CURRICULUM AND CAREER DEVELOPMENT EVENTS: PREPARATION STRATEGIES FOR KNOWLEDGE AND SKILL TRANSFER IN THE MICHIGAN ENVIRONMENTAL SKILLS CDE

By

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ABSTRACT

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School-based agricultural education (SBAE) offers copious opportunities through the classroom and career development events (CDEs), among other contexts, to prepare students with knowledge and skills related to agriculture, food, and natural resources (AFNR) careers and life. However, lack of empirical data evaluating student outcomes associated with varied curriculum and CDE connections forces AFNR educators to make preparation decisions without knowledge of the potential impact on student learning and performance. The current study sought to address the identified problem in a specific Michigan SBAE context by determining the relationship between Michigan AFNR educators' environment and natural resources curriculum and the Michigan FFA Environmental Skills CDE and associated student outcomes.

Quantitative survey methodology was utilized to collect and analyze data from the target population, all Michigan AFNR educators during the 2017-2018 school year. Findings identify a small, positive correlation between the Environmental Skills CDE and curriculum spectrum (CDECS) alignment and student outcomes of rank in the CDE and performance on high-order educational objective components. Additionally, AFNR educator characteristics which influence the Environmental Skills CDECS alignment were identified. Findings support Bronfenbrenner's (1979b; 2005) ecological systems theory, the framework for the current study. Recommendations are provided for Michigan AFNR educators, teacher educators, CDE coordinators, and researchers to improve student learning through CDE and curriculum connections.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

KEY TO ABBREVIATIONS

AFNR – Agriculture, Food, and Natural Resources

CDE – Career Development Event

CDECS – Career Development Event and Curriculum Spectrum

ENR – Environment and Natural Resources

FFA – The National FFA Organization

SBAE – School-Based Agricultural Education

CHAPTER 1: INTRODUCTION

Since its inception, school-based agricultural education (SBAE) has focused on developing knowledge and skills to prepare students for successful careers and a lifetime of informed choices in the agriculture, food, and natural resources (AFNR) industries (McKim, Velez, Lambert, & Balschweid, 2017; National FFA, 2017). To accomplish this purpose, SBAE incorporates classroom and laboratory instruction, supervised agricultural experiences, and involvement in agricultural youth organizations (e.g., the National FFA Organization) to create what is now known as the three-circle model of agricultural education (Croom, 2008; National Council, 2016; National FFA, 2015; Phipps, Osborne, Dyer, & Ball, 2008).

While the three components of agricultural education provide different contexts for students to obtain and apply agricultural knowledge and skills, the three-circle model identifies areas in which these components overlap. In the overlapping areas, the components are used in conjunction to create rich learning experiences for students by combining classroom learning, leadership and career development, and authentic agricultural experiences; however, the extent to which these components overlap has received scant exploration in existing literature. As the three-circle model is the predominant model for SBAE (Croom, 2008; Phipps et al., 2008), an understanding of its complete operationalization within existing AFNR programs, and the associated student outcomes, is crucial to supporting program development which supports student growth. This study sought to increase understanding of the integrated nature of the three-circle model by measuring the overlap between the classroom instruction and FFA components of the three-circle model amongst Michigan AFNR educators and its impact on student success.

Statement of the Problem

Encompassed within the FFA component of the three-circle model of agricultural education are career development events (CDEs). CDEs are designed to provide a competitive experience for students to demonstrate their knowledge and skills related to specific AFNR topics (National FFA, 2016). There are no standard regulations regarding how to prepare students for CDEs, leaving student preparation decisions to individual AFNR educators. Some teachers have been observed preparing students interested in a CDE outside of class time, where they review related content taught in class and practice applications related to the knowledge and skills tested in the CDE (Melodia & Meyer, 2001). Other teachers have been observed using the knowledge and skills tested in the CDE as a base for teaching related content in the classroom; therefore, simultaneously using the CDE content to educate all students and prepare those interested in participation (Beekley & Moody, 2002). While a range of methods to prepare students for CDE competitions exist, no empirical data regarding student performance or learning outcomes associated with such methods are found in existing literature. Therefore, AFNR educators are forced to make decisions regarding student preparation without knowledge of the potential impact on student learning and performance, potentially limiting, or undermining, opportunities to enhance student development.

Purpose Statement and Objectives

The current study sought to determine the influence of Michigan AFNR educators' environment and natural resources (ENR) curriculum and CDE alignment on student learning outcomes associated with the Michigan FFA Environmental Skills CDE. The study is guided by the following research objectives and conceptual model (see Figure 1).

1. Determine the philosophy of CDEs held by Michigan AFNR educators.
2. Measure the alignment between the Environmental Skills CDE and Michigan AFNR educators' ENR curriculum, henceforth referred to as curriculum-CDE alignment.
3. Describe the relationship between Michigan AFNR educator characteristics and their curriculum-CDE alignment.
4. Explain the relationship between Michigan AFNR educators' curriculum-CDE alignment and student performance in the Environmental Skills CDE.

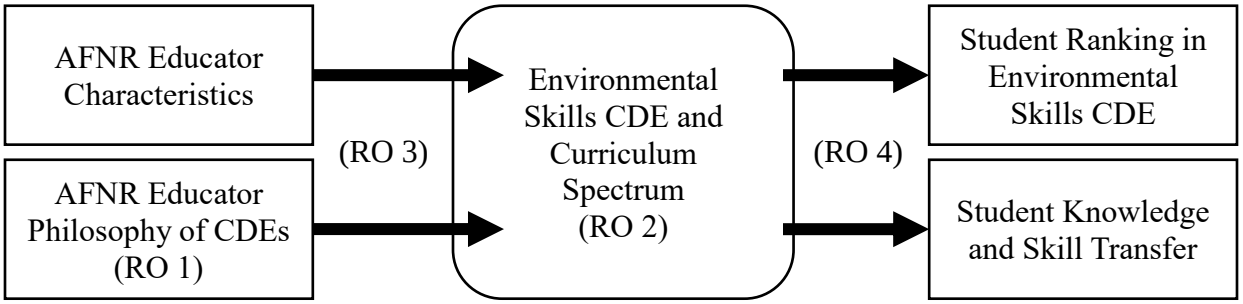


Figure 1. Conceptual model of the current study.

Significance of the Study

The current study directly relates to research priority three of the American Association for Agricultural Education National Research Agenda for 2016-2020 (Roberts, Harder, & Brashears, 2016). The research priority, Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century, calls for research "to draw a connection between the impact of our academic programs and student preparedness and success" (Stripling & Ricketts, 2016, p. 32). The current study responds to this call by examining student outcomes associated with the relationship between classroom curriculum and the Environmental Skills CDE.

While existing literature indicates a practical and theoretical debate regarding the use of CDEs in the classroom (Beekley & Moody, 2002; Edwards & Booth, 2001; Melodia & Meyer, 2001; Russell, Robinson, & Kelsey, 2009), a lack of empirical evidence describes the impact of the relationship between classroom curriculum and CDEs on student outcomes. A more robust understanding of the relationship between curriculum and CDEs, developed from the current study, informs future research related to student outcomes from CDEs. Additionally, the current study identifies opportunities to promote teaching practices and CDE preparation strategies which benefit student learning and success in the classroom, CDEs, and life.

Theoretical Framework

As the aim of the current research was to explore student learning outcomes associated with ENR curriculum and Environmental Skills CDE preparation alignment, a theoretical framework encompassing elements of student development and curricular implementation was sought. Bronfenbrenner's (1979b; 2005) ecological systems theory was identified as an ideal framework to guide the current study as it combines the previously identified elements in a systemic perspective which focuses on the student. Below is a review of ecological systems theory followed by its operationalization in the current study.

Ecological systems theory provides a systemic perspective which illuminates the dynamic, multidirectional, and nested nature of systems and their impact on human development (Bronfenbrenner, 1979b). Understanding individuals do not act nor develop independently of one another or their environment, Bronfenbrenner (1979b; 2005) describes systems, or environments in which people interact as a nested hierarchy with four progressively inclusive levels, (a) microsystem, (b) mesosystem, (c) exosystem, and (d) macrosystem, with the person at the center

(see Figure 2). The microsystem includes the "pattern of activities, roles, and interpersonal relations experienced by the developing person in a given face-to-face setting with particular physical and material features and containing other persons" (Bronfenbrenner, 2005, p. 148), such as the home or classroom. The next level, the mesosystem, is comprised of the "linkages and processes taking place between two or more settings containing the developing person (e.g., the relations between home and school, school and workplace)" (Bronfenbrenner, 2005, p. 80). It is important to note both the microsystem and mesosystem contain only settings in which the person engages.

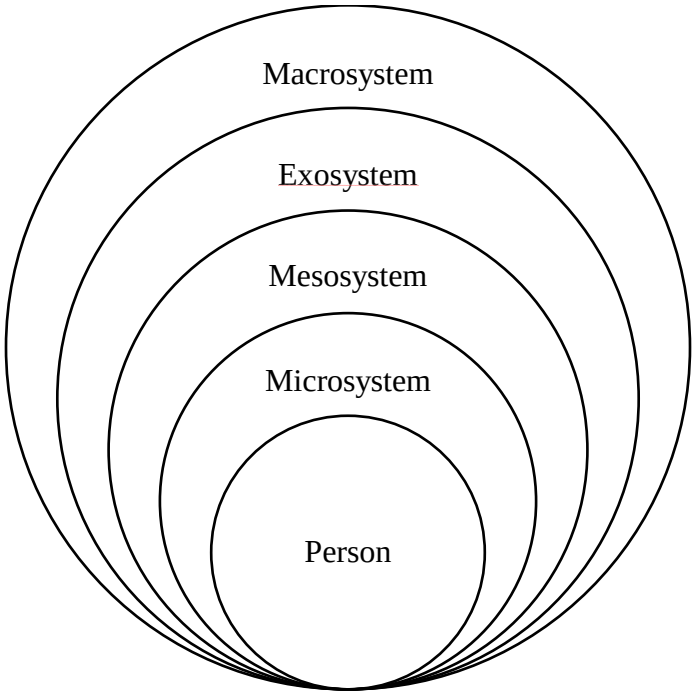


Figure 2. Bronfenbrenner's nested hierarchy of systems (Bronfenbrenner, 1979b; 2005).

Similar to the mesosystem, the exosystem is comprised of connections "between two or more settings containing the developing person;" however, in the exosystem, at least one of the settings "does not ordinarily contain the developing person" (Bronfenbrenner, 2005, p. 80). For

example, an exosystem may contain linkages between a teacher's peer group and the school. It is in the exosystem where ecological systems theory begins to account for settings in which the person does not engage, but which indirectly influence the person. The idea of indirect influence of the environment on the person is broadened in the macrosystem, which contains "an overarching pattern of ideology and organization of the social institutions common to… a given society or segment thereof" (Bronfenbrenner, 2005, p. 80). Given the inclusion of overarching beliefs and values, resources, and opportunity structures (Bronfenbrenner, 2005), the macrosystem refers less to a physical space and more to environmental conditions surrounding the person.

While each individual belongs to a nested system, containing the four environmental levels, it is the person's interactions within the environment which contribute to his or her development (Bronfenbrenner, 1979b; 2005). Each interaction with "persons, objects, and symbols" within an environment provides a developmental opportunity for the individual (Bronfenbrenner & Evans, 2000, p. 118). The "transfer of energy" required to attain developmental outcomes from such environmental interactions is known as proximal process; however, proximal process is not a unidirectional property (Bronfenbrenner, 2005; Bronfenbrenner & Evans, 2000, p. 118). Rather, the nested and dynamic nature of systems containing the person provide copious opportunity for multidirectional interaction, allowing the environment to influence the development of the person and the person to influence the environment (Bronfenbrenner & Evans, 2000). For example, a teacher in a student's microsystem can teach the student a new skill while simultaneously developing patience. In this example, both teacher and student undergo development through their interactions with individuals in their shared environment.

Bronfenbrenner (2005) describes three types of models which describe the influence of proximal processes on an individual's development (see Table 1). The first type of model, process models, analyze influences of interactions which occur in the microsystem (Bronfenbrenner, 2005). Such models serve to identify causal relationships between the environment and the person; however, due to the focus on the microsystem, the environmental level closest to the individual, process models omit the influence of specific contexts outside the immediate environment (Bronfenbrenner, 2005). Process-context models account for varying influence of proximal processes in different contexts by identifying interactions which promote development and analyzing how the interactions vary within the broader environmental contexts (Bronfenbrenner, 2005).

While process-context models account for varying contexts, each interaction during proximal processes does not influence all individuals in the same way or to the same degree (Bronfenbrenner, 2005). Therefore, the final model explained by Bronfenbrenner (2005) to explore the influence of proximal processes is the process-person-context model. Like, the process-context model, the process-person-context model accounts for the context in which development occurs when exploring the influence of proximal processes; however, the process-person-context model also accounts for personal characteristics (e.g., gender, age) of the individual (Bronfenbrenner, 2005). The combined knowledge of process, context, and person provides a more robust understanding of systemic properties which influence human development.

Table 1

Components of Human Development Processes Models

Model Type	Model Components
Process Models	Process through which development occurs
Process-Context Models	Process through which development occurs Context in which development takes place
Process-Person-Context Models	Process through which development occurs Context in which development takes place Personal characteristics of people in the context

Note. Adapted from Bronfenbrenner, 2005.

Ecological systems theory began with Bronfenbrenner's work in the field of psychology (Bronfenbrenner, 1979a). In early development, ecological systems theory was used to explore the role of environmental contexts such as home (Bronfenbrenner, 1979a; Evans, Leopore, Shejwal, & Palsane, 1998; Matheny, Wachs, Ludwig, & Phillips, 1995), school, workplace, and child care facilities on early child development (Bronfenbrenner, 1979a). More recently, use of ecological systems theory has expanded broadly to the fields of social work (Norton, 2012; Paat, 2013) and education (Leonard, 2011; McKim, Velez, & Sorensen, 2018). In the field of education, Leonard (2011) applied ecological systems theory to urban school systems to examine the effect of school-community partnerships on student development. In the context of SBAE, McKim and colleagues (2018) used ecological systems theory to examine the influence of SBAE enrollment on student outcomes of graduation, STEM academic achievement, and income. Results of the study indicated increased units of secondary SBAE coursework are a negative predictor of and postsecondary STEM achievement (McKim et al., 2018), demonstrating the core principle of ecological systems theory, the environment in which students interact (i.e., SBAE courses) influences student development (i.e., STEM achievement).

Bronfenbrenner's (1979b, 2005) ecological systems theory has proven to be a valuable foundation for studies of the influence of general education (Bronfenbrenner, 1979a; Leonard, 2011), and SBAE (McKim et al., 2018), on student development. Additionally, the systems-approach to human development in the theory provides valuable insight to the environments and individuals within those environments which influence student outcomes. Therefore, the ecological systems theory was operationalized in the current study to explore the influence of curriculum and CDE integration on students' competitive performance and ability to transfer knowledge (see Figure 3). The current study focuses on development occurring from proximal processes in the students' microsystem (i.e., classroom); however, also accounts for indirect influences from the personal characteristics (e.g., age, certification path, philosophy of CDEs) of the teachers (i.e., developed within both the microsystem and mesosystem of students). Additionally, the process-context model was utilized in the current study to determine which processes of curriculum and CDE connections influence the development of student knowledge and skills in the context of the environmental skills CDE.

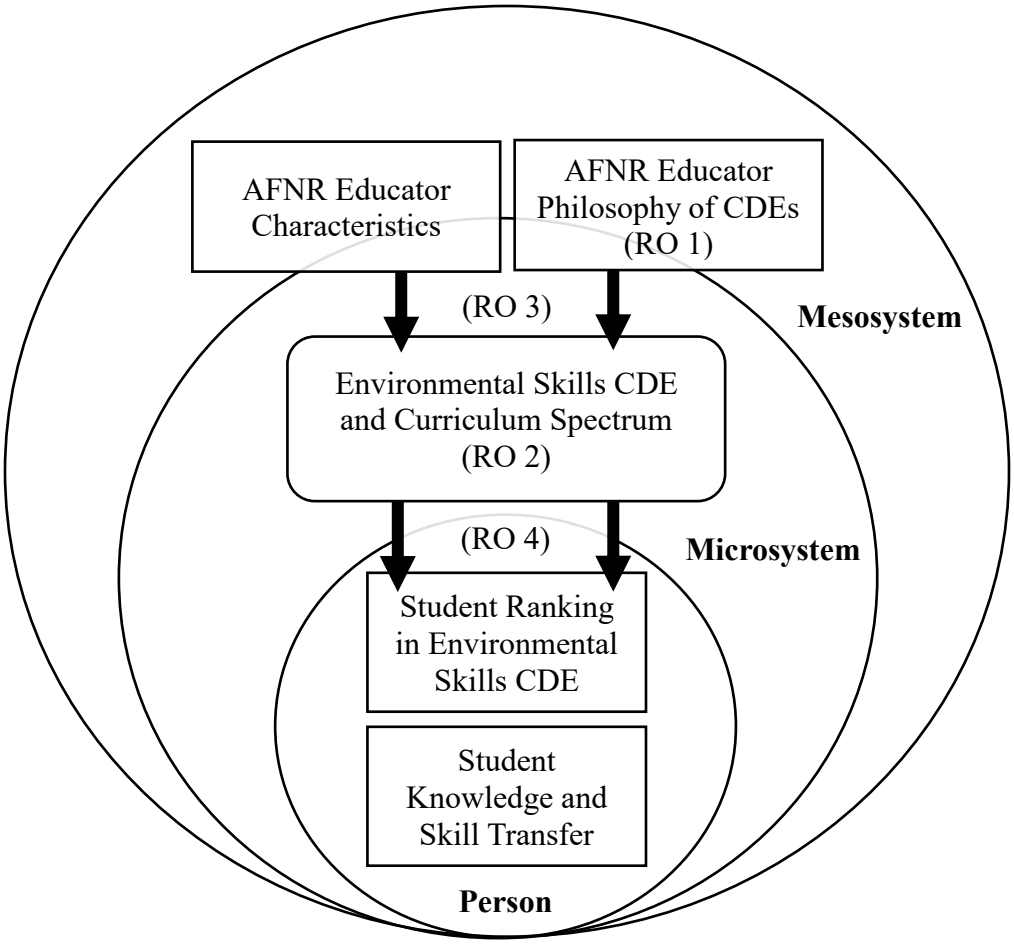


Figure 3. Conceptual model aligned with ecological systems theory.

Setting the Context: The Michigan FFA Environmental Skills CDE

The current study is situated in the context of the Environmental Skills CDE offered by the Michigan FFA Organization to students enrolled in Michigan SBAE programs. The CDE serves to provide opportunities for students to apply knowledge and skills related to ENR systems in a real-world setting (Michigan FFA, 2017, p. 1). During the CDE, students work together in teams of three to five students to complete nine CDE components: a) animal and bird identification, b) ecosystem analysis, c) environmental tools and invasive species identification, d) fish and aquatic organism identification, e) GPS use, f) plant and tree identification, g) reptile

and amphibian identification, h) soils analysis, and i) water quality analysis. A short description of objectives for each component is found in the methods section.

Following the Environmental Skills CDE, team response sheets are scored and ranked from highest scoring team to lowest scoring team based on total score of the nine CDE components (Michigan FFA, 2017). Based on overall scores, a state winner and alternate winner are awarded in addition to awards of gold or silver for the top third of teams (Michigan FFA, 2011).

Assumptions

The current study assumes:

- All members of the target population were included in the frame used to conduct the census. Additionally, only members of the target population were included in the frame.
- Those included in the target population had access to, and were able to complete, the survey.
- Survey respondents were the AFNR educators who prepared students for the Environmental Skills CDE.
- Each survey was completed honestly and to the best of the respondent's ability.
- Student results from the Environmental Skills CDE which were utilized in the study were accurate and final.

Delimitations

The following delimitations exist for the current study:

- Objective one is delimited to all Michigan school-based AFNR educators during the 2017-2018 school year.
- Though many CDE opportunities exist, the Michigan Environmental Skills CDE served as the context of the current study.
- Objectives two, three, and four are delimited to all Michigan school-based AFNR educators during the 2017-2018 school year who prepared students for the Environmental Skills CDE.
- Objective four is delimited to high school AFNR education students who participated in the state-level Michigan Environmental Skills CDE during the 2017-2018 school year.

- The study is delimited to Bronfenbrenner's (1979b; 2005) ecological systems theory process-context model of human development and the microsystem of Michigan AFNR education students participating in the Environmental Skills CDE context.

Limitations

The following limitations are identified for the current study:

- Though all attempts to remain unbiased were made, my prior experiences and beliefs may have influenced the research.
- The current study is not generalizable to other populations of educators, nor to the population of interest regarding other specific CDEs.
- Data were collected following the conclusion of the Michigan Environmental Skills CDE. The results of the event and length of time from which the event occurred may have influenced how some AFNR educators responded.
- Survey item construction was limited to AFNR curriculum and CDE connection themes identified in prior literature, which may not be fully representative of teacher practices.
- Quantitative survey methodology prevents various limitations including types of questions which can be asked, which increases the difficulty of exploring the topic of interest in depth.
- The current study assessed transfer via students' performance on high-order cognitive objectives within existing activities of the Environmental Skills CDE. While the use and successful completion of high-order cognitive objectives correlates to the ability of students to transfer knowledge to other tasks and contexts (Adams, 2015; Reece, 2007),

students in the current study did not utilize knowledge and skills in novel contexts, therefore, limiting the results of the current study.

- While the current study utilizes the process-context model of Bronfenbrenner's (1979b; 2005) ecological systems theory and examines relationships within the individuals' microsystems, the study provides an incomplete view of ecological systems theory. While identifying AFNR educator characteristics developed in the students' microsystems and mesosystems, the current study does not address student interaction among ecosystems outside the microsystem, nor does the study examine specific personal characteristics involved in the process-person-context model.

Definition of Terms

AFNR Curriculum – Learning activities and opportunities which teach knowledge and skills of agriculture, food, and natural resources and their associated industries (Phipps et al., 2008).

Career Development Event (CDE) – A competitive event, offered by the FFA Organization, in which students demonstrate knowledge and skills learned in the classroom to activities in specific agricultural career areas (National FFA, 2016; Phipps et al., 2008).

CDE and Curriculum Spectrum (CDECS) – A researcher-developed construct measuring alignment between classroom curriculum and CDEs on a scale from 0% (*completely unaligned*) to 100% (*completely aligned*).

Environmental Skills CDE – Career Development Event held in Michigan which engages AFNR education students in tasks related to environmental and natural resources knowledge and skills such as wildlife species identification; tool identification and operation; and water, soil, and ecosystem analyses (Michigan FFA, 2017).

FFA – The National FFA Organization (FFA) is an agricultural youth organization throughout the United States and territories which promotes student development of leadership, personal, and career skills (National FFA, 2017).

Philosophy of CDEs – The purpose of CDEs as understood by individual AFNR educators. For the purposes of the current study, AFNR educator philosophy of CDEs was determined via a researcher-constructed instrument in which educators ranked nine outcomes of CDEs in order of importance. As each outcome was associated with one of three main philosophies of CDEs (i.e., classroom extension, competition and achievement, and student development), rank scoring of the outcomes, described further in chapter three, indicated the philosophy of CDEs held by each educator.

School-Based Agricultural Education (SBAE) – Formal instruction of AFNR curriculum in middle and secondary-school settings, often contextualized by the three-circle model of AFNR education.

Three-Circle Model of AFNR Education – The predominant model for SBAE which promotes a combination of classroom/laboratory instruction, youth agricultural organizations, and supervised agricultural experiences (Croom, 2008; Phipps et al., 2008).

Transfer – The ability to apply knowledge or skills gained in one context to a new, differing context (Reece, 2007).

CHAPTER 2: REVIEW OF LITERATURE

The following review aims to contextualize the current study within the context of school-based agricultural education (SBAE) and provide a review of literature relevant to the study objectives. To accomplish this purpose, an overview of SBAE and embedded components (i.e., classroom and FFA) are provided. Then, literature illuminating a relevant professional debate among agriculture, food, and natural resources (AFNR) educators, followed by potential reasons for and implications of the debate will be reviewed.

Contextualizing School-Based Agricultural Education

To accomplish its purpose of preparing students across the United States and Territories for "successful careers and a lifetime of informed choices in global agriculture, food, fiber and natural resources systems" (National FFA, 2017, p. 104), SBAE incorporates a combination of classroom/laboratory instruction, youth agricultural organizations, and supervised agricultural experiences (Croom, 2008; National Council, 2016; National FFA, 2015; Phipps et al., 2008). Though applied in practice since the turn of the twentieth century, it was not until 1947 that the incorporation of these three components were conceptualized to what is now known as the three-circle model of agricultural education (see Figure 4; Croom, 2008).

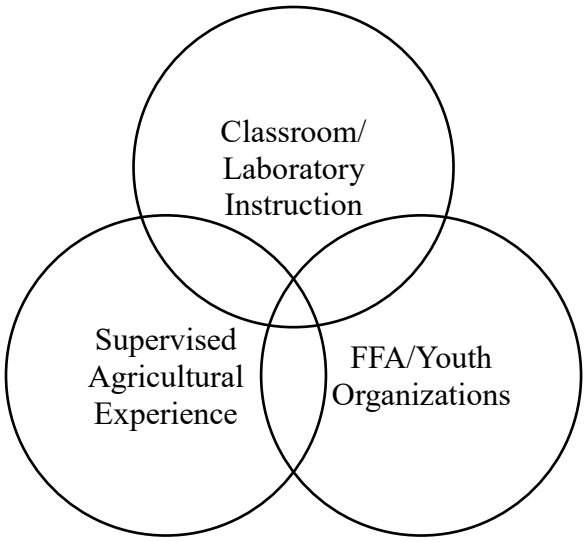


Figure 4. Three-circle model of agricultural education (adapted from Phipps et al., 2008).

The classroom/laboratory instruction component of the three-circle model focuses on contextual, inquiry-based instruction and learning through interaction with agricultural knowledge and skills (Phipps et al., 2008). The second component, agricultural youth organizations, is often referenced as the FFA component, as the National FFA Organization (FFA) is the leading agricultural youth organization, with a vast majority of SBAE programs having a charter of the organization (National FFA, 2017). In the FFA component, students develop leadership, personal, and career skills through engagement in the FFA and other agricultural youth organizations (Ball, Bowling, & Bird, 2016; Curry Jr., Warner, Park, & Falk, 2018; Phipps et al., 2008; Russell et al., 2009). The third component, supervised agricultural experience, requires students participate in experimental, service, or work-based learning related to their agricultural interests (Phipps et al., 2008).

While each component of the three-circle model provides a different context for student learning, the overlapping nature of the model indicates the components do not act independently of each other. Rather, opportunities exist to connect experiences of students to enhance learning

(Croom, 2008; Newcomb, McCracken, Warmbrod, & Whittington, 2004). For example, the classroom/laboratory instruction and supervised agricultural experience components may overlap when a student learns proper methods for testing soil fertility in the classroom by bringing a soil sample from the field in which she conducts her grain production supervised agricultural experience. Further, all three components may overlap when this student conducts a community presentation, explaining useful soil testing methods and collecting samples for other grain farmers.

While the overlapping nature of the three-circle model is evident in many examples of SBAE, there exists hesitation to connect the components in some contexts. For example, the overall implementation of supervised agricultural experiences throughout SBAE programs is decreasing (Rank & Retallick, 2017; Retallick, 2010; Wilson & Moore, 2007). Additionally, some AFNR educators avoid connections between career development events (i.e., situated in the FFA component) and the classroom (Ball & Bowling, 2015; Melodia & Meyer, 2001). The latter example is the focus of the current study and is described further below.

Contextualizing the Classroom/Laboratory Component

The classroom/laboratory component of the three-circle model is where a majority of formal instruction takes place in the SBAE program. AFNR content, knowledge, and skills related to topics, known as *segments* in Michigan, are taught within the curriculum (see Table 2; Michigan Center for Career and Technical Education, 2013). A variety of segments exist within the curriculum; however, each segment is not independent of the others. Specific academic standards within segments offer opportunities for AFNR educators to teach content related to a specific context while connecting multiple segments. For example, when teaching a unit on the

context of environmental and natural resources (ENR) management, natural resource systems and environmental service systems may seem like natural segments to include in the curriculum. However, connections to other segments (e.g., safety, animal anatomy and physiology, plant anatomy and physiology, soils and plant nutrition) may provide a more robust understanding of the interconnected systems involved in the management of ENR.

Table 2

Michigan AFNR Curriculum Segments

1. Safety	7. Soils and Plant Nutrition
2. Animal Anatomy and Physiology	8. Plant Culture and Propagation
3. Animal Genetics and Reproduction	9. Natural Resource Systems
4. Domestic Animal Production	10. Environmental Service Systems
5. Animal Health and Nutrition	11. Agriculture Business and Marketing
6. Plant Anatomy and Physiology	12. Career Readiness and Leadership

Note. Segments were retrieved from the gap analysis of the Michigan Center for Career and Technical Education agriculture pathway (2013).

When teaching the curriculum, AFNR educators often use interactive methods to engage students with the content (Newcomb et al., 2004). Cited in promoting student engagement in SBAE is experiential learning (Ewing, Clark, & Threeton, 2014; Pennington, Calico, Edgar, Edgar, & Johnson, 2015; Phipps et al., 2008; Rank & Retallick, 2017; Roberts, 2006). The work of David A. Kolb in experiential learning theory emphasizes the process of learning with the ability to acquire and apply knowledge through an experience (see Figure 5; Kolb & Kolb, 2005). The experiential learning process, therefore, is cyclical, allowing learners to grasp and transform an experience into knowledge by actively engaging in a concrete experience, reflective observation, abstract conceptualization, and active experimentation.

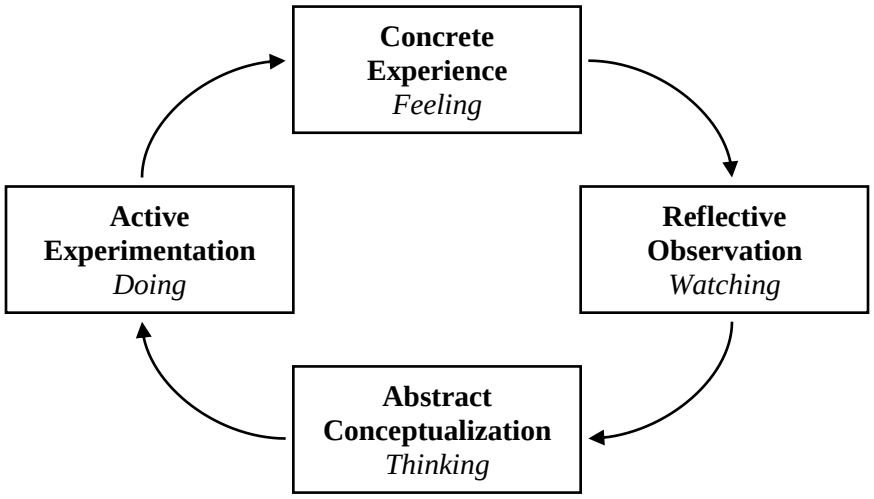


Figure 5. Kolb's model of experiential learning (adapted from Ewing et al., 2014).

In the experiential learning process, learners engage in each component of the cycle pictured above. For example, learners may begin the experiential learning process by engaging in a concrete experience, which provides an opportunity for observation and reflection. Learners may then connect the reflections to prior knowledge as they conceptualize potential implications for future action. Potential implications are then tested through experimentation, providing newly constructed knowledge with which to approach a new experience (Kolb & Kolb, 2005). While the previous example began with engagement in a concrete experience, it is important to note learners can enter the process at any stage (Kolb & Kolb, 2005), as is the case when learners observe an activity prior to engagement.

In the classroom, opportunities exist for students to engage in the experiential learning process through a multitude of experiences which connect to the curriculum (Knobloch, 2003; Newcomb et al., 2004). However, Clark, Threeton, and Ewing (2010) found AFNR educators often fail to engage students in the entire process; rather, opting to focus on the experience itself.

The tendency of AFNR educators to focus on the concrete experience phase of the experiential learning process was also identified by Shoulders and Myers (2013). Additionally, nearly 70 percent of respondents in their study also claimed utilizing three or fewer stages of the experiential learning process in agricultural laboratories, indicating an incomplete use of the process. Though limited use of all components of the experiential learning process has been found, one learning opportunity within SBAE which has been suggested to encourage use of all four phases is career development events (CDEs; Ewing, Clark, & Threeton, 2014), described below.

Contextualizing the FFA Component: Career Development Events

Though strongly connected to classroom and laboratory instruction, there are many opportunities for experiential learning to take place in any component of the SBAE three-circle model. The FFA implements a variety of experiential learning opportunities in which students can engage (Newcomb et al., 2004; Talbert, Vaughn, Croom, & Lee, 2007). CDEs are a prime example of such opportunities to connect experiential learning and the FFA (Ewing et al., 2014). Operationalized at varying levels from local to national, CDEs are an opportunity for students to apply knowledge and skills learned in the classroom to career-specific competitions (Curry Jr. et al., 2018; National FFA, 2016; Phipps et al., 2008).

Currently, 19 CDEs are offered at the national level (National FFA, 2016), while Michigan offers 26 state-level CDEs to students in SBAE (Michigan FFA, n.d.). Each CDE directly relates to a career field in AFNR (see Table 3) and is comprised of a series of activities designed to test student knowledge and skills in the specific context. Additionally, when engaging in CDE activities such as individual practicums and team activities, more transferable

skills such as problem solving, critical thinking, and teamwork are tested (Ball et al., 2016; National FFA, 2016; Newcomb et al., 2004; Russell et al., 2009). Empirical outcomes associated with CDEs are discussed further below.

Table 3

State-Level CDEs in Michigan

AFNR Education	Farm Business Management	Meats Evaluation
Agricultural Communications	Food Science	Milk Quality and Products
Agricultural Mechanics	Floriculture	Nursery/Landscape
Agricultural Sales	Forestry	Poultry
Agronomy	Greenhouse Crop Production	Quiz Bowl, Jr. High
Broiler Contest	Horse Judging	Rabbit (Meat)
Dairy Cattle Judging	Land Conservation	Tractor Driving
Dairy Cattle Showmanship	Livestock Judging	Veterinary Science
Environmental Skills	Marketing	

Note. (Michigan FFA, n.d.). The list does not include events labeled as Leadership Development Events.

Contextualizing Classroom Connections to the Environmental Skills CDE

The current study focuses on the Michigan FFA Environmental Skills CDE which aims "to stimulate student interest, promote environmental and natural resources skills in agricultural education curriculum and provide recognition for those who have demonstrated skills in this area" (Michigan FFA, 2017, p. 1). During the CDE, students work in teams to demonstrate their knowledge and skills of multiple environmental aspects such as water, soil, ecosystems, and wildlife, reptile, amphibian, and aquatic species (Michigan FFA, 2017). The knowledge and skills applied in the Environmental Skills CDE relate to careers with organizations such as the

Michigan Conservation Districts and the Michigan Department of Natural Resources, as well as many other companies and organizations.

While the Environmental Skills CDE fits within the FFA component of the three-circle model of agricultural education, the CDE also aligns closely with the classroom instruction component of the model. Table 4 depicts a cross-walk of the Michigan AFNR curriculum segments with components of the Environmental Skills CDE. The Environmental Skills CDE is most closely related to segments twelve, career readiness and leadership, and nine, natural resource systems; however, it is important to note, the Environmental Skills CDE addresses standards in every Michigan AFNR segment except two (i.e., animal genetics and reproduction, animal health and nutrition).

Table 4

Cross-walk of Michigan AFNR Segments and Environmental Skills CDE Components

CDE Components	Michigan AFNR Education Segments											
	1	2	3	4	5	6	7	8	9	10	11	12
Animal and Bird Identification		X		X					X			X
Ecosystem Analysis	X								X	X	X	X
Environmental Tools and Invasive Species Identification						X			X			X
Fish and Aquatic Organism Identification		X		X					X			X
GPS	X											X
Plant and Tree Identification						X			X			X
Reptile and Amphibian Identification		X		X					X			X
Soils Analysis	X						X	X	X	X	X	X
Water Quality	X								X		X	X

Note. Segments are numbered as follows: 1) Safety, 2) Animal Anatomy and Physiology, 3) Animal Genetics and Reproduction, 4) Domestic Animal Production, 5) Animal Health and Nutrition, 6) Plant Anatomy and Physiology, 7) Soils and Plant Nutrition, 8) Plant Culture and Propagation, 9) Natural Resource Systems, 10) Environmental Service Systems, 11) Agriculture Business and Marketing, and 12) Career Readiness and Leadership.

While the Environmental Skills CDE is closely aligned with the classroom instruction component of the three-circle model, learning related to the CDE components does not end in the classroom. During their participation in the Environmental Skills CDE, students engage in experiential learning. For example, in the soil analysis portion of the Environmental Skills CDE, students participate in the concrete experience phase of Kolb's experiential learning cycle when they handle the soil to determine its physical properties. Students then move to the reflective observation phase as they evaluate their findings. When students relate their findings to prior knowledge of physical and chemical processes of soil, students enter the abstract conceptualization phase. It is in this phase that students may relate the clay texture of the soil to their knowledge of permeability of clay soils. Finally, students move to the last phase of the

experiential learning process, active experimentation, when they identify the environmental impact of the soil and recommend best practices to maintain soil health. Through their engagement in the Environmental Skills CDE, students not only demonstrate knowledge and skills gained in the classroom but continue to develop the knowledge and skills with each new experience. Further, the career-specific knowledge and skills gained from each experience, as well as the ability to engage in the experiential learning process and learn from experiences, may also make students more valued by employers as they enter the workforce (Ewing et al., 2014; Scott & Sarkees-Wircenski, 2008).

CDE Preparation Debate

CDEs, such as Michigan's Environmental Skills event, prove to be valuable opportunities for experiential learning; however, there is debate amongst professionals in SBAE as to the degree to which CDE preparation should be integrated in the classroom curriculum (Ball & Bowling, 2015). There are professionals who feel CDE preparation should not be the focus of curriculum or instruction, arguing AFNR educators should not teach FFA components, such as CDEs, but rather utilize FFA components to support the existing classroom curriculum (Melodia & Meyer, 2001). Others advocate for the utilization of classroom curriculum to prepare students for CDEs (Beekley & Moody, 2002). There are others, yet, who argue both sides of the debate, recognizing the utilization of class time to prepare students for CDEs has its critics (Russell et al., 2009) and the potential to mislead curriculum (Edwards & Booth, 2001), but assert that relating relevant curriculum to the CDE components provides students with valuable opportunities for knowledge and skill acquisition and application (Edwards & Booth, 2001; Russell et al., 2009).

The curriculum and CDE preparation debate is not only evident in theory. A Pennsylvania study by Ewing and colleagues (2014) identified a large gap in practice between AFNR educators and the preparation of their students for CDEs. In the study, 39 percent of teachers reported preparing students for CDEs "during the regular school hours in agricultural education classes" (p. 44), while the remaining 61 percent of teachers reported preparing their students during free periods or outside of regular school hours. Though the teachers in the study did not report their reasoning for the timing of their CDE preparation, these findings indicate a clear divide between CDE preparation strategies. As the preparation strategies utilized by AFNR educators have a direct influence on students (Ball & Bowling, 2015; Ewing et al., 2014), an understanding of student outcomes associated with various CDE preparation strategies is beneficial to student growth and the overall value of SBAE. However, a dearth of literature explores such relationships. Therefore, the current study explores student outcomes associated with varying degrees of CDE and classroom connections.

Philosophy of Career Development Events

One component that may drive the curriculum and CDE debate amongst SBAE professionals is the philosophy of CDEs held by individual AFNR educators. Outcomes AFNR educators expect from CDE participation vary (Ball et al., 2016; Russell et al., 2009); however, three main themes arise from the literature a) student development, b) classroom extension, and c) competition and achievement.

Student development. When considering CDEs, AFNR educators identify opportunities for student development as drivers of participation (Ball et al., 2016; Russell et al., 2009). As a

primary goal of CDEs is to develop career readiness skills (National FFA, 2016), many AFNR educators indicate development of career-specific knowledge and skills is a motivating factor of participation (Ball et al., 2016; Russell et al., 2009). In a study by Russell et al. (2009), one AFNR educator stressed skills demonstrated in CDEs are "some of the skills that they [students] will carry right on into their colleges and careers" (p. 111). Additionally, the application of diverse knowledge bases, such as science and mathematics, to the CDE context encourages students to make connections between core subject area knowledge and career-specific tasks (Ball et al., 2016) which benefits students in their future careers.

While the focus of CDEs is career development, AFNR educators also cite the importance of leadership and life skill development through CDE participation (Ball et al., 2016; McKim, Pauley, Velez, & Sorensen, 2017; Russell et al., 2009). In their 2017 study, McKim and colleagues found AFNR educators intended to teach leadership in over 65 percent of FFA experiences, thus illuminating the value of leadership development among FFA experiences, in which CDEs are included. Literature specifically related to leadership development through CDEs identifies various leadership skills such as teamwork and conflict management as outcomes of CDE participation (Russell et al., 2009).

In addition to leadership development, AFNR educators identify the occurrence of life-skill development through CDEs (Ball et al., 2016; Russell et al., 2009). Attributes such as pride (Ball et al., 2016; Russell et al., 2009), confidence, and responsibility, and skills such as public speaking and interviewing (Russell et al., 2009) are identified as specific life-skill developmental outcomes.

Classroom extension. The role of CDEs in support of classroom curriculum is supported by the National FFA Organization (2016), which states, "Events [CDEs] are intended to be an outgrowth of instruction" (p. iii). The value of CDE participation as an extension of classroom learning is confirmed by AFNR educators who indicate CDEs provide opportunities for students to apply knowledge and skills gained during classroom instruction (Edwards & Booth, 2001; Russell et al., 2009). Additionally, CDEs provide context for student learning of agricultural career-related and core academic subject area knowledge and skills (Russell et al., 2009). Another opportunity valued by AFNR educators is the opportunity to assess student knowledge and skills. In a case study, Ball et al. (2016) found an AFNR educator assessed student learning during CDE preparation to identify areas where more scaffolded instruction was required as well as to identify students who could teach other team members.

Competition and achievement. In addition to student development and learning outcomes, AFNR educators indicate competition and achievement as a motivating outcome of CDE participation (Ball et al., 2016; Russell et al., 2009). In fact, AFNR educators participating at the national level indicate competition is the most important reason for student participation in CDEs, with over 86 percent of teachers labeling competition as important or very important (Croom, Moore, & Armbruster, 2009). CDEs provide copious opportunities for students to compete, including during events, practices, and even tryouts for the team (Ball et al., 2016); however, competition during events provides most opportunities to formally recognize student success. Team and individual success are measured by ranking at the conclusion of each event (Michigan FFA, 2017; National FFA, 2016). Rankings are then used to present awards such as

certificates, award pins, or plaques to students and SBAE programs for their success (Michigan FFA, 2011).

Such awards for achievement play a role in student motivation for participation in CDEs (Russell et al., 2009); however, students do not only compete for material tokens. High achievement in CDEs is sometimes rewarded with opportunities for future success in the form of scholarships and industry recognition. For example, the Michigan SBAE student placing first in the agriculture, food, and natural resources education CDE receives a scholarship to Michigan State University for the pursuit of an AFNR education degree (Everett et al., 2016). In addition to scholarships, high ranking students may also receive industry recognition in their preferred career field as CDEs are developed with input from relevant industry partners (National FFA, 2016) who encourage their employees to assist with the judging of various events. Students may also benefit from showcasing their achievement on their resumes and during interviews, indicating attainment of career-specific ability and knowledge to potential employers.

In addition to individual student recognition, high placings in CDEs provide opportunities to build a reputation of success for AFNR programs and their schools. Top placings at state and national-level events earn AFNR programs banners or trophies, which are often displayed in the classroom or the school building (Russell et al., 2009). The display of tokens won encourages students and AFNR educators to continue the pursuit of success in CDEs (Russell et al., 2009), thus increasing competition to maintain the tradition of success.

Student Learning Implications: Transfer

Though success is often measured by top placings at CDEs, it is important to determine whether participating students can also be successful outside of the CDE context by transferring

knowledge and skills to other applications within their prospective career-paths. The transfer of knowledge and skills from one application to another requires a deep understanding of related concepts. Bloom's Taxonomy of Educational Objectives aids in identifying depth of understanding by offering a hierarchical ranking of categories of cognition from simple, concrete objectives to complex, abstract objectives (Krathwohl, 2002). First published by Benjamin S. Bloom in 1956, the Taxonomy of Educational Objectives, hereafter referred to as Bloom's Taxonomy, identified six major categories of cognition. Bloom arranged each category (i.e., knowledge, comprehension, application, analysis, synthesis, and evaluation) in order from low-order cognition to high-order cognition. Later, in 2001, Bloom's Taxonomy was revised, reversing the order of the highest two categories to reflect current understanding of cognition (see Figure 6) (Anderson & Krathwohl, 2001).

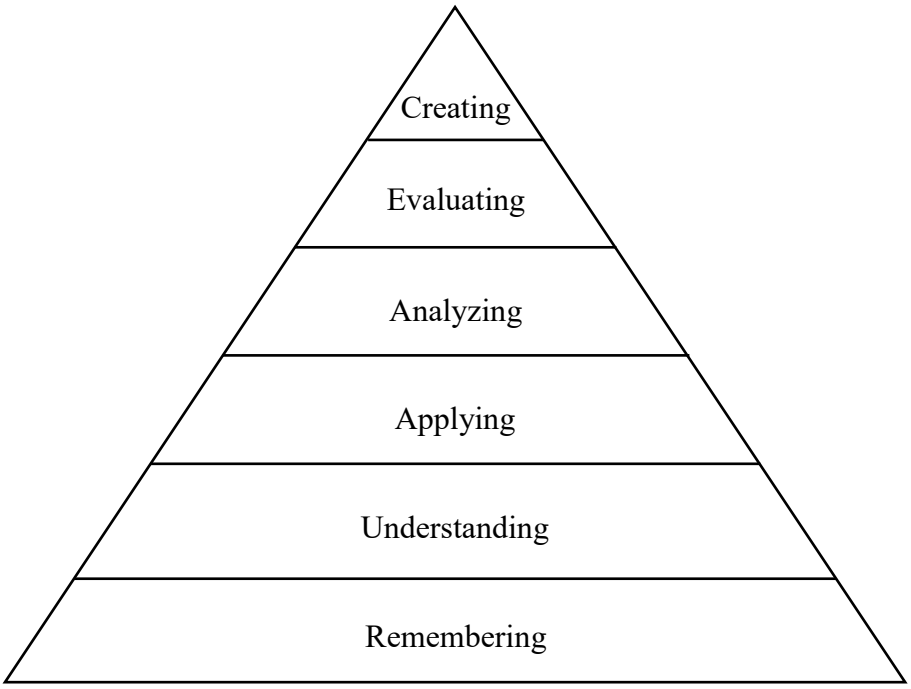


Figure 6. Bloom's Taxonomy, revised (Anderson & Krathwohl, 2001).

The bottom three categories of Bloom's Taxonomy (i.e., remembering, understanding, and applying) are considered low-order cognitive skills. The lowest order objective, remembering, is classified as the recognition or recall of knowledge as basic as terminology or as complex as methodology (Bloom, 1956). Once students have mastered remembering, they can move to the understanding objective. This objective emphasizes the comprehension of communication, ensuring learners not only know what is being communicated, but understand its meaning and intent (Bloom, 1956). The next step in Bloom's Taxonomy is applying, which is demonstrated when a learner can apply an abstraction of his or her understanding to a new problem (Bloom, 1956).

Building from the foundation of the low-order cognitive skills, the top three categories of Bloom's taxonomy (i.e., analyzing, evaluating, and creating) are considered high-order cognitive skills. Analysis requires the learner to determine the organization and relationships between components of the material (Bloom, 1956). Once a learner is able to analyze material, he or she can proceed to evaluating material where judgements can be made on the value of the material for a specific purpose (Bloom, 1956). The final and highest-order cognitive objective is creation. The completion of this objective would indicate the ability of the learner to synthesize materials into patterns or structures which were not previously observed (Bloom, 1956). The use and successful completion of these high-order cognitive objectives correlates to the ability of students to transfer knowledge to other tasks and contexts (Adams, 2015; Reece, 2007).

The transfer of knowledge between classroom and workplace settings has been studied over time, especially in career and technical education (Daniels, Lauder, & Porter, 2009; Kilbrink & Bjurulf, 2013; Konkola, Tuomi-Gröhn, Lambert, & Ludvigsen, 2007). In interviews with vocational education teachers and supervisors, Kilbrink and Bjurulf (2013) found the

transfer of a) basic knowledge, b) principles and skills, c) written materials, and d) experiences to be crucial for classroom and workplace success. Konkola et al. (2007) suggested developmental transfer as a best practice for integration of these four themes. The practice of developmental transfer is accomplished through the ideology of learning as a process through a real-world scenario, developed with cooperation between school and workplace, where students can integrate the school system and workplace system to identify an overlap in necessary knowledge and skills (Konkola et al., 2007). The focus here is not to emphasize only school or workplace-specific knowledge and skills attainment, but to provide students with the tools they need to approach new situations with confidence and ability (Konkola et al., 2007). CDEs provide opportunities to operationalize developmental transfer by providing a real-world, career-specific context to which students can simultaneously apply knowledge and skills gained in the classroom and learn or refine knowledge and skills during the experience.

While preparing students with tools to increase their ability to transfer knowledge and skills from classroom to workplace is ideal, it is under-explored in the literature. Daniels et al. (2009) demonstrates the lack of evidence of transfer when they relate learning and knowledge to an iceberg. They liken the learning of knowledge for educational assessment to the portion of the iceberg above the water as it is "explicit and well supported" (p. 82). The ability to transfer that knowledge to other situations is represented by the portion of the iceberg which is hidden by the ocean as people know it is there, but it is largely unexplored. Transposing this relationship to SBAE and career preparation, the knowledge students learn and apply to CDEs could be considered the visible portion of the iceberg. Student knowledge and success in the context of CDEs is well documented by SBAE professionals; however, little is known about student ability

to apply such knowledge and skills to other situations, or how this ability is affected by CDE preparation strategy.

CHAPTER 3: METHODS

The current study of the relationship between classroom curriculum and preparation of students for the Environmental Skills career development event (CDE) amongst Michigan agriculture, food, and natural resources (AFNR) educators, and the impact of this relationship on student Environmental Skills CDE performance and knowledge transfer was conducted using quantitative methods. Survey methodology was used to collect data from Michigan AFNR educators regarding their environment and natural resources (ENR) curriculum and Environmental Skills CDE preparation. Student performance data was collected from Michigan FFA officials following the release of the Environmental Skills CDE rankings.

Population, Sample, and Data Collection

The target population included all school-based, Michigan AFNR educators during the 2017-2018 school year. A census of the target population (N = 131) was attempted. Names and email addresses for the target population were retrieved from the Michigan AFNR frame, obtained by State Supervisor for AFNR education and State FFA Advisor, Mark Forbush. Due to frame error, potential respondents were limited to 127. Usable data were provided by 92 respondents (n = 92), resulting in a 72% response rate.

Data were collected April through June of 2018, following completion of the Michigan FFA Agriculture Skills CDE day, held on April 20, 2018. Data collection during the selected period ensured proximity to the time of CDE preparation. Additionally, contact with AFNR educators during the selected period attempted to avoid reaching out during an especially busy time of the year for AFNR educators in Michigan, with the expectation of increasing response rate.

Dillman's (2007) tailored design method was used to collect the data. All five points of contact were conducted via email, which included a link to take the online Qualtrics® survey. Non-response bias was analyzed by comparing on-time respondents (i.e., those responding within the first three points of contact; $n = 65$) to late respondents (i.e., those responding within the last two points of contact; $n = 27$) within the variables of interest (i.e., philosophy of CDEs: Chi-Square test and CDECS: Independent Samples T-test). No evidence of statistically significant differences was found, thus rejecting non-response bias in the current analysis (Lindner, Murphy, & Briers, 2001). Rejection of non-response bias is further supported through a comparison of respondent demographics against the target population, in which the respondent demographics were determined to be similar to the known demographics of the population.

Instrumentation

The survey instrument was comprised of three main sections of interest (i.e., philosophy of CDEs, Environmental Skills CDE and Curriculum Spectrum [Environmental Skills CDECS], and respondent characteristics).

Philosophy of CDEs. The first section of the instrument was the researcher-constructed philosophy of CDEs item which asked respondents to rank nine outcomes of CDE participation (i.e., apply classroom learning, assess student proficiency, build/maintain a reputation of success, compete and/or win, develop career-specific knowledge, develop career-specific skills, develop leadership and life skills, provide a context for learning, and provide student recognition), from 1 (*most important*) to 9 (*least important*). The nine outcomes of CDE participation included in the construct were adapted from Ball et al. (2016) and Russell et al. (2009), who, in their respective

studies, identified the outcomes as motivating factors for involvement in CDEs. Both Ball et al. (2016) and Russell et al. (2009) identified competition, student recognition, and development of leadership and life skills as motivating outcomes of CDEs, while Russell et al. (2009) recognized outcomes of maintaining traditions of success, providing a context for learning, applying classroom learning, and assessing student knowledge. Additionally, outcomes of career-specific knowledge and skills were identified by Ball et al. (2016).

The ranking of outcomes associated with CDE engagement was utilized to determine the respondent's philosophy of CDEs. Three specific domains existed within the philosophy of CDEs item, (a) student development, (b) classroom extension, and (c) competition and achievement. Additionally, each domain was comprised of three related outcomes. The three domains representing general philosophies of CDEs were synthesized from existing literature (Ball et al., 2016; Russell et al., 2009) and may not fully represent the CDE philosophy of each Michigan AFNR educator. However, a review of additional literature related to CDE preparation (Beekley & Moody, 2002; Edwards & Booth, 2001) reveals similar outcomes represented among the three identified philosophies; therefore, the three domains are considered representative of current understanding of AFNR educator CDE philosophy. A table of outcomes and associated domains is found in the data analysis section below.

It is important to note the construction of the philosophy of CDEs item asked respondents to rank the nine outcomes of CDEs in order of importance rather than identify one of the three philosophies of CDEs. This process was intended to limit the possibility of response bias related to respondents self-selecting the philosophy which they felt sounded most appealing, thus allowing for a more authentic representation of Michigan AFNR educator thoughts and attitudes toward purposes for CDE engagement.

Environmental Skills CDE and Curriculum Spectrum (Environmental Skills CDECS). Following the philosophy of CDEs section, participants were asked to indicate whether they were affiliated (i.e., trained, helped train, or provided support) with a 2018 Environmental Skills CDE team. Only those who indicated affiliation were authorized to respond to the second section of interest, the Environmental Skills CDECS construct, which measured the influence of the Environmental Skills CDE on ENR curriculum. In the researcher-developed Environmental Skills CDECS construct, respondents indicated their level of agreeance to four statements on a sliding scale from 0 (*strongly disagree*) to 100 (*strongly agree*). Each statement (i.e., I conduct a replication of the [Environmental Skills] CDE for students to complete during ENR instruction; All students in the program receive the same instruction of ENR *content* regardless of whether or not they participate in the [Environmental Skills] CDE; All students in the program receive the same instruction of ENR *applied skills* regardless of whether or not they participate in the [Environmental Skills] CDE; and I include problem solving components of the [Environmental Skills] CDE in classroom instruction of ENR content and skills) was adapted from findings of Ewing et al. (2014) related to Pennsylvania AFNR educator techniques for preparing students for CDEs.

Demographics. The final section of the instrument allowed respondents to report various characteristics of interest including age, sex, years of AFNR teaching experience, certification path, years of experience preparing students for the Environmental Skills CDE, and participation in professional development related to the Environmental Skills CDE.

Environmental Skills CDE team data. Data associated with student performance in the Environmental Skills CDE were retrieved from a publicly-available score report on the Michigan FFA website. Data of interest included school of attendance, overall score, and scores of each component of the Environmental Skills CDE, all of which were available at the team level. To determine high-order educational components of the Environmental Skills CDE, objectives of each component were evaluated using Bloom's Taxonomy of Educational Objectives (Bloom, 1956). An expanded discussion regarding the identification of high-order educational components of the Environmental Skills CDE is found in the data analysis section below.

Validity and Reliability

Face and content validity were evaluated by a panel of experts, comprised of five faculty in AFNR education. Feedback provided during evaluation assisted in improving user interaction with the instrument, including suggestions related to question response type and organization, as well as question clarity and improved alignment with common practice related specifically to the Environmental Skills CDE in Michigan, such as the absence of qualifying events to advance to the state event.

Reliability was determined via a pilot test among Ohio agricultural educators (n = 45) who prepared students for a comparable CDE (i.e., Wildlife Management). During the initial test for reliability, the construct utilized in the current study, CDECS, did not meet the threshold for reliability among the pilot population. However, after further review, one item within the scale (i.e., I utilize regularly-scheduled class time to prepare students for the [Wildlife Management] CDE) was identified as an outlier and removed. As other questions within the scale and throughout the survey collected data measuring the use of class time to prepare students for the

Wildlife Management CDE, the omittance of the item was not deemed a threat to content validity. Additionally, removal of the item from the CDECS resulted in reliability of the construct which exceeded the threshold among the pilot population (Chronbach's Alpha = .72; Fraenkel & Wallen, 2000). Additionally, reliability was established *post hoc* via an analysis of respondents to the current study (Chronbach's Alpha = .85; Fraenkel & Wallen, 2000).

Institutional Review Board Approval

Approval for the current study was obtained through the Institutional Review Board (IRB) at Michigan State University on April 11, 2018. After submission and review of the research protocol, participant consent form (see Appendix B), and survey instrument (see Appendix C), the study was deemed exempt under categories one, two, and four (see Appendix A).

Data Analysis

Objective one. Research objective one, determining the philosophy of CDEs held by Michigan AFNR educators, was accomplished using the philosophy of CDEs measure. First, each of the nine outcomes of CDEs ranked in the measure were aligned to one of three general philosophies of CDEs, (a) student development, (b) classroom extension, and (c) competition and achievement (see Table 5). The three general philosophies of CDEs were synthesized from findings related to motivations for engaging students in CDEs (Ball et al., 2016; Russell et al., 2009), as discussed previously in the instrumentation section.

Table 5

CDE Outcome Items Linked to General Philosophy of CDEs

Outcome Item	Philosophy of CDEs
Apply classroom learning. Assess student proficiency. Provide a context for learning.	Classroom Extension
Build/maintain a reputation of success. Compete and/or win. Provide student recognition.	Competition and Achievement
Develop career-specific knowledge. Develop career-specific skills. Develop leadership and life skills.	Student Development

Note. Adapted from Ball et al. (2016) and Russell et al. (2009).

For each respondent, the rank of CDE outcomes associated with each general philosophy of CDEs was summated. The philosophy category which received the lowest summated score (i.e., highest original rank) was recorded as the respondent's general philosophy of CDEs. Tied scores were broken by recording the philosophy category associated with the top ranked outcome item as the respondent's general philosophy of CDEs. An example of the process is provided below (see Table 6). Descriptive statistics were utilized to describe the mean ranks of outcome items and the distribution of each general philosophy of CDEs among the sample.

Table 6

Example Ranking Process to Determine General Philosophy of CDEs

	Respondent 1			Respondent 2			Respondent 3		
Ranked Item	Ext.	Comp.	Dev.	Ext.	Comp.	Dev.	Ext.	Comp.	Dev.
Apply	1			2			4		
Assess	2			6			5		
Context	4			5			6		

Ext. Total	**7**			**13**			**15**	
Reputation		6			1			9
Competition		5			3			7
Recognition		9			9			8
Comp. Total		**20**			**13**			**24**
Knowledge			7			7		3
Skill			3			4		2
Leadership			8			8		1
Dev. Total			**18**			**19**		**6**
General Philosophy	Classroom Extension			Competition and Achievement			Student Development	

Note. In the table, general CDE philosophy domains are abbreviated (i.e., "dev." indicates student development, "ext." indicates classroom extension, and "comp." indicates competition and achievement) as well as items within each domain. See Table 5 for the complete item names. Additionally, the tie score between the "ext." total and "comp." total for respondent two was broken by identifying the top-ranking item (i.e., reputation) and recording the domain in which the item exists (i.e., competition and achievement).

Objectives two, three, and four utilized a subsample of the target population, which includes only Michigan AFNR educators who prepared students for the 2017-2018 Environmental Skills CDE (n = 42).

Objective two. To accomplish objective two, determining the alignment between the Environmental Skills CDE and Michigan AFNR educators' ENR curriculum, the Environmental Skills CDECS construct was utilized. Construct items were averaged to determine an overall alignment between the Environmental Skills CDE and ENR curriculum, reported on a scale from 0% (*completely unaligned*) to 100% (*completely aligned*). For the purposes of the current study, CDECS alignment from 0-40 is referred to as 'minimal, 40-70 'moderate,' and 70-100 'extensive.' A CDECS alignment was recorded for each respondent and the average score for respondents is described in the findings.

Objective three. Research objective three sought to describe the relationship between Michigan AFNR educator characteristics and the alignment between the Environmental Skills CDE and ENR curriculum. Statistical mean comparisons were analyzed using eight characteristics of interest, including philosophy of CDEs (i.e., identified in objective one), as independent variables and the Environmental Skills CDECS alignment score as the dependent variable. A one-way ANOVA was used to analyze the relationships with the independent variables age, years of preparing students for the Environmental Skills CDE, career stage (i.e., categorized from years of AFNR teaching experience), and philosophy of CDEs. For the preceding analyses, effect sizes were established as "small effect," Cohen's $d = .20$; "medium effect," Cohen's $d = .50$; and "large effect," Cohen's $d = .80$ (Cohen, 1988). Additionally, an independent-samples t-test was used to analyze the relationships with the independent variables sex, certification path, and Environmental Skills CDE professional development participation, with effect sizes established as "small," $\eta = .100$; "medium," $\eta = .243$; and "large," $\eta = .371$ (Cohen, 1988). The threshold for statistical significance used in objective three was set according to existing norms in social sciences research ($\alpha < .05$; Hoy, 2010). Inferential statistics are reported for each relationship; however, these findings should not be generalized due to low in-group sizes (e.g., late career teachers: $n = 7$).

Objective four. Objective four sought to explain the relationship between the Environmental Skills CDE and ENR curriculum alignment and student performance in the Environmental Skills CDE. This objective was initiated by identifying the high-order educational components of the Environmental Skills CDE. To identify the high-order educational objectives, assessments of knowledge and skills within each component of the Environmental Skills CDE

were identified in the event handbook (Michigan FFA, 217) and were evaluated to determine their position among Bloom's Taxonomy (see Table 7; Bloom, 1956). For example, the plant and tree identification component of the Environmental Skills CDE requires students identify plant species, therefore, is positioned at the bottom of Bloom's taxonomy. Alternatively, the water quality component requires students analyze water quality data obtained from the site, therefore is positioned in the top of Bloom's educational objectives.

Table 7

Michigan Environmental Skills CDE Components Linked to High and Low-order Cognitive Objectives

CDE Component	Component Objectives	Cognitive Level
Ecosystems Analysis	Assess the site location considering associated products and quality	High-order
GPS	Operate a GPS unit to answer questions related to the site location	High-order
Soils Analysis	Evaluate a soil pit for soil properties and environmental impact	High-order
Water Quality	Analyze water quality data obtained from site location	High-order
Animal and Bird Identification	Identify common animals and birds	Low-order
Environmental Tools and Invasive Species Identification	Identify common environmental tools and invasive species	Low-order
Fish and Aquatic Organism Identification	Identify common fish and aquatic organisms	Low-order
Plant and Tree Identification	Identify common plants and trees	Low-order
Reptile and Amphibian Identification	Identify common reptiles and amphibians	Low-order

Note. CDE components were retrieved from the Michigan FFA Environmental Skills CDE Handbook (Michigan FFA, 2017) and aligned to Bloom's Taxonomy of Educational Objectives (Bloom, 1956).

Scores from each high-order CDE component were then summated and averaged to determine an overall high-order team score. Additionally, for schools with two or more teams, team scores from the highest scoring team from the school were recorded for each variable of interest (i.e., overall team score and high-order component score). For example, if a school entered two teams and team 1 scored 117 points on the high-order components and 300 on the overall score while team 2 scored 110 points on high-order components and 340 on the overall score, the high-order score from team 1 (i.e., 117 points) would be the high-order score of record and the overall score from team 2 (i.e., 340 points) would be the overall score of record for the

school. Correlations between the independent variable, Environmental Skills CDECS alignment, and dependent variables, overall team score and high-order component team score were analyzed, with the threshold for statistical significance set at $\alpha < .05$ (Hoy, 2010) and effect sizes established as "small effect," $r = .10$; "medium effect," $r = .30$; and "large effect," $r = .50$ (Cohen, 1988).

CHAPTER 4: FINDINGS

Objective One

The purpose of research objective one was to determine the philosophy of career development events (CDEs) held by Michigan agriculture, food, and natural resources (AFNR) educators. Mean ranks of CDE outcomes indicate application of classroom learning (M = 3.14; SD = 1.90) as the most important outcome and competition and/or winning (M = 7.66; SD = 1.87) as the least important outcome of CDEs (see Table 8). However, outcomes related to student development consistently received highest rankings (develop career-specific knowledge: M = 3.64; SD = 1.85; develop career-specific skills: M = 3.47; SD = 1.69; develop leadership and life skills: M = 3.21; SD = 2.15), while outcomes related to competition and achievement consistently received lowest rankings (build/maintain a reputation of success: M = 7.18; SD = 1.87; compete and/or win: M = 7.66; SD = 1.87; provide student recognition: M = 6.90; SD = 1.69).

Table 8

Michigan AFNR Educators' Ranking of CDE Outcomes

	f	*M*	*SD*	Min	Max
Classroom Extension					
Apply classroom learning.	92	3.14	1.90	1	9
Provide a context for learning.	92	3.96	2.00	1	9
Assess student proficiency.	92	5.84	1.97	1	9
Competition and Achievement					
Provide student recognition.	92	6.90	1.69	2	9
Build/maintain a reputation of success.	92	7.18	1.87	1	9
Compete and/or win.	92	7.66	1.87	1	9
Student Development					
Develop leadership and life skills.	92	3.21	2.15	1	8
Develop career-specific skills.	92	3.47	1.69	1	8
Develop career-specific knowledge.	92	3.64	1.85	1	9

Note. Values represent ranked items from 1 (*most important*) to 9 (*least important*); therefore, lower means indicate higher ranked, more important, outcomes.

Analysis of Michigan AFNR educators' general philosophy of CDEs indicates most teachers align with the philosophy of student development (*f* = 58; 63.0%; see Table 9). The classroom extension philosophy (*f* = 30; 32.6%) was the second most frequent philosophy amongst Michigan AFNR educators, while the least held philosophy was competition and achievement (*f* = 4; 4.3%).

Table 9

Michigan AFNR Educators' Philosophy of CDEs

	f	%
Student Development	58	63.0
Classroom Extension	30	32.6
Competition and Achievement	4	4.3

Objective Two

The purpose of research objective two was to determine the alignment between the Environmental Skills CDE and Michigan AFNR educators' environment and natural resources (ENR) curriculum. It is important to note, the population for the current objective as well as objectives three and four included only Michigan AFNR educators who indicated involvement with the Environmental Skills CDE. While the influence of the Environmental Skills CDE on curriculum varied among educators (min = 10; max = 100), the Career Development Event and Curriculum Spectrum (CDECS) indicated an overall moderate alignment (*M* = 66.10%; *SD* = 23.55) between the Environmental Skills CDE and Michigan AFNR educators' curriculum related to the environment and natural resources (see Table 10).

Table 10

Alignment Between the Environmental Skills CDE and Michigan AFNR Educators' Environment and Natural Resources Curriculum

	f	*M*	*SD*	Min	Max
Total Alignment	42	66.10	23.55	10.00	100.00

Note. Alignment was measured using the CDECS and is reported on a scale from 0% (*completely unaligned*) to 100% (*completely aligned*) and includes only Michigan AFNR educators who prepared students for the Environmental Skills CDE.

Objective Three

In research objective three the relationship between Michigan AFNR educator characteristics and the alignment between the Environmental Skills CDE and ENR curriculum was described. Findings are displayed by characteristics of interest, with relationships analyzed by an ANOVA (see Table 11) displayed separately from relationships analyzed with t-tests (see Table 12) for increased readability.

Table 11

Relationship Between AFNR Educator Characteristics and Environmental Skills CDECS Alignment: Analysis of Variance Tests

	f	*M*	*SD*	*df*	*F*	*p*	η
Philosophy of CDEs	42			2	1.024	.368	.223
Classroom Extension	18	60.13	21.65				
Student Development	23	70.45	24.91				
Competition and Achievement	1	73.75	-				
Career Stage	37			2	.630	.538	.189
Early-Career (0-5 years)	12	70.54	20.38				
Mid-Career (6-19 years)	18	69.94	21.43				
Late-Career (20+ years)	7	58.93	34.34				
Years Preparing Students for the Environmental Skills CDE	36			2	.426	.656	.159
0 to 5 years	18	71.60	21.23				
6 to 19 years	13	66.37	24.08				
20 or more years	5	61.05	35.35				
Age	37			2	.086	.918	.071
20 to 34	13	68.79	22.97				
35 to 49	19	66.66	25.56				
50 to 65	5	71.45	22.25				

Note. Career stage refers to years of AFNR teaching experience. Means indicate average alignment between the Environmental Skills CDE and classroom curriculum as measured using the CDECS, which ranges in scale from 0% (*completely unaligned*) to 100% (*completely aligned*).

Table 12

Relationship Between AFNR Educator Characteristics and Environmental Skills CDECS Alignment: T-Tests

	f	*M*	*SD*	*df*	*t*	*p*	Cohen's *d*
Environmental Skills CDE Professional Development	37			35	.856	.398	.308
No Participation	27	66.02	23.04				
Participation	10	73.55	25.73				
Certification Path	37			35	.753	.456	.300
Traditional Teacher Prep Program	27	66.26	25.50				
Alternative Certification	10	72.90	18.12				
Sex	37			35	.161	.873	.053
Female	21	67.50	24.27				
Male	16	68.78	23.64				

Note. Means indicate average alignment between the Environmental Skills CDE and classroom curriculum as measured using the CDECS, which ranges in scale from 0% (*completely unaligned*) to 100% (*completely aligned*).

Across all characteristics of interest, no statistical significance was found in relation to the dependent variable, Environmental Skills CDECS alignment. However, a small effect size was determined for all characteristics except age ($\eta = .071$) and sex (Cohen's $d = .053$), both of which were negligible (Cohen, 1998).

Michigan AFNR educators early in their careers ($M = 70.54\%$; $SD = 20.38$) and those who have prepared students for the Environmental Skills CDE for five or fewer years ($M = 71.60\%$; $SD = 21.23$) indicated higher alignment between the Environmental Skills CDE and ENR curriculum than educators with more teaching (Late Career: $M = 58.93\%$; $SD = 34.34$) and Environmental Skills CDE preparation (20 or more years: $M = 61.05\%$; $SD = 35.35$) experience.

The preparation of Michigan AFNR educators, in both teacher certification (Cohen's $d = .300$) and Environmental Skills professional development (Cohen's $d = .308$), also had a small effect on alignment between the Environmental Skills CDE and ENR curriculum (Cohen, 1998). Teachers prepared in a traditional teacher preparation program ($M = 66.26\%$; $SD = 25.50$)

reported alignment nearly six and a half points less than their alternatively certified peers (*M* = 72.90%; *SD* = 18.12) and teachers who engaged in an Environmental Skills CDE professional development event (*M* = 73.55%; *SD* = 25.73) reported alignment seven and a half points higher than those who did not engage (*M* = 66.02%; *SD* = 23.04).

Findings from the characteristic of interest, Michigan AFNR educators' philosophies of CDEs, as identified in objective one, also indicated a small effect on the Environmental Skills CDECS alignment ($\eta = .223$; Cohen, 1998). The educator with the philosophy of competition and achievement indicated the highest alignment between the Environmental Skills CDE and environment and natural resources curriculum (73.75%); whereas teachers with the lowest alignment (*M* = 60.13%; *SD* = 21.65) held the classroom extension philosophy. Teachers with the philosophy of student development indicated Environmental Skills CDECS alignment at 70.45% (*SD* = 24.91).

Objective Four

The purpose of objective four was to determine the relationship between the alignment of the Environmental Skills CDE and Michigan AFNR educators' environment and natural resources curriculum and students' overall score and performance on high-order educational objectives in the Environmental Skills CDE (see Table 13). The correlations between both overall team score ($r = .14$; $p = .446$) and high order team score ($r = .13$; $p = .476$) were similar, both having a small, but statistically insignificant, positive correlation with Environmental Skills CDECS alignment.

Table 13

Relationship between Environmental Skills CDECS Alignment and Environmental Skills CDE Component Scores

	Independent Variable: Environmental Skills CDECS	
Scored CDE Component	Pearson Correlation (*r*)	*p*-value
Overall Team Score	.14	.446
High Order Team Score	.13	.476

CHAPTER 5: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

As school-based agricultural education (SBAE) professionals seek to provide opportunities for students to engage in personal and career development through engagement in AFNR programs, knowledge and practice related to connections between components of the three-circle model must be evaluated. The current study examined connections between the classroom and FFA components of the model, by focusing on the overlap between classroom curriculum and the Michigan FFA Environmental Skills CDE.

In chapters one and two, the professional debate regarding connections between classroom curriculum and career development events (CDEs) was discussed. While existing literature has explored curriculum and CDE connections through empirical research (Ewing et al., 2014), no empirical studies have been conducted exploring student outcomes related to curriculum and CDE connections. The gap in existing literature limits understanding of teaching practices and CDE preparation strategies which benefit student learning and development.

Grounded in Bronfenbrenner's (1979b; 2005) ecological systems theory, the current study sought to overcome the existing limitations of previous research by determining the relationship between Michigan agriculture, food, and natural resources (AFNR) educators' environment and natural resources (ENR) curriculum and CDE alignment and student learning outcomes associated with the Michigan FFA Environmental Skills CDE. To accomplish its purpose, the study was guided by the following research objectives.

1. Determine the philosophy of CDEs held by Michigan AFNR educators.
2. Measure the alignment between the Environmental Skills CDE and Michigan AFNR educators' ENR curriculum, henceforth referred to as curriculum-CDE alignment.

3. Describe the relationship between Michigan AFNR educator characteristics and their curriculum-CDE alignment.
4. Explain the relationship between Michigan AFNR educators' curriculum-CDE alignment and student performance in the Environmental Skills CDE.

To accomplish the research objectives, a quantitative survey methodology was utilized. The survey consisted of two, researcher-developed constructs measuring philosophy of CDEs and Environmental Skills CDE and Curriculum Spectrum (CDECS) alignment, as well as demographic questions for the target population, all school-based Michigan AFNR educators during the 2017-2018 school year. Additionally, student data related to performance in the Michigan FFA Environmental Skills CDE were obtained from publicly-released documents. Findings related to each research objective were described in the previous chapter and are discussed further below.

Discussion of Findings

Objective one. In research objective one, the philosophies of CDEs held by Michigan AFNR educators were explored. While findings indicate Michigan AFNR educators value the application of classroom learning as the most important outcome of CDEs, the majority of Michigan AFNR educators hold a student development philosophy of CDEs, more consistently ranking outcomes associated with the development of leadership, life, and career-specific knowledge and skills as more important CDE outcomes. Additionally, the philosophy of CDEs held by the fewest Michigan AFNR educators is competition and achievement, indicating outcomes such as competition and winning, developing a reputation of success, and providing

student recognition are not as important as opportunities for student development or classroom extension.

Findings related to the philosophies of CDEs held by Michigan AFNR educators contradict findings of Croom et al. (2009). In their study, Croom and colleagues (2009) found AFNR educators with teams at national level CDEs indicate competition as the most important reason for student participation in CDEs. The discrepancy between findings may be explained by the level of competition in which AFNR educators engage their students, with those advancing to the highest level of competition (i.e., national-level CDEs) valuing competition more than those who participate in more local-level CDEs. However, the current study did not differentiate between AFNR educators who had advanced to national competitions and those who had not.

Objective two. In the second research objective, alignment between the Environmental Skills CDE and Michigan AFNR educators' ENR curriculum was measured using the Environmental Skills CDECS. Though alignment varied among respondents from 10% to 100%, the average Environmental Skills CDECS alignment was 66.1%. The finding supports existing literature regarding the overlapping nature of the three-circle model of agricultural education (Croom, 2008; Newcomb et al., 2004), indicating, on average, Michigan AFNR educators who prepare students for the Environmental Skills CDE establish moderate connections between the CDE and ENR curriculum. When comparing the average Environmental Skills CDECS alignment reported by Michigan AFNR educators to the ongoing professional debate regarding the degree to which CDE preparation should be integrated in the classroom curriculum (Ball & Bowling, 2015; Beekley & Moody, 2002; Edwards & Booth, 2001; Melodia & Meyer, 2001; Russell et al., 2009), it can be reasoned the moderate alignment indicates Michigan AFNR

educators value connections between the Environmental Skills CDE and ENR curriculum; however, the large range and standard deviation of scores indicates disagreement as to the ideal Environmental Skills CDECS alignment.

Objective three. Findings from research objective three indicate Environmental Skills CDECS alignment varies among groups of AFNR educators with differing personal characteristics. While no statistically significant relationships were identified, small effect sizes between the Environmental Skills CDECS and various personal characteristics (i.e., Environmental Skills CDE professional development participation, certification path, philosophy of CDEs, career stage, and years of experience preparing students for the Environmental Skills CDE) were identified.

The largest difference between groups of Michigan AFNR educators was found between those who had participated in Environmental Skills CDE professional development and those with no professional development specifically related to the Environmental Skills CDE. Michigan AFNR educators with Environmental Skills CDE professional development participation indicated alignment between the CDE and ENR curriculum nearly eight percent higher than their peers. This finding suggests professional development specifically related to the Environmental Skills CDE (e.g., the Agroliquid Environmental Skills Bootcamp) may intentionally promote the use of Environmental Skills content in the classroom or may simply make educators aware of opportunities to support ENR curriculum with the Environmental Skills CDE.

The current study also found differences between Environmental Skills CDECS alignment among Michigan AFNR educators with varied experience in AFNR education. Less

experienced AFNR educators, such as educators with alternative teaching certificates, educators in early to mid-career stages, and educators with less experience preparing students for the Environmental Skills CDE, indicated higher Environmental Skills CDECS alignment. Educators with such characteristics may lack content knowledge or pedagogical content knowledge related to ENR curriculum. In such cases, utilization of the Environmental Skills CDE as a teaching tool may support the classroom curriculum (Melodia & Meyer, 2001).

Previously discussed findings from research objective three relate to the experiences of Michigan AFNR educators; however, their philosophical perspectives were also found to have a relationship with Environmental Skills CDECS alignment. Michigan AFNR educators with the classroom extension philosophy of CDEs indicated the lowest Environmental Skills CDECS alignment, 10% below that of educators with the student development philosophy of CDEs, and nearly 14% below that of the respondent with the CDE philosophy of competition and achievement. As Michigan AFNR educators holding the classroom extension philosophy of CDEs indicate CDE outcomes related to the support of classroom learning as most important, it is reasonable to argue their alignment may favor the classroom curriculum more than the CDE, whereas, those holding a philosophy of competition and achievement may value opportunities to bring the competitive nature of the Environmental Skills CDE into the classroom. It is important to note, however, only one respondent who prepared students for the Environmental Skills CDE held the philosophy of competition and achievement, therefore, the alignment for the individual is compared to the averages of other groups of respondents.

Objective four. In research objective four, the relationship between Michigan AFNR educators' Environmental Skills CDECS alignment and their students' overall score and

performance on high-order educational objectives in the Environmental Skills CDE was determined. Findings indicate a small, positive correlation between the Environmental Skills CDECS alignment and both overall team score and team score on the high-order components of the CDE. As high-order thinking is correlated to ability to transfer (Adams, 2015; Reece, 2007), the correlation between increased Environmental Skills CDECS alignment and increased high-order component scores could be indicative of improved student development of knowledge and skills with increased alignment between ENR curriculum and the Environmental Skills CDE. Findings are supported by the ecological systems theory (Bronfenbrenner, 1979b; 2005) as, in the context of the Environmental Skills CDE, the Environmental Skills CDECS alignment (i.e., a component of students' microsystems) impacts the learning development of the students.

Discussion of the conceptual model. The conceptual model for the current study (see Figure 7) is supported by the findings. Objective one identified the philosophies held by Michigan AFNR educators and objective two determined the alignment between their ENR curriculum and the Environmental Skills CDE. Findings from objective three indicate AFNR educator characteristics, particularly those pertaining to their experience in AFNR education and their philosophies of CDEs, have a small effect on the educators' Environmental Skills CDECS alignment. Additionally, a small correlation was found between the Environmental Skills CDECS alignment and student outcomes related to overall rank in the Environmental Skills CDE and their performance in transfer components (i.e., high-order educational objective components) of the CDE.

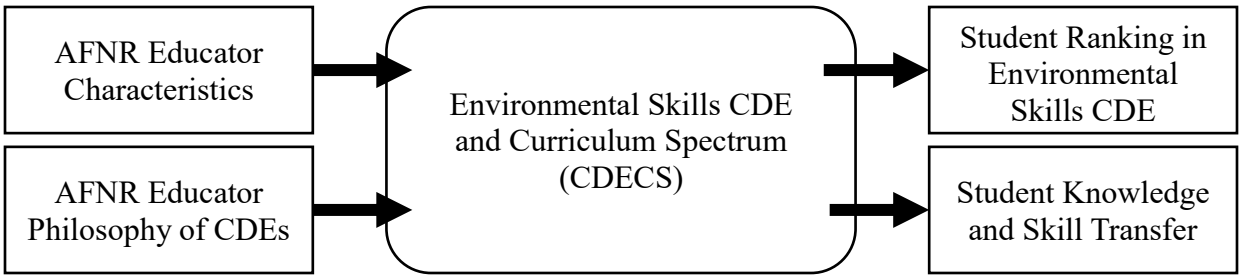


Figure 7. Review of conceptual model for the current study.

Discussion of ecological systems theory. Bronfenbrenner's (1979b; 2005) ecological systems theory was used to guide the current study and is supported by the findings. The current study found Environmental Skills CDECS alignment, a component of the students' microsystem, to be correlated with student outcomes in the Environmental Skills CDE. The finding supports Bronfenbrenner's (1979b; 2005) description of proximal processes, in this case occurring between the microsystem and the student, which support the development of the student. Additionally, the current study found Michigan AFNR educator characteristics, developed both within the microsystem and mesosystem of students, to influence the Environmental Skills CDECS alignment, further supporting the ecological systems theory. This finding supports the systemic perspective of the theory, illuminating the effect of proximal processes occurring among ecosystems more distant from the student (i.e., the mesosystem) on the ecosystem in which the student most engages (i.e., the microsystem). Overall, findings support, within the context of the current study, the influence of dynamic and nested systems on human development as described within ecological systems theory.

Conclusions

In conjunction with the research objectives, findings support three main conclusions. Each conclusion is identified below and followed by remarks.

- **Michigan AFNR educators indicate an average Environmental Skills CDECS alignment of 66.1%; however, a large variation in alignment exists among individual educators.** Therefore, Michigan AFNR educators operationalize the overlapping nature of classroom and FFA components of the three-circle model of agricultural education. However, disagreement exists regarding the ideal alignment between ENR curriculum and the Michigan Environmental Skills CDE.
- **The characteristics of Michigan AFNR educators identified as most influential on Environmental Skills CDECS alignment are participation in Environmental Skills professional development, experience in AFNR education, and philosophy of CDEs.** In conjunction with Bronfenbrenner's (1979b; 2005) ecological systems theory, the identification of the previous characteristics illuminates the influence of Michigan AFNR educator personal characteristics on the microsystems of their students. Additionally, while some characteristics cannot be changed (e.g., certification path or years of teaching experience), other characteristics (e.g., participation in Environmental Skills professional development) can be changed with intentionality by educators.
- **A small, positive relationship exists between Environmental Skills CDECS alignment and student outcomes of team overall rank and performance on high-order educational objective components in the Environmental Skills CDE.** In an ongoing professional debate regarding alignment between AFNR curriculum and CDEs (Ball & Bowling, 2015; Beekley & Moody, 2002; Edwards & Booth, 2001; Melodia &

Meyer, 2001; Russell et al., 2009), the current study sought to examine student outcomes associated with Michigan AFNR educators' Environmental Skills CDECS alignment. Having identified a correlation between Environmental Skills CDECS alignment and student outcomes, the current study contributes empirical data illustrating potential implications of the professional debate. Not only does Environmental Skills CDECS alignment relate to scores in a competitive event; the alignment also relates to development of knowledge and skills which will transfer to careers and life.

Remarks

Though the previous conclusions are supported by the data, it is important to note, due to small sample sizes, findings should not be generalized to other populations or contexts. Additionally, while practical significance existed among relationships of interest in objectives three and four, no statistically significant findings resulted from the study. Therefore, in addition to the independent variables of interest in the current study, other variables outside the study's scope are likely to be related to the outcomes of interest. However, recommendations, provided below, are based on the practically significant relationships identified within the current study.

Recommendations

Following are recommendations resulting from the current study, provided for Michigan AFNR educators, teacher educators and CDE coordinators, and researchers.

Michigan AFNR educators

- Michigan AFNR educators interested in promoting student transfer of Environmental Skills CDE knowledge and skills or overall enhancement of team scores in the Environmental Skills CDE should increase connections between the CDE and ENR curriculum.
- Michigan AFNR educators seeking to increase alignment between ENR curriculum and the Environmental Skills CDE should participate in professional development specifically related to the Environmental Skills CDE, such as the Agroliquid Environmental Skills CDE Bootcamp.
- Upon receiving scores from the Environmental Skills CDE, or other CDEs, Michigan AFNR educators should conduct an informal assessment of student performance in the complete CDE, as well as in high-order educational objective components of the CDE, to determine opportunities to support continued student development of knowledge and skills related to the context, especially those which promote transfer.
- Michigan AFNR educators should engage in self-reflection to determine their philosophy of CDEs and to ensure the philosophy matches desired student outcomes.
- Upon reflection of their philosophy of CDEs, Michigan AFNR educators should evaluate their operationalization of CDEs within the AFNR program to ensure their practice reflects their philosophy.

Teacher Educators and CDE Coordinators

- To aid Michigan AFNR educators in fostering connections between ENR curriculum and the Environmental Skills CDE, teacher educators should illuminate opportunities to operationalize components of the Environmental Skills CDE within ENR curriculum.
- Teacher educators or CDE coordinators should continue to support professional development opportunities specifically related to the Environmental Skills CDE.
- To encourage intentionality in future practice regarding CDE implementation in AFNR programs, teacher educators should engage pre-service AFNR educators in learning opportunities to explore potential outcomes of CDEs and to create a philosophy of CDEs which aligns with desired outcomes.
- CDE coordinators should include a crosswalk of CDE components and Michigan AFNR curriculum (see Table 4 for an example) for each Michigan CDE offering in the respective CDE handbook to illuminate connections between the CDE and AFNR curriculum.
- CDE coordinators should include a table of high- and low-order educational objective components (see Table 7 for an example) for each Michigan CDE offering in the respective CDE handbook to identify CDE components which promote a greater depth of student knowledge and skill attainment.
- As a component of the current study, high-order educational objectives were identified in four of nine components in the Environmental Skills CDE. As high-order educational objectives are correlated with student transfer (Adams, 2015; Reece, 2007), CDE coordinators should increase the proportion of high-order educational objective

components within the Environmental Skills CDE. Additionally, as anecdotal evidence suggests the Environmental Skills CDE is one of the strongest CDEs in Michigan for offering high-order educational objective components, CDE coordinators should assess other CDEs in the state to identify opportunities to include more CDE components which promote student transfer of knowledge and skills.

Researchers

- Future research should replicate the current study in the context of other CDEs to determine how CDECS alignment varies and if correlations between CDECS alignment and student outcomes exist in other CDE contexts.
- The Michigan Environmental Skills CDE is a state-level only competition; therefore, the current study did not measure differences in CDECS alignment according to other levels of competition (e.g., local, regional, national). Future research should replicate the current study across CDEs with qualifying events to determine if differences among the variables of interest exist across levels of participation.
- A national study of philosophies of CDEs and CDECS alignment among AFNR educators across the United States should be conducted to gain empirical data regarding the curriculum and CDE debate across the AFNR education profession.
- The current study explored the overlap between the classroom and FFA components of the three-circle model of agricultural education in the context of the Michigan FFA Environmental Skills CDE. Future research should explore the overlap between a) classroom and supervised agricultural experience (SAE) components and b) SAE and FFA components of the model and the impact of the overlap on student development.

- Future research should include a qualitative study to determine specific strategies or tools utilized by AFNR educators to build connections between AFNR curriculum and CDEs.
- The use of high-order educational objective component performance from the Environmental Skills CDE to measure student ability to transfer knowledge and skills was a limitation of the current study; therefore, future studies should measure transfer via a novel context to obtain a more reliable determination of the student outcome.
- The current study was limited by an incomplete view of Bronfenbrenner's (1979b; 2005) ecological systems theory; therefore, future research should collect personal data from students to incorporate the process-person-context model of human development.
- Future research should determine proportions of high- and low-order educational objective components across state and national CDE offerings to identify opportunities to enhance student development.

Call to Action

Professionals within SBAE can take pride in the integrated nature of the three-circle model of AFNR education as it symbolizes a combination of opportunities for students to continuously develop and apply knowledge and skills related to careers and life. However, a lack of best practices for integrating multiple components of the three-circle model forces AFNR educators to make decisions regarding program implementation without knowledge of the potential impact on student development. The current study sought to address this problem in the context of classroom and FFA overlap by determining the influence of Michigan AFNR educators' ENR curriculum and Environmental Skills CDE alignment on student learning outcomes.

Through its purpose, the current study revealed current practice of Michigan AFNR educators for integrating the classroom and FFA components of the three-circle model through ENR curriculum and the Environmental Skills CDE as well as relationships between practice and student learning outcomes. Conclusions and recommendations resulting from the study serve to further knowledge and practice of AFNR curriculum and CDE connections in Michigan and beyond. However, results of the current study are first steps in exploring curriculum and CDE connections within SBAE. Practice and research implementing and evaluating such connections must continue to provide the most transformative opportunities for student learning and success in the classroom, CDEs, and life.

APPENDICES

APPENDIX A

IRB Exemption Determination

MICHIGAN STATE
UNIVERSITY

EXEMPT DETERMINATION

April 11, 2018

To: Aaron McKim

Re: **MSU Study ID:** STUDY00000740
Principal Investigator: Aaron McKim
Category: Exempt 1, 2, 4
Exempt Determination Date: 4/11/2018

Title: Curriculum and Career Development Events: Preparation Strategies for Knowledge and Skill Transfer in the Michigan Environmental Skills CDE

This project has been determined to be exempt under 45 CFR 46.101(b) 1, 2, 4.

Principal Investigator Responsibilities: The Principal Investigator assumes the responsibilities for the protection of human subjects in this project as outlined in Human Research Protection Program (HRPP) Manual Section 8-1, Exemptions.

Continuing Review: Exempt projects do not need to be renewed.

Modifications: In general, investigators are not required to submit changes to the Michigan State University (MSU) Institutional Review Board (IRB) once a research study is designated as exempt as long as those changes do not affect the exempt category or criteria for exempt determination (changing from exempt status to expedited or full review, changing exempt category) or that may substantially change the focus of the research study such as a change in hypothesis or study design. See HRPP Manual Section 8-1, Exemptions, for examples. If the project is modified to add additional sites for the research, please note that you may not begin the research at those sites until you receive the appropriate approvals/permissions from the sites.

Change in Funding: If new external funding is obtained for an active human research project that had been determined exempt, a new initial IRB submission will be required, with limited exceptions.

Reportable Events: If issues should arise during the conduct of the research, such as unanticipated problems that may involve risks to subjects or others, or any problem that may increase the risk to the human subjects and change the category of review, notify the IRB office promptly. Any complaints from participants that may change the level of review from exempt to expedited or full review must be reported to the IRB. Please report new information through the project's workspace and contact the IRB office with any urgent events. Please visit the Human Research Protection Program (HRPP) website to obtain more information, including reporting timelines.

Office of Regulatory Affairs
Human Research Protection Program

4000 Collins Road
Suite 136
Lansing, MI 48910

517-355-2180
Fax: 517-432-4503
Email: irb@msu.edu
www.hrpp.msu.edu

Personnel Changes: After determination of the exempt status, the PI is responsible for maintaining records of personnel changes and appropriate training. The PI is not required to notify the IRB of personnel changes on exempt research. However, he or she may wish to submit personnel changes to the IRB for recordkeeping purposes (e.g. communication with the Graduate School) and may submit such requests by submitting a Modification request. If there is a change in PI, the new PI must confirm acceptance of the PI Assurance form and the previous PI must submit the Supplemental Form to Change the Principal Investigator with the Modification request (http://hrpp.msu.edu/forms).

Closure: Investigators are not required to notify the IRB when the research study is complete. However, the PI can choose to notify the IRB when the project is complete and is especially recommended when the PI leaves the university.

For More Information: See HRPP Manual, including Section 8-1, Exemptions (available at https://hrpp.msu.edu/msu-hrpp-manual-table-contents-expanded).

Contact Information: If we can be of further assistance or if you have questions, please contact us at 517-355-2180 or via email at IRB@ora.msu.edu. Please visit hrpp.msu.edu to access the HRPP Manual, templates, etc.

Exemption Category. This project has qualified for Exempt Category (ies) 1, 2, 4. Please see the appropriate research category below from 45 CFR 46.101(b) for the full regulatory text. [123]

Exempt 1. Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

Exempt 2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Exempt 3. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if:
(i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) require(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

Exempt 4. Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Exempt 5. Research and demonstration projects which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) Public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.

Exempt 6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

[1]Exempt categories (1), (2), (3), (4), and (5) cannot be applied to activities that are FDA-regulated.
[2] Exemptions do not apply to research involving prisoners.
[3] Exempt 2 for research involving survey or interview procedures or observation of public behavior does not apply to research with children, except for research involving observations of public behavior when the investigator(s) do not participate in the activities being observed.

APPENDIX B

Participant Consent Form

Curriculum and Career Development Events: Preparation Strategies for Knowledge and Skill Transfer in the Michigan Environmental Skills CDE

Survey Consent Form

You are being asked to participate in a research study of classroom curriculum and Michigan CDEs among agriculture, food, and natural resources educators in Michigan. Your participation will only include completing the following survey. Your responses will be used for research. You must be at least 18 years old to participate in this research.

Participation in this research project is completely voluntary. You have the right to say no. You may change your mind at any time and withdraw. You may choose not to answer specific questions or to stop participating at any time. Whether you choose to participate or not will have no effect on current or future evaluations.

If you have concerns or questions about this study, such as scientific issues, how to do any part of it, or to report an injury, please contact Catlin Pauley, pauleyca@msu.edu or Dr. Aaron McKim, 480 Wilson Road, Room 131, East Lansing, MI 48824; amckim@msu.edu; (517) 432-0318.

If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 4000 Collins Road, Suite 136, Lansing, MI 48910.

By clicking on the button below, you voluntarily agree to participate in this online survey.

<Agree and Continue>

APPENDIX C

Survey Instrument

Michigan FFA Environmental Skills CDE and Curriculum Survey

Q1: Drag and drop the outcomes of Career Development Events, listed below, to rank them in order from **most important (1)** to **least important (9)**.

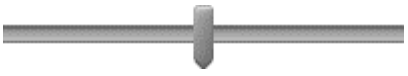
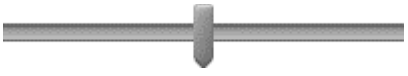
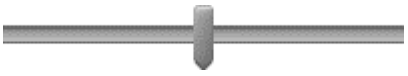
_____ Apply classroom learning.
_____ Assess student proficiency.
_____ Build/maintain a reputation of success.
_____ Compete and/or win.
_____ Develop career-specific knowledge.
_____ Develop career-specific skills.
_____ Develop leadership and life skills.
_____ Provide a context for learning.
_____ Provide student recognition.

Q2: Were you affiliated (i.e., trained, helped train, or provided support) with a Michigan FFA Environmental Skills CDE team during the 2017-2018 (current) school year?

- ○ Yes
- ○ No

Q3: In this question, the following abbreviations are used:
CDE - Environmental Skills CDE
ENR - Environment and Natural Resources

Drag the sliders to indicate your level of agreement with the following statements from **strongly disagree (0)** to **strongly agree (100)**.
In my program...

	Strongly Disagree 0 — Strongly Agree 100
I conduct a replication of the CDE for students to complete during ENR instruction.	
All students in the program receive the same instruction of ENR CONTENT regardless of whether or not they participate in the CDE.	
All students in the program receive the same instruction of ENR APPLIED SKILLS regardless of whether or not they participate in the CDE.	
I include problem solving components of the CDE in classroom instruction of ENR content and skills.	
I utilize regularly-scheduled class time to prepare students for the CDE.	

Q4: Drag the slider to answer the question below.

	Completely Unaligned 0	Completely Aligned 100
How would you rate the alignment between your curriculum and the Environmental Skills CDE?		

In the following questions, the following abbreviation is used:
CDEs - All CDEs at Ag Skills Day (April 20, 2018) for which you prepared students.

Q5: At what level(s) did your students compete in CDEs during the 2017-2018 school year? Please select all that apply.

- ☐ Local (i.e., school, county, or invitational)
- ☐ District
- ☐ Regional
- ☐ State
- ☐ National

Q6: Approximately how far in advance of the first level of competition do you begin to prepare students for CDEs?

For example: If your students first competed in an invitational competition, how far in advance of the invitational competition did you begin to prepare students for the CDEs?

- ○ At a time more than two months prior to the first level of the CDE.
- ○ Two months prior to the first level of the CDE.
- ○ Six weeks prior to the first level of the CDE.
- ○ One month prior to the first level of the CDE.
- ○ At a time less than one month prior to the first level of the CDE.

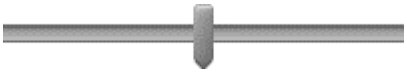
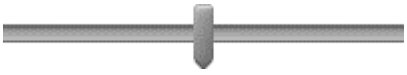
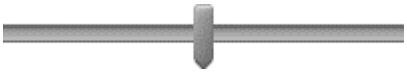
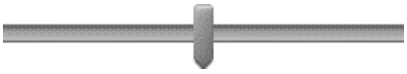
Q7: Who prepared students for the 2017-2018 CDEs? Please select all that apply.

- ☐ Agriculture Teacher
- ☐ Community Industry Professional
- ☐ FFA Alumni
- ☐ Other - Please indicate. _____

Q8: In this question, the following abbreviations are used:
CDEs - All CDEs at Ag Skills Day (April 20, 2018) for which you prepared students.

Drag the sliders to indicate your level of agreement with the following statements from **strongly disagree (0)** to **strongly agree (100)**.

In my program...

	Strongly Disagree 0 — Strongly Agree 100
I conduct a replication of the CDEs for students to complete during classroom instruction.	
All students in the program receive the same instruction of CONTENT regardless of whether or not they participate in the CDEs.	
All students in the program receive the same instruction of APPLIED SKILLS regardless of whether or not they participate in the CDEs.	
I include problem solving components of the CDEs in classroom instruction of content and skills.	
I utilize regularly-scheduled class time to prepare students for the CDEs.	

Q9: Drag the slider to answer the question below.

	Completely Unaligned 0 — Completely Aligned 100
How would you rate the alignment between your curriculum and the CDEs?	

Q10: What percentage of CDE preparation occurs outside regularly-scheduled agricultural education class time?

0 10 20 30 40 50 60 70 80 90 100

Q11: Please indicate how often you utilize materials (e.g., lesson plans, references, activity kits, etc.) from each of the sources below to create, implement, or evaluate your curriculum.

	Never	Rarely	Sometimes	Most of the Time	Always
Another AFNR Educator	○	○	○	○	○
CASE	○	○	○	○	○
Colleague	○	○	○	○	○
Communities of Practice	○	○	○	○	○
iCEV	○	○	○	○	○
Michigan FFA CDE Handbook or Resources	○	○	○	○	○
National CDE Handbook or Resource Guide	○	○	○	○	○
Self-created	○	○	○	○	○
Other - Please indicate.	○	○	○	○	○

Q12: During the 2017-2018 school year, did your students compete in any level of the Envirothon competition?

- ○ Yes
- ○ No

Q13: At what school do you teach? _____

Q14: To what State FFA District does your school belong? _____

Q15: Which of the following best describes the school at which you teach?

- ○ Comprehensive Middle or High School
- ○ Career and Technical Center
- ○ Other - Please indicate. _____

Q16: In what type of community is your school located?

- ○ Rural
- ○ Suburban
- ○ Urban

Q17: For each of the responses below, please give whole numbers, not ranges.

At the school where you teach, please indicate the number of…

students per graduating class (please report average). _____

students enrolled in the agricultural education program (total of all grade levels). _____

teachers in your agricultural education program, including yourself. _____

How many years, including the current year, have you... (Please do not include time during student teaching.)

taught school-based agricultural education? _____

prepared a team for the Environmental Skills CDE? _____

Q18: During the past year, have you participated in a professional development opportunity related to the Environmental Skills CDE?

- ○ Yes
- ○ No

Q19: Please indicate all professional development opportunities related to the Environmental Skills CDE in which you have participated during the past year.

_____

Q20: On average, approximately how many total hours per week (Monday through Sunday) do you invest in your teaching job during the current school year? Please give a whole number, not a range.

_____

Q21: What is the highest level of education you have obtained?

- ○ Bachelor's Degree
- ○ Some Graduate Coursework
- ○ Master's Degree
- ○ Ph.D.

Q22: Did you go through a traditional agriculture teacher education program (i.e., undergraduate or graduate degree in agricultural education)?

- ○ Yes
- ○ No

Q23: What is your age in years?

_____

Q24: What is your sex?

- ○ Male
- ○ Female
- ○ Choose not to respond.

APPENDIX D

Initial Survey Correspondence

Subject: Share Your Perspective on Michigan FFA CDEs

Good Afternoon <FirstName>,

Michigan FFA Career Development Events are concluding, making now a prime time to inquire about CDE preparations occurring across the state. You have been selected to participate in a study to determine the relationship between classroom curriculum and preparation of students for the Michigan CDEs. This research will identify opportunities to strengthen CDE preparation and contribute to the growth of students.

This survey will take approximately 5 to 10 minutes to complete. For completing this survey, you will receive a short write-up of the results of this project, indicating popular strategies for preparing students for Michigan CDEs.

This study will provide important information about classroom curriculum and CDEs, and your participation is valuable. Please feel free to e-mail Catlin Pauley at pauleyca@msu.edu with any questions or concerns you may have about this research or the survey. Thank you for taking time out of your busy schedule to make a difference for our profession and students.

Regards,

Catlin Pauley
Graduate Research Assistant
Department of Community Sustainability
Michigan State University
480 Wilson Road Room 131
East Lansing, MI 48824

Aaron McKim
Assistant Professor of Community Sustainability
Agriculture, Food, and Natural Resources Education Program
Michigan State University
480 Wilson Road, Room 131
East Lansing, MI 48824

APPENDIX E

Follow-Up Survey Correspondence

Second Correspondence

Good Afternoon ${m://FirstName},

Last week, you received an email informing you of an opportunity to participate in a project to determine the relationship between curriculum and preparation of students for the Michigan CDEs.

With just 5 to 10 minutes of your time to complete the survey you will receive a short write-up of the results of this project, indicating the popular strategies for preparing students for CDEs. In addition, your input will help inform CDE preparation across the state.
Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

This project will provide important information about classroom curriculum and CDEs, and your participation is valuable. Please feel free to e-mail Catlin Pauley at pauleyca@msu.edu with any questions or concerns you may have about this research or the survey. Thank you for taking time out of your busy schedule to make a difference for our profession and students.

Regards,

Catlin Pauley
Ohio FFA CDE Intern
Graduate Research Assistant
Department of Community Sustainability
Michigan State University
480 Wilson Road Room 131
East Lansing, MI 48824

Aaron McKim
Assistant Professor of Community Sustainability
Agriculture, Food, and Natural Resources Education Program
Michigan State University
480 Wilson Road, Room 131
East Lansing, MI 48824

Third Correspondence

Good Afternoon ${m://FirstName},

Over the past few weeks, you have been invited to participate in a survey to determine the relationship between curriculum and preparation of students for the Michigan CDEs. Your input in this area is valuable to Michigan AFNR Education.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Please e-mail Catlin Pauley at pauleyca@msu.edu with any questions or concerns you may have about this research or the survey. Thank you for taking time out of your busy schedule to make a difference for our profession and students.

I hope your end to the school year is going great.

Talk to you soon,

Mark

Mark Forbush
Department of Community Sustainability
Michigan State University
Outreach Specialist - Ag Food and Natural Resources Education
MDE OCTE - State Supervisor for Ag and Natural Resources
State FFA Advisor
480 Wilson Road
Natural Resources Building Rm. 131
East Lansing, MI 48824
Cell 989-277-9249 Office 517-432-0322

Catlin Pauley
Ohio FFA CDE Intern
Graduate Research Assistant
Department of Community Sustainability
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480 Wilson Road Room 131
East Lansing, MI 48824

Aaron McKim
Assistant Professor of Community Sustainability
Agriculture, Food, and Natural Resources
Education Program
Michigan State University
480 Wilson Road, Room 131
East Lansing, MI 48824

Fourth Correspondence

Good Afternoon <Mail Merge 1st Name>,

Our graduate student, Catlin Pauley, is leading some exciting research here at MSU regarding the relationship between curriculum and CDEs. Email links to her survey have been sent through Qualtrics, but some of your schools may block these emails, so I wanted to send you a personal invitation to be sure you have the opportunity to participate.

Follow this link to take the survey:
https://msu.co1.qualtrics.com/jfe/form/SV_01GKITAXiPvL9Xv

The survey will close Monday, June 18 at 5:00 pm. Please share your perspectives on this important topic to better CDEs across Michigan.

Talk to you soon,

Mark

Mark Forbush
Department of Community Sustainability
Michigan State University
Outreach Specialist - Ag Food and Natural Resources Education
MDE OCTE - State Supervisor for Ag and Natural Resources
State FFA Advisor
480 Wilson Road
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Agriculture, Food, and Natural Resources
Education Program
Michigan State University
480 Wilson Road, Room 131
East Lansing, MI 48824

Final Correspondence

Subject: Please Respond by June 18 @ 5pm

Good Morning <Mail Merge 1st Name>,

Last week, you received an email from Mark Forbush informing you of the survey I am conducting for my Master's thesis research. Please take 10 minutes of your time to help improve CDEs across Michigan.

Follow this link to take the survey:
https://msu.co1.qualtrics.com/jfe/form/SV_01GKITAXiPvL9Xv

This is your last chance to provide input. Please respond by next Monday, June 18 at 5:00 pm.

Thank you,

Catlin Pauley
Graduate Research Assistant
Department of Community Sustainability
Michigan State University
480 Wilson Road Room 131
East Lansing, MI 48824

APPENDIX F

Thank You Letter to Respondents

Subject: Survey Report: Thank You!

Good Afternoon!

You may recall responding to a survey earlier this year asking about your classroom curriculum and preparation of students for CDEs. Thank you for your response. Your participation has provided valuable information about how curriculum and CDEs work together here in Michigan.

As noted in previous communication, I have created an infographic description of the survey results (attached). On the infographic, you will find what resources are most commonly used for curriculum as well as popular CDE preparation strategies and more. I hope this resource can be of use/interest to you.

Also, if infographics of are interest to you, be on the lookout for my session at Fall PDI! During the session we will discuss how infographics can be used throughout your program and will devote some time to learning a FREE and easy-to-use software so you can create impactful infographics of your own!

If you have questions regarding anything on the infographic or my upcoming Fall PDI session, please feel free to contact me. I will gladly discuss with you!

Again, thank you for your participation in the survey. I hope you have an enjoyable summer and a great start to the school year!

Regards,

Catlin Pauley
Graduate Research Assistant
Department of Community Sustainability
Michigan State University
480 Wilson Road Room 131
East Lansing, MI 48824
E: pauleyca@msu.edu

APPENDIX G

Infographic for Respondents

Michigan AFNR Curriculum and CDEs

2017-2018

Common Strategies for Classroom Instruction and CDE Preparation

Most Used Resources for classroom instruction.

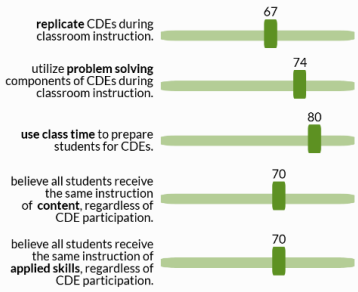
With so many resources to choose from, which should you use? Teachers share the resources they most commonly use in the classroom.

1. Self-created 94%
2. Another Ag Educator 88%
3. MI CDE Rules and Resources 78%
4. National CDE Rules and Resources 59%
5. Communities of Practice 54%
6. iCEV 54%
7. CASE 17%

Other Suggestions:

Industry Manuals, MyCAERT, Quizlet, PDI, Professional Organizations, michiganffa.org, and many more!

On a scale from 0 (*strongly disagree*) to 100 (*strongly agree*) teachers...



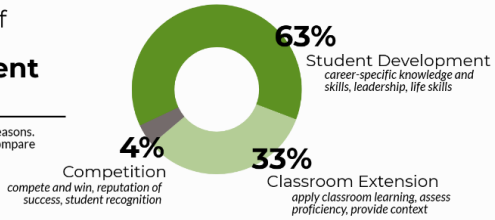
Classroom Connections Using Career Development Events to support instruction.

CDEs provide a unique context for teaching a variety of Agriculture, Food, and Natural Resources topics.

Michigan teachers agree there should be connections between CDEs and the classroom, regardless of whether or not students participate in CDEs. Try one of these strategies to make the connection in your classroom.

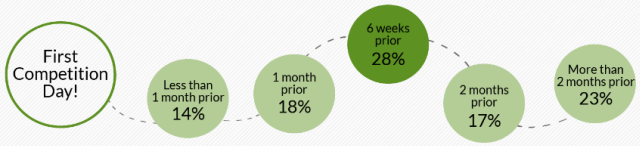
Philosophy of Career Development Events

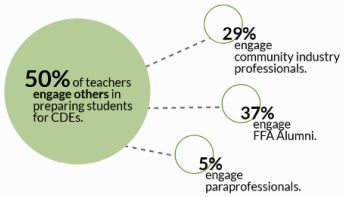
CDEs occur for a variety of reasons. How does your philosophy compare with others across the state?



When to Begin Preparation:

About six weeks before the first event seems like a popular starting place, but no matter when you begin preparing students for the CDE, it is likely that you are in good company.





Who should prepare students?

Though it sometimes feels like it, you don't have to prepare students by yourself! Enrich your students' experiences and add more time to your day by engaging others.

Questions? Contact Catlin M. Pauley, pauleyca@msu.edu.

Special thanks to the teachers who participated in this study!

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REFERENCES

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