal of Agricultural Education , 39* (4), 1-10.

Barsalou, L. W. (2009). Situating concepts. In P. Robbins, & M. Aydede (Eds.), *Cambridge Handbook of Situated Cognition* (pp. 236-263). New York: Cambridge University Press.

Bednarz, A. L. (2007, July). Evaluating the Effectiveness of Integrating Agricultural Science and Technology with Algebra I on the Texas Assessment of knowledge and Skills Mathematics Test. Lubbock, Texas: Texas Tech University.

Bell, J. M. (1995). *Agricultural literacy of civic organizations (Masters thesis).* Retrieved from http://etd.lib.ttu.edu

Bellah, K. A., & Dyer, J. E. (2009). Attitudes and stages of concern of elementary teachers toward agriculture as a context for teaching across grade level content area standards. *Journal of Agricultural Education , 50* (2), 12-25.

Bell-Ritz, J., & Lockaby, J. (1996). An assessment of agricultural literacy level of civic leaders. *Proceedings of the Fifteenth Annual Western Region Agricultural Education Research Meeting.* Moscow, ID.

Birkenholz, R. J. (1993). *Pilot Study of Agricultural Literacy.* Columbia, MO: University of Missouri, Department of Agricultural Education.

Brown, W. B., & Stewart, B. .. (1992). Agriculture instruction in middle school. *Proceedings of the 19th Annual National Agricultural Education Research Meeting.* St. Louis, MO.

Byrum, W. D., & Elliot, J. F. (1994). Homeowners' attitudes about the uses of lawn chemicals. *Proceedings of the the 21st Annual National Agricultural Education Research Meeting.* Dallas, TX.

Cognition and Technology Group at Vanderbilt. (1993). Integrated media: Toward a theoretical foundation and data on problem solving transfer. *Journal of Special Education Technology , 12* (2), 76-89.

Crawford, A. R., Chamblee, G. E., & Rowlett, R. J. (1998). Assessing concerns of algebra teachers druing a curriculum reform: A constructivist approach. *Journal of In-service Education , 24* (2), 317-327.

Crawford, M. B. (2009). *Shop Class as Soulcraft: An Inquiry into the Value of Work.* New York, NY: Penguin Group.

Deeds, J. P. (1991). Agricultural literacy- The undefinable goal of agricultural education. *Agricultural Education Magazine , 68* (8).

Derry, S. J. (1996). Cognitive schema theory in the constructivist debate. *Educational Psychologist , 31* (3/4), 163-174.

Dewey, J. (1916). *Democracy and Education.* New York, NY: The Free Press.

Dewey, J. (1939). *Experience and Education.* New York: Macmillan Company.

Dewey, J. (1897). My pedagogic creed. *The School Journal* , 77-80.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2009). *Internet, Mail, and Mixed-mode Surveys: The Tailored Design* (3rd ed.). Hoboken, NJ: Wiley and Sons.

Dobbs, R. (2004). Effects of training in a telecommunications classroom upon the stages of concern of college faculty and administrators. *International Journal of Instructional Technology and Distance Learning , 1* (4).

Doefert, D. L. (2003). Agricultural literacy: An assessment of research studies published within the agricultural education profession. *Proceedings from the Western Region Annual Agricultural Education Research Meeting.* Portland, OR.

Doolittle, P. E., & Camp, W. G. (1999). Constructivism: The career and technical education perspective. *Journal of Vocational and Technical Education , 16* (1).

Dyers, J. .., Lacey, R., & Osbourne, E. W. (1995). Attitudes of University of Illinois College of Agriculture freshman toward agriculture. *Proceedings of the 22nd Annual National Agricultural Education Research Meeting.* Denver, CO.

Elliot, J., & Olson, J. (1995). Identifying and understanding Arizona consumers' agricultural and environmental issues. *Proceedings from the 14th Annual Western Region Agricultural Education Research Meeting.* Phoenix, AZ.

Eraut, M. (2004). Transfer of knowledge between education and workplace settings. In A. Fuller, A. Munro, & H. Rainbird, *Workplace Learning in Context* (pp. 201-221). Routledge.

Flood, R. A., & Elliot, J. (1994). Agricultural awareness in Arizona. *Proceedings of the 21st Annual National Agricultural Education Research Meeting.* Dallas, TX.

Fosnot, C. T., & Perry, R. S. (2005). Constructivism: a psychological theory of learning. In C. T. Fosnot, *Constructivism: Theory, Perspectives, and Practice* (pp. 9-38). Columbia University: Teachers College.

Frick, M. J., & Wilson, D. (1996). Native American high school student knowledge and perception of agriculture. *Proceedings from the 23rd Annual National Agricultural Education Research Meeting.* Cincinnati, OH.

Frick, M. J., Birkenholz, R. J., & Machtemes, K. (1994). 4-H member knowledge and perception of agriculture. *Proceedings of the 21st Annual National Agricultural Education Research Meeting.* Dallas, TX.

Frick, M. J., Birkenholz, R. J., & Machtemes, K. (1995). Rural and urban adult knowledge and perceptions of agriculture. *Journal of Agricultural Education , 36* (2), 44-53.

Frick, M. J., Kahler, A. A., & Miller, W. W. (1991). A definition and the concepts of agricultural literacy. *Journal of Agricultural Education*, 49-57.

Gall, J. P., Gall, M. D., & Borg, W. R. (2005). *Applying Educational Research: A Practical Guide* (5th Edition ed.). Boston, MA.: Pearson.

Giddens, B., & Stasz, C. (1999). *Context Matters: Teaching and Learning Skills for Work.* Berkeley, CA: National Center for Research in Vocational Education.

Grabinger, R. S., & Dunlap, J. C. (1995). Rich environments for active learning: A definition. *Association for Learning Technology Journal , 3* (2), 5-34.

Grigg, W., Donahue, P., & Dion, G. (2007). *The Nation's Report Card: 12th grade Reading and Mathematics 2005.* Washington DC: United States Department of Education, National Center for Education Statistics.

Grubb, W. H. (1995). "The cunning hand, the cultured mind". In W. H. Grubb, *Education Through Occupations in American High Schools* (Vol. 1, pp. 11-25). New York: Teachers College Press.

Hall, G. E., & Hord, S. .. (2006). *Implementing change: Patterns, principles and potholes* (2nd ed.). Boston: Pearson Education, Inc.

Hall, G. E., & Hord, S. M. (1984). *Change in Schools: Facilitating the Process.* Albany, NY: State University of New York Press.

Hall, G. E., & Hord, S. M. (2001). *Implementing Change: Patterns, Principles and Potholes.* Needham Heights, MA: Allyn and Bacon.

Hall, G. E., George, A. A., & Rutherford, W. L. (1977). *Measuring stages of concern about the innovation: A manual for use of the SoC questionnaire.* University of Texas at Austin, The Research and Development Center for Teacher Education. Washington, D.C.: National Institute of Education.

Hall, G. E., George, A. A., & Rutherford, W. L. (1979). *Measuring stages of concern about the innovation: A manual for use of the SoC Questionnaire.* Austin, TX: The Research and Development Center for Teacher Education.

Harper, J. (2000). *Public Perceptions of the Future of Agricultural Education in Illinois.* Rantoul, Illinois: Facilitating Coordination in Agricultural Education.

Harrington, R. A., & Enochs, L. G. (2008). *Constructivist learning environment experiences: accounting for pre-service teacher's constructivist learning environment experiences.* Corvallis, OR: unpublished.

Hayward, G. C., & Benson, C. S. (1993). *Vocational-Technical Education: Major Reforms and Debates 1917-Present.* Washington, DC: Office of Vocational and Adult Education.

Hernández, V. M., & Brendefur, J. L. (2004). Developing authentic, integrated, standards-based mathematics curriculum: [more than just] an interdisciplinary collaborative approach. *Journal of Vocational Education Research , 28* (3), 259-283.

Hess, A. J., & Trexler, C. J. (2011). A qualitative study of agricultural literacy in urban youth; Understanding for democratic participation in renewing the agri-food system. *Jourrnal of Agricultural Education , 52* (2), 151-162.

Howell, K., & White, J. (1996). Agricultural literacy of radio station news reporters in Oklahoma. *Proceedings of the 23rd National Agricultural Education Research Meeting.* Cincinnati, OH.

Kincheloe, J. L. (2005). *Critical Constructivism.* New York: Peter Lang Publishing, Inc.

Kincheloe, J. (1995). *Toil and Trouble: Good Work, Smart Workers, and the Integration of Academic and Vocational Education.* New York: Peter Lang Publishing.

Knobloch, N. A., Ball, A. L., & Allen, C. (2007). The benefits of teaching and leaning about agriculture in elementary and junior high schools. *Journal of Agricultural Educaiton, 48* (3), 25-36.

Leising, J. G. (1990, Februrary). Agricultural literacy: Challege of the nineties. *The Agricultural Education Magazine , 62* (8), p. 4.

Locke, J. (1690). *An Essay Concerning Human Understanding.* Retrieved March 14, 2008, from Early Modern Texts: http://www.earlymoderntexts.com/pdfbig/lockebig.pdf

Meischen, D. L., & Trexler, C. J. (2003). Rural elementary students understanding of science and agricultural education benchmarks related to meat and livestock. *Journal of Agricultural Education , 44* (1), 43-55.

National Center for Education Statistics. (2011). *The Nation's Report Card: Science 2009 (NCES 2011-451).* Institute of Educational Sciences. Washington, D.C.: US Department of Education.

National Council for Agricultural Education. (2000). *Reinventing agricultural education for the year 2020: A model for educational reform.* W. K. Kellogg Foundation.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics.* Reston, VA: National Council of Teachers of Mathematics.

National Research Center for Career and Technical Education. (2008). *Major Research Findings 2000-2007: Engagement, Acheivement, and Transition.* Louisville, KY: Univeristy of Louisville.

National Research Council. (1988). *Understanding Agriculture: New Directions for Education.* Washington D.C.: National Academic Press.

Newlove, B. W., & Hall, G. E. (1976). *A Manual for Assessing Open-ended Statements of Concern About an Innovation.* Austin, TX: University of Texas.

No Child Left Behind Act of 2001. (2008). *20 U.S.C.*

Oregon Department of Education. (2010). *Statewide Reprt Card: An Annual Report the the Legislature on Oregon Public Schools.* Salem, OR: Oregon Department of Education.

Osbourne, E. .., & Dyer, J. E. (1995). Attitudes of Illinois high school science teachers toward agricultural industry and educational programs in agriculture. *Proceedings of the National Agricultural Education Research Meeting.* Denver, CO.

Parnell, D. (1998). Mathematics as a gateway to student success. In N. R. Council, *High School Mathematics at Work* (pp. 14-17). Washington, D.C.: National Academies Press.

Pense, S. L., Leising, J. G., Portillo, M. T., & Igo, C. G. (2005). Comparative assessment of student agricultural literacy in selected agriculture in the classroom programs. *Journal of Agricultural Education , 46* (3), 107-118.

Pope, J. (1990). Agricultural literacy: A basic American need. *Agricultural Education Magazine , 62* (9).

Rakes, G. C., & Casey, H. B. (2002). An analysis of teacher concerns toward instructional technology. *International Journal of Instructional Technology , 3* (1).

Robbins, P., & Aydede, M. (2009). A short primer on situated cognition. In P. Robbins, & M. Aydede (Eds.), *The Cambridge Handbook of Situated Cognition* (pp. 3-10). New York: Cambridge University Press.

Rogers, E. M. (1995). *Diffusion of innovations.* New York, NY: Simon & Schuster, Inc.

Russel, E. B., McCracken, J. D., & Miller, W. W. (1990). Position statement on agricultural literacy. *Agricultural Education Magazine , 62* (9).

Ryan, D., & Lockaby, J. (1996). An assessment of agricultural literacy level of city and government leaders. *Proceedings of the 15th Annual Western Region Agricultural Education Research Meeting.* Moscow, ID.

Schoenfeld, A. H. (2004). The math wars. *Educational Policy , 18* (1), 253-286.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and Quasi-experimental Designs for Generalized Causal Inference.* Boston, MA: Houghton Mifflin Company.

Shoulders, C. W., & Myers, B. E. (2011). An analysis of national agriscience teacher ambassadors' stages of concern regarding inquiry-based instruction. *Journal of Agricultural Education , 52* (2), 58-70.

Simon, R., Dippo, D., & Schenke, A. (1991). *Learning Work: A Critical Pedagogy of Work Education.* New York: Bergin and Garvey.

Smith, E. A. (2001). The role of tacit and explicit knowledge in the workplace. *Journal of Knowledge Management , 5* (4), 311-321.

Swortzel, K. A. (1996). Systematic educational efforts teaching about agriculture and the effects on fourth-grade students knowledge of animal agriculture in Ohio. *Proceedings from the 23rd Annual National Agricultural Education Research Meeting.* Cincinnati, OH.

Traxler, S. (1990, February). Why, "Agriculture In The Classroom". *The Agricultural Education Magazine , 62* (8), p. 9 & 19.

Trexler, C. (2000, July-August). Conversational literacy: A moving target that has yet to be defined. *The Agricultural Education Magazine , 73* (1), p. 2 & 4.

Trexler, C. J. (2000). A qualitative study of urban and suburban elementary student understandings of pest-related science and agricultural education benchmarks. *Journal of Agricultural Education , 41* (3), 89-102.

Trexler, C. J., & Hess, A. J. (2004). 15 years of agricultural literacy research: Has the profession only focused on a practical picture of what it means to be agricultural literate? *Proceedings from the 23rd Annual Western Region Agricultural Education Research Meeting.* Honolulu, HI.

Venville, G. J., Wallace, J., Rennie, L. J., & Malone, J. A. (2001). Curriculum integration: Eroding the high ground of science as a school subject? *annual Conference of the Australian Association for Research in Education.* Fremantle, WA.

Vestal, T. A., & Biers, G. E. (1999). Knowledge, attitudes, and perceptions of journalists for newspapers in metropolitan markets in the United States regarding food biotechnology. *Proceedings of the 18th Annual Western Region Agricultural Education Research Meeting.* Corpus Cristi, TX.

von Glaserfeld, E. (1988). *Cognition, Construction of Knowledge, and Teaching.* Washington, D.C.: National Science Foundation.

von Glasersfeld, E. (1989). *An Exposition of Constructivism: Why Some Like It radical.* Washington D.C: National Science Foundation.

Williams, M. K., & Foulger, T. (2006). Filling the gap with innovations: Standards, curriculum, collaboration, success! *National Educational Computing Conference.* San Diego. CA.

Zubrick, P. R. (1990, February). Agricultural literacy- Why! *The Agricultural Educaiton Magazine , 62* (8), p. 3.

APPENDICES

APPENDIX A
Stages of Concern Questionnaire

Concerns Questionnaire: **Summer Agriculture Institute: Using agriculture as a context for teaching.**

Name (optional)_____

In order to identify these data, please give us the last four digits of your social security number:
SSN(last 4 digits):____ ____ ____ ____

The purpose of this questionnaire is to determine what people who are using or thinking about using various programs are concerned about at various times during the innovation adoption process. The items were developed from typical responses of school and college teachers who ranged from no knowledge at all about various programs to many years experience in using them. Therefore, a good part of the items on this questionnaire may appear to be of little relevance or irrelevant to you at this time. For the completely irrelevant items, please circle "0" on the scale. Other items will represent those concerns you do have, in varying degrees of intensity, and should be marked higher on the scale.

For example:

This statement is very true of me at this time.	0	1	2	3	4	5	6	7
This statement is somewhat true of me now.	0	1	2	3	4	5	6	7
This statement is not at all true of me at this time.	0	1	2	3	4	5	6	7
This statement seems irrelevant to me.	0	1	2	3	4	5	6	7

Please respond to the items in terms of your present concerns, or how you feel about your involvement or potential involvement with the **Summer Agriculture Institute, using agriculture as a context for teaching**. We do not hold to any one definition of this innovation, so please think of it in terms of your own perception of what it involves. Since this questionnaire is used for a variety of innovations, the name **Summer Agriculture Institute, using agriculture as a context for teaching** never appears. However, phrases such as "the innovation", "this approach", and "the new system" all refer to **using agriculture as a context for teaching.** Remember to respond to each item in terms of your present concerns about your involvement or potential involvement with **Summer Agriculture Institute, using agriculture as a context for teaching.**

Thank you for taking your time to complete this task.

SoC QUESTIONNAIRE ITEMS Summer Agriculture Institute: Using agriculture as a context for teaching.

0	1	2	3	4	5	6	7
Irrelevant	Not true of me now		Somewhat true of me now			Very true of me now	

1.	I am concerned about students' attitudes toward this innovation.	0	1	2	3	4	5	6	7
2.	I now know of some other approaches that might work better.	0	1	2	3	4	5	6	7
3.	I don't even know what the innovation is.	0	1	2	3	4	5	6	7
4.	I am concerned about not having enough time to organize myself each day.	0	1	2	3	4	5	6	7
5.	I would like to help other faculty in their use of the innovation.	0	1	2	3	4	5	6	7
6.	I have very limited knowledge about the innovation.	0	1	2	3	4	5	6	7
7.	I would like to know the effect of reorganization on my professional status.	0	1	2	3	4	5	6	7
8.	I am concerned about conflict between my interests and my responsibilities.	0	1	2	3	4	5	6	7
9.	I am concerned about revising my use of the innovation.	0	1	2	3	4	5	6	7
10.	I would like to develop working relationships with both our faculty and outside faculty using this innovation.	0	1	2	3	4	5	6	7
11.	I am concerned about how the innovation affects students.	0	1	2	3	4	5	6	7
12.	I am concerned about this innovation.	0	1	2	3	4	5	6	7
13.	I would like to know who will make the decisions in the new system.	0	1	2	3	4	5	6	7
14.	I would like to discuss the possibility of using the	0	1	2	3	4	5	6	7

innovation.

0	1	2	3	4	5	6	7
Irrelevant	Not true of me now		Somewhat true of me now			Very true of me now	

15.	I would like to know what resources are available if we decide to adopt this innovation.	0	1	2	3	4	5	6	7
16.	I am concerned about my inability to manage all the innovation requirements.	0	1	2	3	4	5	6	7
17.	I would like to know how my teaching or administration is supposed to change.	0	1	2	3	4	5	6	7
18.	I would like to familiarize other departments or persons with the progress of this new approach.	0	1	2	3	4	5	6	7
19.	I am concerned about evaluating my impact on students.	0	1	2	3	4	5	6	7
20.	I would like to revise the innovation's instructional approach.	0	1	2	3	4	5	6	7
21.	I am completely occupied with other things.	0	1	2	3	4	5	6	7
22.	I would like to modify our use of the innovation based on the experiences of our students.	0	1	2	3	4	5	6	7
23.	Although I don't know about this innovation, I am concerned about things in the area.	0	1	2	3	4	5	6	7
24.	I would like to excite my students about their part in this approach.	0	1	2	3	4	5	6	7
25.	I am concerned about time spent working with nonacademic problems related to this innovation.	0	1	2	3	4	5	6	7
26.	I would like to know what the use of the innovation will require in the immediate future.	0	1	2	3	4	5	6	7
27.	I would like to coordinate my effort with others to maximize the innovation's effects.	0	1	2	3	4	5	6	7

28. I would like to have more information on time and energy commitments required by this innovation.	0	1	2	3	4	5	6	7
29. I would like to know what other faculty are doing in this area.	0	1	2	3	4	5	6	7
30. At this time, I am not interested in learning about this innovation.	0	1	2	3	4	5	6	7
31. I would like to determine how to supplement, enhance, or replace the innovation.	0	1	2	3	4	5	6	7
32. I would like to use feedback from students to change the program.	0	1	2	3	4	5	6	7
33. I would like to know how my role will change when I am using the innovation.	0	1	2	3	4	5	6	7
34. Coordination of tasks and people is taking too much of my time.	0	1	2	3	4	5	6	7
35. I would like to know how this innovation is better than what we have now.	0	1	2	3	4	5	6	7

0	1	2	3	4	5	6	7
Irrelevant	Not true of me now		Somewhat true of me now			Very true of me now	

Demographics

Please complete the following:

What percent of your job is:

Teaching _____ % Adminstration _____% Other (specify) _____%

Do you work: Full time _____ Part time _____

Female _____ Male _____

Age:

20-29
30-39
40-49
50-59
over 60

Highest degree earned:

Bachelors
Masters
Doctorate

Year degree earned: _____

Number of years at present school: _____

What grade level do you teach? _____

What subjects do you teach? Check all that apply

Mathematics
Science
Social Studies
English
Other:_____

What year were you enrolled in Summer Agriculture Institute? _____

In your use of agriculture as a context for teaching do you consider yourself to be a:

nonuser
novice
intermediate
old hand
past user

Would you be willing to be interviewed by the researcher to get a better understanding of how agriculture is being used in the classroom?

APPENDIX B
Interview Protocol

When you think of using agriculture as a context for teaching your curriculum what concerns do you have? Please be frank.

Describe in your own words what it means to use agriculture as a context for teaching.

How much training have you had in agriculture?

What formal or informal communication such as meetings or discussions has occurred to support you in the use of agriculture as a context for teaching? (What do you do or who do you go to if you are having difficulties?)

What goals or expectations do you have for your class when you are using agriculture as a context for teaching?

When planning for classroom instruction, how do you integrate agriculture into the curriculum?

Does agriculture integrate well into district or grade level curriculum? If so, in what ways or what courses?

How much time do you spend each week using agriculture as a context for teaching?

Where do you go for more information about using agriculture as a context for teaching?

Do you develop your own curriculum or do you use premade curriculum? If premade, do you make any adaptations to that curriculum?

Are agricultural contexts used in your evaluation and assessment of students?

Has the district supported your use of agriculture as a context for teaching?

Do you wish you had more support from Summer Agriculture Institute staff? If so, in what ways

would support be beneficial?

APPENDIX C
Cover Letter to Electronic Survey

Dear [FirstName]

You have been identified as a past participant of Summer Agriculture Institute. As a past participant you are aware of the diversity of the agricultural industry and you may have some concerns regarding the use of agriculture as a context for teaching your curriculum. We are constantly trying to find better ways to make SAI that much stronger. And here is where we could use your help!

This message is being sent to request your participation in a research study to assess your concerns regarding the use of agriculture as a context for teaching. Your participation in this research is strictly voluntary; however the information that you and other respondents provide will be used to help us provide advice and direction for Summer Agriculture Institute participants. The purpose of this study to determine the concerns of past participants of the Summer Agriculture Institute regarding the use of agriculture as a context for teaching and to determine how they implement the curriculum integration. The study has two overarching objectives: To determine teachers' concerns about using agriculture as a context for teaching and to clarify how teachers are using agriculture as a context for teaching.

There is no penalty for non-participation and you are free to discontinue your participation at any time. In no way will your participation in this study affect your relationship with Summer Agriculture Institute. We assure you that your identity and responses will be kept confidential; SAI coordinators will only receive data in aggregate from the researchers.

If you are willing to participate in this research, it will involve about 20 minutes of your time to complete a questionnaire. The questionnaire will ask you to assess your concerns with using agriculture as a context for teaching. There are twelve additional questions related to personal characteristics. At the end of the survey you will be asked if you would like to volunteer for a follow-up phone interview. The interview will take approximately 30 minutes and will help researchers get a better understanding of how agriculture is being used in the classroom.

There is a risk that we could accidentally disclose information that identifies you. Also, the security and confidentiality of information collected from you online cannot be guaranteed. Information collected online can be intercepted, corrupted, lost, destroyed, arrive late or incomplete, or contain viruses. We hope that you feel comfortable in responding to the survey questionnaire which can be accessed at the following link: <insert URL here>.

If you have questions concerning your rights as a participant in this research project, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator at (541) 737-8008 or by email at IRB@oregonstate.edu. Please refer to study 4931 entitled teacher concerns regarding the use of agriculture as a context for teaching.

Thank you in advance for your consideration.

Respectfully,

Dr. Larry Enochs
Science and Mathematics Education
233 Weniger Hall
Corvallis, Oregon
541-737-1305

Shawn Anderson
Agricultural Education and General Agriculture
112 Strand Ag Hall
Corvallis, Oregon
541-737-1338

APPENDIX D
Follow-up Letter to Non-Responders

Dear [FirstName],

I am glad you chose to participate in Summer Agriculture Institute. I hope you learned a lot and it has been beneficial in your classroom teaching. As part of my dissertation, I am examining teachers' use of agriculture to help them teach their content. It would be very helpful if you would be able to answer a few quick questions about your use of the Summer Agriculture Institute materials.

I hope that your school year is coming to an end smoothly. I know this time of year is very busy for teachers, as I am also trying to tie all the loose ends before the term ends. This survey should only take around 15 minutes to complete. Your responses could help us better the program for future teachers as well as help me graduate. Thanks again for your time, I greatly appreciate it.
Shawn Anderson

Agricultural Education and General Agriculture

APPENDIX E
Innovation Configuration Map

Innovation Configuration Map for the Use of Agriculture as a Context for Teaching

Teacher: School:

Balanced Coverage of the Agricultural Literacy Concept Areas

__ Plant and Animal Production
__ Processing, Marketing, Distribution
__ Global Significance
__ Societal Impact
__ Economic Impact
__ Relationship with Environment/NR
__ Public Policy

	(A)	(B)	(C)	(D)
Accurate agricultural content	Do not use agricultural content	Teacher uses some examples from SAI	Teacher adequately uses content from SAI	Teacher has moved beyond what was taught in SAI
Integration of agricultural w/ curriculum	No integration of agriculture with existing curriculum	Stand alone agricultural lessons	Agriculture is integrated as a context throughout a single academic lesson	Agriculture is used as a context for multiple lessons/units of instruction; all tied to academic standards.
Hands-on activities	No hands-on agricultural activities	A few hands-on agricultural activities are used	Most lessons with agriculture have hands-on activities	All lessons using agriculture have a hands-on component
Teachers perception of agriculture	Teacher has a negative perception of agriculture	Teacher has a somewhat positive perception of agriculture	Teacher has a positive perception of agriculture	Teacher communicates agriculture in a positive manner with students
Interaction w/ local agricultural professionals	No teacher interaction with local agricultural professionals	Teacher brings personal examples of interaction with agricultural professionals	Local agricultural professionals are invited into classroom; interaction with students	Students visit agricultural professionals on location

APPENDIX F
Stages of Concern Percentile Conversion Chart

Raw Score	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
0	10	5	5	2	1	1	1
1	23	12	12	5	1	2	2
2	29	16	14	7	1	3	3
3	37	19	17	9	2	3	5
4	46	23	21	11	2	4	6
5	53	27	25	15	3	5	9
6	60	30	28	18	3	7	11
7	66	34	31	23	4	9	14
8	72	37	35	27	5	10	17
9	77	40	39	30	5	12	20
10	81	43	41	34	7	14	22
11	84	45	45	39	8	16	26
12	86	48	48	43	9	19	30
13	89	51	52	47	11	22	34
14	91	54	55	52	13	25	38
15	93	47	57	56	16	28	42
16	94	60	59	60	19	31	47
17	95	63	63	65	21	36	52
18	96	66	67	69	24	40	57
19	97	69	70	73	27	44	60
20	98	72	72	77	30	48	65
21	98	75	76	80	33	52	69
22	99	80	78	83	38	55	73
23	99	84	80	85	43	59	77
24	99	88	83	88	48	64	81
25	99	90	85	90	54	68	84
26	99	91	87	92	59	72	87
27	99	93	89	94	63	76	90
28	99	95	91	95	66	80	92
29	99	96	92	97	71	84	94
30	99	97	94	97	76	88	96
31	99	98	95	98	82	91	97
32	99	99	96	98	86	93	98
33	99	99	96	99	90	95	99
34	99	99	97	99	92	97	99
35	99	99	99	99	96	98	99