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By Amy Jo Jones

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Motivational Factors Related to Youth Performance in a Horticulture Career Development Event

For the degree of Master of Science

Is approved by the final examining committee:

Neil Knobloch
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MOTIVATIONAL FACTORS RELATED TO YOUTH PERFORMANCE IN A HORTICULTURE CAREER DEVELOPMENT EVENT

A Thesis

Submitted to the Faculty

of

Purdue University

by

Amy Jo Jones

In Partial Fulfillment of the

Requirements for the Degree

of

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To my family, who never stopped believing in or loving me.

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ABSTRACT

Jones, Amy J. M.S., Purdue University, August 2011. Motivational factors related to youth performance in a 4-H/FFA State Horticulture Career Development Event. Major Professors: Neil Knobloch and Kathryn Orvis.

Youth-serving organizations offer out-of-school activities to provide youth opportunities with competency development and competitions that allow youth to explore various careers and contexts. Though this competitive aspect can increase youth motivation, it may also expose youth to experiences and pressure that lead to negative consequences. It is important to know what motivates youth to participate in free-choice activities and whether those experiences are meeting youth's expectations and preparing them for future career opportunities.

The purpose of this study was to explore youth's knowledge, motivation and educational experiences and to describe the relationships between youth motivation, coach motivation, learning and preparation, and youth's performance in a competitive, out-of-school horticultural career development event. This study was a census (*n* = 59) of all youth participants in the senior division (i.e., Grades 9-12) and their coaches (*n* = 7) at the 2010 Indiana 4-H/FFA Horticulture Career Development Event (CDE). Youth and coaches filled out questionnaires upon completion of the event. Youth questionnaires were designed to measure youth

motivation, learning resources and preparation time, as well as demographics. Coach questionnaires included coach motivation for having youth participate, learning resources and preparation time with their youth, and demographics. The dependent variable of horticultural competencies was assessed with three examinations: a general horticulture knowledge exam, an identification exam, and a product evaluation assessment.

There were three salient conclusions of this study. First, youth were motivated to participate in a competitive horticulture career development event and that motivation was related to performance of horticultural competencies. Second, coaches' motivation was related to youth motivation and youth performance of horticulture competencies. Third, time spent preparing for the horticulture career development event and learning resources used by youth were related to youth's overall performance of horticultural competencies. However, youth did not perform horticultural competencies at a level required to be a certified horticulture manager or technician in the horticulture industry.

The results of this study suggest that coaches serve an important role in youth motivation and competency-building, and organizations with out-of-school competitive events that build career development should ensure their programs are aligned with university coursework and industry certifications so youth in their organizations are building competencies to prepare them for future occupations. It was suggested that this study be continued to other contexts and youth-serving organizations, that more exploratory research be carried out, and that studies reflecting impact be conducted.

CHAPTER 1. INTRODUCTION

High school students develop knowledge, interests, and skills for prospective careers through competitive out-of-school experiences such as career development events (CDEs). Youth experiences are important to study in out-of-school settings, in particular, because if youth do not have positive experiences or see the benefits, they will choose to discontinue their participation in that activity (Carnegie Council on Adolescent Development, 1992). Competitive career development experiences have been used to engage students to learn knowledge and skills in various competitive career-oriented venues (Gordon, 2003). Although career development events can yield positive youth outcomes, competition can lead to mixed results (Radhakrishna, 2006, Lepper & Greene, 1978; Weber & McCullers, 1986; Johnson, 1914). Competition can be beneficial because it allows youth to formulate goals, learn team work, and learn about their personal abilities and limitations; however, competition can also be harmful in that it can be emotionally tiring for youth, embarrassing in the face of failure, and can cause hostility or aggression (Johnson, 1914).

Adolescence is the life stage where youth are exploring their identities and experiences the most physical, intellectual, social, emotional, and moral development in a short length of time (Carnegie Council on Adolescent

Development, 1992; Borgen & Hiebert, 2006). Youth have stronger desires to be involved in activities that involve their interests or hobbies (Csikszentmihalyi & Larson, 1984; Homan, Dick, & Hedrick, 2006; Texas AgriLife Extension Service, 2005). As such, it is important for youth-serving organizations such as FFA and 4-H to know youth interests and promote activities that help them develop interests. If youth do not have an outlet to partake in activities that they have interests in, they may choose negative or harmful activities (Murtaugh, 1988; Quinn, 1995). In order to avoid negative situations, youth-serving organizations should create out-of-school quality programs to reach youth (Carnegie Council on Adolescent Development, 1992).

In addition to engaging youth to explore and develop their interests, the most beneficial youth-serving organizations are those who prepare them for the real world (Nicholson, Collins, & Holmer, 2004). Youth organizations that provide youth with opportunities for career exploration may help youth determine their career interests, and jump start them into gaining knowledge and confidence in that particular industry (National Alliance for Secondary Education and Transition, n.d.). Career development opportunities provided by out-of-school programs such as 4-H and FFA are available to youth during the career decision-making stages of their lives (Rockwell, Stohler, Rudman, 1984). Participation in career developing organizations can be helpful for youth to determine future educational paths and make successful transitions into careers (National Alliance for Secondary Education and Transition, n.d.).

The National FFA Organization and the National 4-H Organization are two youth-serving organizations that provide high school students opportunities to develop knowledge and skills for agricultural careers. These learning experiences are known as “Career Development Events,” (CDEs) and provide high school students opportunities to demonstrate knowledge and skills in career areas such as animal sciences, horticulture, dairy foods, wildlife and natural resources, and agricultural mechanics. Career development events allow content learned in the classroom to be applied in a competitive, career-oriented setting based on curriculum in local agricultural education and 4-H youth development programs, current and future financial behavior of local communities, and national and global workforces (Beekley & Moody, 2002; National FFA Organization, 2006). Moreover, career development events are competitive and promote individual achievement and team activities to promote cooperation and teamwork. According to the National FFA Organization, “The role of career development events is to motivate students and encourage leadership, personal growth, citizenship and career development” (2006, p. 5).

Youth typically need motivation to participate in events which require them to gain more knowledge and competence about a content area or career pathway. Educational activities can be participation-based without competition such as camps or workshops, or they can be competitive events such as skillathons or contests. Competition acts as an extrinsic motivator for youth to participate in these events and can provide them with opportunities to gain new knowledge, set their own goals, and build life skills while receiving distinction for

their efforts (Radhakrishna, Everhart, & Sinansky, 2006). However, there is a growing concern about the effects of competition on youth (Smith & Collins, 1987). External recognition and rewards typically have short-term positive effects, possible long-term negative effects and are often criticized (Elliot & Knight, 2005; Abernathy & Vineyard, 2001). Competition and contesting should not exist only for awards, but also to build personal skills and goals and career development (Blakely, 1993).

1.1. Statement of the Research Problem

Activities in 4-H and FFA like CDEs provide opportunities for career selection and are helpful as individuals assume adulthood roles (Rockwell, Stohler, & Rudman, 1984). The motivation of youth to participate in activities that build career competencies should be studied; particularly with career development events that are out-of-school career-building activities with strong competitive aspects (Croom et al., 2005). It has been addressed that competition can have both positive and negative outcomes on youth participants (Alfed et al., 2007; Radhakrishna, 2006; Smith & Collins,1987) and serves as extrinsic motivation for youth. However, youth participation is affected by reasons other than external factors (Russell et al., 2009). For this reason, it is important to determine the primary motives of youth and the level and variety of these motivational factors from the youth's perspectives (Russell et al., 2009; Talbert & Balschweid, 2004) and to see if those factors are related to other independent and dependent variables such as learning and preparation and performances.

1.2. Significance of the Study

There are two ways this study has educational value. This study is relevant to preparation of youth for future STEM and horticultural careers through degree programs and industry certification training, as well as the contribution to more positive learning outcomes, including better utilization practices of coaching methods.

1.2.1. Preparation for STEM and Horticultural Careers

Horticulture is the art and science of developing, propagating, processing, and promoting ornamental plants, flowers, turf, vegetables, fruits and nuts (LSU AgCenter, 2011). Horticultural careers require knowledge and experiences with plants and their surrounding environments, and can include occupations in management and business, science and engineering, agriculture and forestry production, education, communication, and governmental services occupations (Goecker, Gilmore, Smith, & Smith, 2005). Much of this knowledge is gained through practice and educational programs. The content and applications a participant would learn and experience by participating in the Horticulture CDE contain similar content and experiences as courses taken by a horticulture student at Purdue University. Appendix A contains a list of horticulture courses required by a student pursuing a degree in one of the four horticulture degree programs and how those courses use principles and learning content found in the horticulture CDE assessments.

If youth decide to not pursue horticultural degree programs, they may also be prepared to complete certifications from national horticultural associations, botanical gardening programs, or certifications through the Cooperative Extension Service. A nationally identified organization, The Professional Landcare Network (PLANET), has certifications for the landscape industry that includes similar topics as the Horticulture CDE, including plant identification, turfgrass maintenance, pruning techniques, and tree planting (Professional Landcare Network, 2011). Through a CDE participant may need additional preparation and training to receive industry certification, basic competencies and interests can be gained through CDE participation.

1.2.2. Positive Learning Outcomes

Youth participating in the Horticulture CDE have opportunities to not only gain interest and knowledge in horticulture, but also to gain positive learning outcomes through coach interactions and university visits the day of the event. The planning and execution of these events requires several hours of preparation from all stakeholders.

Initial preparation occurs from faculty and staff at Purdue University. These personnel gather examination materials and create guidelines for youth and coaches to follow in all CDEs. This preparation can include creating examination questions, collecting specimens, or writing Extension publications that can be used in the future as study guides. Four extension specialists,

several staff, and graduate students from the department of Youth Development and Agricultural Education at Purdue University work with 16 faculty and staff from other departments including Agronomy, Animal Sciences, Entomology, Forestry and Natural Resources, Horticulture and Landscape Architecture, and Agricultural Communications spend several hours planning and organizing CDEs as well as the registration and communication processes with Indiana coaches.

Occurring simultaneously with CDE event planning is youth preparation. Every year, approximately 60 youth participate in the Horticulture CDE. Approximately 10 coaches help prepare and teach these youth for the CDE. Coaches must identify youth participants and determine that learning resources they will introduce to them to build competencies. In the Horticulture CDE, coaches may gather publications, create leaf collections, practice questions, site visits or determine what parts of their current lesson plans are applicable to the event. They must do this preparation swiftly due to the timing of the Horticulture CDE as the second weekend in September. This means the majority of youth have only been in their academic years a month, and their preparation and learning must be eagerly utilized.

Organizations that provide youth with out-of-school competitive events may look at the variables in this study and assess their organization and its events. It is important that organizations with competitive out-of-school events look at their participants' experiences to assess how those events can be improved. This study is beneficial in ensuring the preparation and execution of

these events is satisfying the stakeholders particularly because of the integration of CDE content into agricultural curriculum, as well as the purpose and missions of 4-H and FFA (Blakely, 1993).

1.3. Purpose of the Study

The purpose of this research study was to describe youth's knowledge, motivation, and learning experiences in a competitive out-of-school horticulture career development experience. The researcher was interested in determining the relationships that may exist between youth outcomes and instructional variables such as coaches' motivation and learning resources used.

1.4. Research Questions

1. How did youth perform in the Horticulture CDE (Knowledge Exam, Identification Exam, Product Evaluation, and overall score)?
2. What learning resources were utilized in preparation for the Horticulture CDE?
    a. What was the relationship between youth's learning resources and preparation with performance in the Horticulture CDE?
3. To what extent were coaches motivated (intrinsic value, utility value, attainment value, cost, and sense of self-efficacy) regarding their youth's participation in the Horticulture CDE?

   a. What was the relationship between coach motivation and youth performance?

4. To what extent were youth motivated (intrinsic value, utility value, attainment value, cost, and sense of self-efficacy) to participate in the Horticulture CDE?
   a. What was the relationship between youth motivation and youth performance?
   b. What was the relationship between youth motivation and coach motivation?
   c. What was the relationship between youth motivation and learning resources and preparation?

1.5. Limitations of the Study

This study is not to be generalized to all competitive out-of-school events. It is limited in external validity because the Horticulture CDE is a context-specific event. It may only be generalized to other competitive events that have similar examination and preparation practices. Although there was no evidence, a possible threat to validity could include the Hawthorne effect. In this case, volunteers distributing the questionnaires may expose too much of the study purpose to youth and youth may answer dishonestly such as apathetic or socially desirable responses. One of the greatest limitations to this study is the honesty of youth responses, and could have been due to a variety of instances. Youth may have become lethargic by the time the questionnaire was disseminated and could have disregarded the individual items and marked the numbers

inconsistent to their actual feelings or perceptions. Youth may have answered untruthfully about their study practices if they were using practices that were unfair. The completion of the questionnaires directly after youth participate could influence their answers and self-perceptions. For example, a youth who participated and felt that they did poorly may affect their sense of self-efficacy, when in reality they may have actually performed very well.

1.6. Definitions of Terms

4-H: a youth serving Extension program that involves rural and urban youth through a variety of programs in hopes to improve self-assurance, gain knowledge, and build important skills including communication, leadership, citizenship, and decision-making that can be used throughout their futures (Indiana 4-H Website, 2010).

Attainment Value: the significance of doing a task well (Eccles & Wigfield, 2002).

Career Development Events: a competitive program that provides students an opportunity to explore a variety of agriculture-, food-, and environmentally-related careers by studying and preparing for area, regional, state, and national events to compete with other teams and individuals.

CDE Learning Resources: materials that coaches and youth use in any capacity to prepare for career development events.

Coaches: instructor of youth participating in the Horticulture CDE; may be an agriculture teacher, Extension Educator, industry worker, volunteer, or parent.

Cooperative Extension Service: A substantial scientific research-based information and education provider built of a network of colleges, universities, and the U.S. Department of Agriculture (Purdue University, 2008).

Cost: the negative aspects of engaging in a task (Eccles & Wigfield, 2002).

CTSO: Career and Technical Student Organization; organizations designed to support student vocational learning by providing career and leadership development opportunities (Fiscus & Dixon Hyslop, 2008).

FFA: the National FFA Organization, a career and technical student organization (CTSO) that is part of agriculture education programs at middle and high schools to connect students to careers in the science, business, and technology of agriculture through various programs (National FFA Website, 2011).

General Knowledge Exam: an assessment of youth CDE participants' understanding of common horticulture information.

Identification Exam: an assessment of youth CDE participants' ability to identify various species of trees, shrubs, annuals, perennials, fruits, and vegetables.

Intrinsic Value: participating in a task for individual satisfaction or interests (Eccles & Wigfield, 2002).

Pre-Educational Experiences: Experiences youth undergo prior to a Career Development Event in which knowledge and skills are gained.

Product Evaluation: as assessment of youth CDE participants' ability to determine the best quality merchandise in plant material, fruits, and vegetables.

Sense of Self-efficacy: the certainty in one's ability to arrange and perform various actions that are necessary to handle future situations (Bandura, 1995).

Utility Value: how a task relates to a person's future goals, such as career goals (Eccles & Wigfield, 2002).

YDAE: Purdue University Department of Youth Development and Agricultural Education. A department within the Purdue University College of Agriculture that focuses on engagement, learning, and discovery through undergraduate, graduate, and extension programs, research, and international activities (YDAE Strategic Plan, 2009).

Youth: Participants (Grades 9-12) of the Horticulture CDE.

1.7. Basic Assumptions

The following assumptions were made for this study:

1. Participants who completed the questionnaire provided truthful answers.
2. Participants had accurate recognition when asked questions in relation to their past.
3. Participants who completed survey gave independent answers and did not ask their peers.
4. Participants in the Horticulture CDE were interested in improving the event.
5. The study was conducted in an objective manner and researcher biases were minimized by having an expert panel guiding the research process.

CHAPTER 2. REVIEW OF THE LITERATURE

2.1. Purpose of the Study

The purpose of this research study was to describe youth's knowledge, motivation, and learning experiences in a competitive out-of-school horticulture career development experience. The researcher was interested in determining the relationships that may exist between youth outcomes and instructional variables such as coaches' motivation and learning resources used.

2.2. Research Questions

1. How did youth perform in the Horticulture CDE (Knowledge Exam, Identification Exam, Product Evaluation, and overall score)?
2. What learning resources were utilized in preparation for the Horticulture CDE?
    a. What was the relationship between youth's learning resources and preparation with performance in the Horticulture CDE?
3. To what extent were coaches motivated (intrinsic value, utility value, attainment value, cost, and sense of self-efficacy) regarding their youth's participation in the Horticulture CDE?

   a. What was the relationship between coach motivation and youth performance?

4. To what extent were youth motivated (intrinsic value, utility value, attainment value, cost, and sense of self-efficacy) to participate in the Horticulture CDE?
   a. What was the relationship between youth motivation and youth performance?
   b. What was the relationship between youth motivation and coach motivation?
   c. What was the relationship between youth motivation and learning resources and preparation?

2.3. Introduction

This study was guided by expectancy-value, self-efficacy and social cognitive theories. Expectancy-value theory was chosen to explain the relationship of the independent variable of youth motivation to the dependent variable of youth performance. According to Eccles et al. (1983), motivation is comprised of two sections: an individuals' assessment of the importance of the task and their certainty of their proficiency in that task. These two concepts are very closely related to participation in out-of-school competitive events, such as those found in the Horticulture CDE.

Bandura (1997) was chosen to help further inform the variables of self-efficacy motivation because students who participate in career development events develop knowledge and skills in hopes of applying those competencies in

future career and life goals. An individual's self-efficacy is thought to determine an individual's thoughts and actions, level of motivation, and behaviors (Bandura, 1994).

Social cognitive theory helped to describe and build the conceptual framework of this study. Social cognitive theory is a triadic reciprocal causation in which personal, behavioral, and environmental factors interact (Bandura, 1989). This theory was chosen because it illustrates how personal (e.g., youth motivation) and environmental factors (e.g., coach motivation; learning and preparation activities) may influence youth outcomes (e.g., knowledge and skills performance in CDE).

This study was conceptually framed on the premise that attending CDEs is a free-choice activity for students and they may choose to participate in competitive CDEs based on rational/instrumental values such as competition or exhibitionism, and intrinsic/aesthetic values such as sociability or adventure (Recours, Souville, & Griffet, 2004). Because students have free-choice to participate in youth organizations, such as the National FFA or 4-H, it is important to study the reasons why youth choose to participate in these programs and how they value the program outcomes. As such, expectancy-value motivation and the learning resources used to prepare for the career development event were studied as independent variables. The dependent variable in this study was youth's performance at an out-of-school competitive event. The next sections will contain information regarding youth serving organizations with competitive

events for developing career skills, including the Indiana 4-H and FFA Career Development Events.

2.4. Youth Organizations with Competitive Events for Developing Career Skills

This study contains a youth-serving organization with a career developing competitive event. There are many youth organizations for youth to participate in, some of which have opportunities for career development and personal goal settings through competitive events (Table 2.1). These organizations can be school-based, community-based, or industry-sponsored.

Table 2.1

Youth Serving Organizations

Organization	Sponsorship	Year Est.	Target Audience
Business Professionals of America (BPA)	School-Based (CTSO)	1966	youth with interests in accounting, business, and marketing
Distributive Education Clubs of America (DECA)	School-Based (CTSO	1964	youth and adults interested in marketing, management, and entrepreneurship
Future Business Leaders of Amercan – Phi Beta Lambda (FBLA – PBL)	School-Based (CTSO)	1942	students who have interests in leadership, business and technology
Family, Career and Community Leaders of America (FCCLA)	School-Based (CTSO)	1945	students interested in areas surrounding family and consumer science.
Health Occupations Students of America (HOSA)	School-Based (CTSO)	1976	youth interested in the health care industry.
National FFA Organization (FFA)	School-Based (CTSO)	1928	youth involved in agricultural courses.
Skills USA (Formerly Vocational Industrial Clubs of America)	School-Based (CTSO)	1965	professional development, business partnerships, and leadership
Technology Student Association (TSA)	School-Based (CTSO)	1978	technological literacy and excellence.
Science Olympiad	School-Based	1982	youth interested in science
4-H	Community-Based	1902	youth ages 9 to18
Boy Scouts/Girl Scouts	Community-Based	1908/1912	youth ages 7 to 18
Skill-a-thons	Industry-Sponsored		youth interested in various livestock species
National Junior Horticulture Association	Industry-Sponsored	1935	youth interested in flowering plants, fruits and nuts, ornamental plans, or turf grass

2.4.1. School-Based Organizations

There are several extracurricular activities for youth to choose from that are sponsored by their school. Science fairs and Olympiads, as well as vocational clubs provide youth opportunities to build knowledge and compete with their peers to demonstrate levels of proficiency in knowledge and skills previously learned in a classroom or school-based setting. The CTSO that is involved in this study is the National FFA Organization.

2.4.1.1. Career and Technical Student Organizations

Career and Technical Student Organizations (CTSOs) have been an element of career and technical education since 1917 (Zirkle & Connors, 2003). CTSOs are youth organizations, which are intended to support development of leadership and career skills and include many career development experiences (Fiscus & Dixon Hyslop, 2008). One of the experiences common to CTSOs are student competitive events (Litowitz, 1995). These experiences apply knowledge and skills gained in courses and lab work to build appreciation of careers and production (Thompson, Thompson, Orr, & Arkansas, 2003; Taylor, 2006)

There are ten CTSOs widely recognized throughout career and technical education offering a wide variety of contexts. The CTSO that was studied in this research is the National FFA organization.

2.4.1.1.1. The National FFA Organization

The National FFA Organization is a youth organization with over 500,000 members that is part of agricultural education programs in middle and high schools that strives to connect youth to careers in science, business, and technology of agriculture (National FFA Organization, 2011). The FFA's mission is to make a beneficial difference in the lives of its members by developing their potential in leadership, individual growth, and occupational achievement through agricultural education programs (National FFA Organization, 2011). In 1928, Future Farmers of America (FFA) was founded to support agriculture and agriculture education (National FFA Organization, 2011). The organization is structured on the local, state, and national level. Students begin their membership in FFA by joining their school's local chapter, where the agriculture teacher serves as advisor (National FFA Archives, n.d.). FFA members are then encouraged to not only participate in agricultural education courses, but also in hands-on experiences through supervised agricultural experience (SAE) programs and career development activities (National FFA Archives, n.d.).

FFA Career Development Events (CDEs) are designed to prepare students for agricultural careers (National FFA Organization, 2006). The primary goal of these events is to increase responsibilities, promote cooperation and communication, and identify ethical competition and individual accomplishment (National FFA Organization, 2006). CDEs are intended to complement classroom instruction (Johnson, 1991) and develop leadership, personal growth, and career development. Croom and Flowers (2001) discovered that students

involved in FFA do believe that the organization helps them to make career choices and attain their educational goals. The National FFA Organization provides youth with 24 national Career Development Events. These events are: Agricultural Communications, Agricultural Issues Forum, Agricultural Mechanics, Agricultural Sales, Agronomy, Creed Speaking, Dairy Cattle Evaluation, Dairy Cattle Handlers' Activity, Dairy Foods, Environmental and Natural Resources, Extemporaneous Public Speaking, Farm Business Management, Floriculture, Food Science and Technology, Forestry, Horse Evaluation, Job Interview, Livestock Evaluation, Marketing Plan, Meats Evaluation and Technology, Nursery/Landscape, Parliamentary Procedure, Poultry Evaluation, and Prepared Public Speaking (National FFA Organization, 2006). Each CDE has its own milieu and assessment practices. Some contests include identification or judging, whereas other competitions may include knowledge exams, written and oral essays, or demonstrations.

2.4.2. Community-Based Organizations

More than 17,000 organizations offer community-based youth programs (Carnegie Council on Adolescent Development, 1992). These organizations include organizations such as church groups, Boys and Girls Clubs, Boys Scouts and Girl Scouts. The community-based organization of interest in this study was 4-H.

2.4.2.1. 4-H

With over 100 years of history, 4-H is a youth development program that contains over 60 million alumni and 6 million current members (National 4-H Council, 2010). The original purpose of 4-H was to make a connection between school and home country life for youth. In 1914, the Smith-Lever Act was passed and created the Cooperative Extension Service (National 4-H Council, 2010). This service combines the research and expertise of federal, state, and local governments with current research of land-grant universities (National 4-H Council, 2010). When the Cooperative Extension System was created, it worked with various boys' and girls' clubs in the subjects of agriculture and home economics. These clubs were adopted as 4-H clubs by 1924 and the 4-leaf clover emblem became the symbol (National 4-H Council). The National 4-H is an organization that allows youth and adults to work together for positive change. Today, 4-H not only encompasses rural youth and agricultural programs, it involves urban and suburban youth and communities by exposing them to programs both in and out-of-school and projects in a wide variety of subjects. Competitive events in 4-H include not only county fairs and livestock shows, but career development experiences (Thelen, Renner, & Copeland, 2009; Spike, 1997). The National 4-H Organization identifies that career development is an important goal (Matulis, Hedges, Barrick, & Smith, 1988) and 4-H alumni have felt that the activities they participated in through 4-H as well as the people involved assisted them in their future careers (Rockwell, Stohler, & Rudman, 1984; Ward, 1996). The 4-H motto, "To make the best better," along with the 4-H

pledge encompass the idea that personal growth and development can help to change communities, countries, and even the world.

2.4.3. Industry–Based Organizations

Knowledge quiz bowls, skillathons, and livestock shows sponsored by organizations like Junior Livestock Associations allow youth to participate in competitions related to industry knowledge. The National Junior Horticulture Association is an industry youth-serving organization with a competitive event that serves this study and its participants at the National Junior Horticultural Association Convention.

2.4.3.1. National Junior Horticultural Association

The National Junior Horticultural Association was founded in 1935 as the National Junior Vegetable Growers Association by four vegetable industry leaders of the United States (Carney, 2009). The name of the organization was converted to the National Junior Horticulture Association (NJHA) in 1964 to encompass a wider range of interests (Carney, 2009). The goals of the NJHA are to encourage educational programs that build horticultural understanding, as well as citizenship, career development, group cooperation, and leadership (Carney, 2009).

The NJHA hosts an annual convention which includes a contest to assess youth horticulture competency. The various contests include demonstration

contests, horticulture essay contests, horticulture identification and judging contests, poster contests, speech contests, and state display contests.

2.4.4. Indiana 4-H/FFA Ag Judging and Career Development Experiences

The youth organizations of 4-H and FFA both capitalize on the importance of personal growth and development through activities and involvement. One program that is offered simultaneously to both organizations in Indiana are Career Development Events (CDEs).

4-H/FFA Ag Judging in Indiana is a statewide career development program that is a joint effort between the Purdue Cooperative Extension Service, the Office of Career and Vocational Services, and the Indiana Department of Education (Purdue University Cooperative Extension Service, 2009). There are 14 4-H/FFA State Career Development Events held annually in Indiana throughout the year. 4-H/FFA CDEs contribute to a young person's success in many aspects. Some of the skills that youth may gain by participating in a CDE include learning to evaluate and make logical decisions, to create and defend conclusions, to stimulate interest in agricultural industries, to improve examination and memory developments, to build personal confidence and promote team spirit, and to develop positive leadership skills (Purdue University Cooperative Extension Service, 2009). The 4-H/FFA Career Development Event being studied in this research was the Horticulture Career Development Event.

2.4.4.1. Indiana 4-H FFA Horticulture Career Development Event

The Indiana 4-H/FFA Horticulture CDE is the first CDE of the academic year. Agricultural and Extension Educators and their students are recruited and pay a small fee to participate in the event. The event is held the second Saturday in September each year at Purdue University in the Horticulture Greenhouse. There are three 45-minute rotations that youth must prepare for including a general knowledge exam, identification exam, and product evaluation exam. After youth complete the rotations, points are calculated and the winning team and individuals are announced. The winner of the Indiana 4-H/FFA Horticulture CDE is given the opportunity to participate at the NJHA convention (mentioned earlier). The previous discussed organizations and programs assisted the researcher in building a conceptual framework, which is discussed in the next section.

2.5. Conceptual Framework

Youth motivation was a key variable in this study and was seen as intrinsic value, utility value, attainment value, cost, and self-efficacy. The researcher assumed a bi-directional relationship between youth motivation and pre-CDE educational experiences because both variables were considered to dynamically influence each other throughout the learning experience. The educational experiences of youth who participate in the Horticulture CDE included not only the day of the event, but the preparation prior to the event. The pre-educational experience variables included coach motivation and learning and preparation.

Coach motivation in this study was the motivation of coaches for having youth participate in the event and captured the educator process of teaching and learning. Although this was not tested in the study, the relationship of coach motivation and youth motivation was considered a moderating variable. This is because a teacher who is motivated and enthusiastic about what they are doing creates a greater probability of a student being motivated (Wedel & Jennings, 2006). A moderating variable is a variable whose variation determines the conditions upon which a given magnitude of an effect occurs (Osborne, 2008). Although this was not tested due to a small sample in this study, learning and preparation was considered a mediating variable in relation to youth motivation. Mediating variables are variables whose variation determines the conditions upon which a mediation effect occurs (Osborne, 2008). Learning and preparation for the event includes the learning resources that are used (e.g., old exams, Extension publications, leaf collections), and the preparation time that youth spend both with their team and as individuals; this variable captured the methodology of teaching and learning. Being informed through the theoretical framework and related studies, it was assumed that pre-CDE educational experiences and youth motivation could impact CDE performance. CDE performance includes the general knowledge exam, identification exam, product evaluation exam, and total event score.

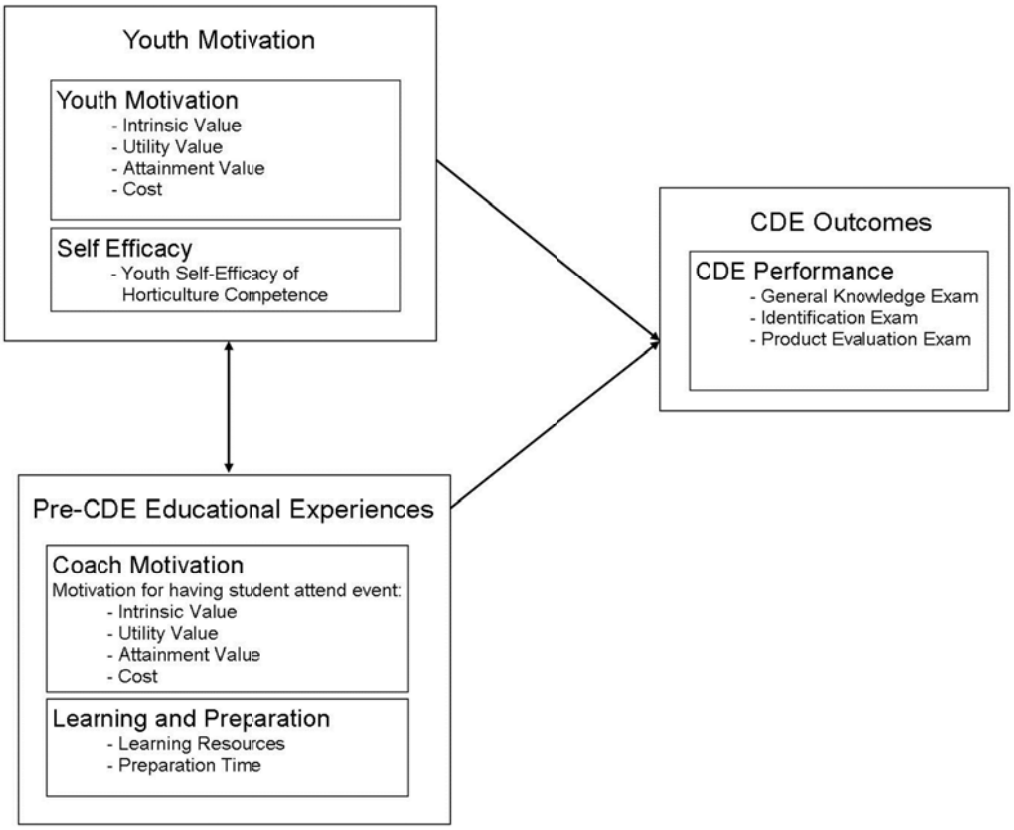

Figure 1: *Conceptual Framework of the Research Study*

2.5.1. Performance

Participating in and performing at the Horticulture CDE gives individuals the content and topics that are necessary for early stages of certification and degree programs. At the end of the event, youth will have helpful information for entering into a degree program and a snap-shot of the facilities that they would be using if they chose a degree program in horticulture at Purdue University and general knowledge and skills necessary as a professional horticulturalist.

Performance in the Horticulture CDE includes the 2200 points possible in three rotations and will be discussed in detail in the subsequent chapter. Youth are given scores as both individuals and teams on all three rotations. The winning individual and team are the highest scores when all three rotations are combined. General knowledge exam questions used Bloom's taxonomy levels of knowledge, comprehension, and application (Bloom, 1956). The identification exam and product evaluation exams were developed using contest guidelines of the National Junior Horticulture Association (NJHA). These guidelines and levels of knowledge were used to ensure that youth's performance was a reflection of general horticulture knowledge and that the knowledge they gained could be applicable into other contexts besides the Horticulture CDE.

2.5.2. Pre-Career Development Event Educational Experiences

Pre-CDE educational experiences and youth motivation impact both CDE performance and youth's sense of self-efficacy. The pre-CDE educational experiences for youth that were reviewed in this study included working with coaches, teams, and as individuals to study content and prepare for the Horticulture CDE.

2.5.2.1. Coach's Role

Coach motivation in this study is the motivation of coaches for having youth participate in the event. An advisor (aka, coach) has a significant role in their youth participants' lives and successes of their teams (Ambrose & Goar,

2009; Thompson et al., 2003; Reese, 2003), and effective teachers can yield higher-achieving students (Darling-Hammond & Bransford, 2005). According to the National Commission on Teaching and America's Future (1996), teaching is the most significant factor in improving U.S. students' academic success.

Coaches also make differences in the lives of youth by being strong role models (Reese, 2003). In this research study, coaches were defined as any adult in a teaching position for their CDE team. This could be an agriculture teacher, Extension Educator, parent, or community volunteer. Agricultural instructors create the environment and culture of an agricultural education program and teachers who find an event useful for youth to participate and are confident in their teaching are more likely to have a high ranked team (Beekley & Moody, 2002).

Coaches should create environments which are conducive to knowledge gaining and skill building to build a positive environment yielding student performance (Elliot & Knight, 2005); because an increase youth pressure and stress can result in youth discontinuation in an organization (Homan, 2006). Teacher's self-efficacy to teach content areas influences youth motivation and teacher behavior can either assist or hinder youth motivation (Eccles & Wigfield, 1985). In Thompson et al. (2003), FFA advisors placed large amounts of their coaching on extrinsic factors. Croom et al. (2005) mentioned an overemphasis on contesting from coaches may be interfering with youth enjoyment. For this reason, it is important to note the motivations for coaches to have youth participate and the learning and preparation that occur prior to the event.

2.5.2.2. Learning and Preparation

Preparation is an important aspect in career and technical education, and how educators help both individuals and teams prepare for career development events is important to measure (Threeton, Ewing, & Clark, 2010; Poskey et al., 2005). Rayfield (2006) discovered that a successful team at a National FFA Livestock CDE included competitiveness of the team and good study skills. Due to the nature of the content in this study being declarative and skills-oriented, and through discussions with program administrators, the learning and preparation for the Horticulture CDE was considered to be based on the direct-instruction model. This model includes four steps, which allow the instructor to first introduce the goals and present the content, and then coach a guided practice with the students before giving students independent practice time to develop the skills and concepts on their own (Eggen & Kauchak, 2001). This method of teaching and learning is seen in out-of-school competitive events when a coach of a team gives students information about the contest, as well as the content that will be covered. Coaches may then hold practices for the team to help make sure the content is being disseminated, but youth (students) are expected to gain the knowledge and skills on their own.

2.6. Theoretical Framework

In this study, the variable of youth motivation was informed by two motivational theories, expectancy value theory and self-efficacy theory.

2.6.1. Expectancy-Value Theory

Expectancy-value theory served as the theoretical frame and informed the variables of interest in this study. Dr. Jacquelynne Eccles and colleagues developed the current expectancy-value theory based on the works of John Atkinson, Vaughn and Virginia Crandall, and Bernard Weiner (Eccles, 1983). Expectancies and values are projected to directly influence achievement, perseverance, and personal choice to complete a task (Eccles & Wigfield, 2002). These beliefs and values include perceptions of task difficulty, self-concept of ability, locus of control, and task value (Eccles et al., 1983).

Task value contains four specific values within the construct: attainment value, intrinsic value, utility value and cost. Attainment value is the importance of doing well at the specific task, and can include a wide variety of magnitudes (Eccles et al., 1983; Eccles & Wigfield, 2002). Such magnitudes can include: the importance of gaining new knowledge, a personal challenge, power or social needs (Eccles et al., 1983). Intrinsic value (also referred to as interest value) is the participation for personal enjoyment or interests (Eccles et al., 1983; Eccles & Wigfield, 2002). Contrasting intrinsic value is utility value. Utility value is the task relating to an individual's future goals, such as career goals (Eccles et al., 1983; Eccles & Wigfield, 2002). Cost includes an identification of the costs and benefits of participating and can also be broken down into: effort to succeed, loss of alternative activities, and the cost of failure (Eccles et al., 1983). These four values can then be influenced by other individuals' outlooks and beliefs (Eccles

et al., 1983; Eccles & Wigfield, 2002) such as peers', parents', or coaches' expectations and values of the task.

There have been several studies that have used expectancy-value theory to view youth motivations and achievement (e.g., Yoon, Eccles, & Wigfield; 1996; Eccles & Wigfield, 1995; Gao, 1996). Yoon et al. (1996) found that students with an interest or partiality had higher performance, and Eccles and Wigfield (1995) mention the lack of acknowledged connections to nonacademic activities. Gao (1996) found a connection between both expectancy-related beliefs and self-efficacy with student persistence and effort. Some expectancy-value articles have also been in the context of out-of-school organizations and events (e.g., Kowitz, 1976; Grolnick, Farkas, Sohmer, Michaels, & Valsiner, 2007). Kowitz discussed how the four values of expectancy-value theory were related to competition and incentive programs, and Grolnick et al. discussed that youth who participated in an after-school program had more internal motivation. There have also been discussions of motivations of youth in 4-H competitions (e.g., Quarrick & Rankin, 1965; Weber & McCullers, 1986), however many studies using expectancy-value theory are in academic settings and study early to middle adolescents.

Expectancy value motivation was chosen to better understand why high school students participate in CDEs. For example, students must determine if they have the intellectual capacity to compete, how difficult the contest will be, if participating is in line with their future career goals, self-schema and interests, and if they choose to listen to external influences such as parents, friends, or

CDE coaches. Eccles and Wigfield (1985) mentioned a substantial association between student motivation, teacher behavior and student achievement.

2.6.2. Self-Efficacy

Though Eccles and Wigfield's Expectancy-Value Theory mentions self-efficacy, Bandura (1997) was chosen to help further inform the variables of self-efficacy motivation because students who participate in career development events develop mastery of knowledge and skills through practices, verbal persuasion from coaches, and modeling from coaches and volunteers who exhibit expertise.

Self-efficacy is considered a person's beliefs in their capabilities and can determine the way a person thoughts and feelings, their level of motivation, and their behaviors (Bandura, 1994). There are four main sources of a person's self-efficacy: mastery experiences, vicarious experiences, verbal persuasions, and personal capability assessment (Bandura, 1977; Bandura, 1989; Bandura, 1994). Mastery experience includes an individual's personal successes and is considered one of the most effective ways to build self-efficacy (Bandura, 1977; Bandura, 1989; Bandura, 1994). The reflection of a similar individual's experience of success or failure is an example of a vicarious experience (Bandura, 1977; Bandura, 1989; Bandura, 1994). Verbal persuasions are social indications that an individual is capable of succeeding and contains the mastery to complete a task (Bandura, 1977; Bandura, 1989; Bandura, 1994). An individual's capabilities and endurance is also assessed and internally defined to

determine if he or she could be successful in the task (Bandura, 1977; Bandura, 1989; Bandura, 1994). These factors are internally assessed to determine an individual's self-efficacy which can influence other attributes of task-related processes.

People's self-efficacy beliefs establish their level of motivation, which is also reflected in their effort and perseverance when they are faced with various obstacles (Bandura, 1977; Bandura, 1989). Increases in self-confidence can create an increase in achievement (Eccles, 1983). An individual's self-efficacy is thought to influence performance both directly and indirectly through influences on personal goals (Zimmerman, Bandura, & Martinez-Pons, 1992).

There have been several studies examining self-efficacy in the context of education or competition (e.g., Schunk & Hansen, 1985; Schunk, 1989; Weiss, Weiss, & Klint, 1989; Bandura, Barbaranelli, Vittorio Caprara, & Pastorelli, 1996; McAuley & Tammen,1989; Liem, Lau, & Nie, 2007). Bandura et al. (2008) found children's self-efficacy were related to academic achievement, and higher achieving individuals in McAuley and Tammen's (1989) study reported feeling they had tried harder, had more competence, and enjoyed the event more than lower achievers. There have also been studies of teacher self-efficacy and youth (e.g., Ross, 1992; Goddard, Hoy, & Hoy, 2000; Caprara, Barbaranelli, Steca, & Malone, 2006). These studies (Ross, 1992; Goddard, Hoy, & Hoy, 2000; Caprara, Barbaranelli, Steca, & Malone, 2006) all confirmed a teacher with higher efficacy will have higher achieving students. Though there are studies focused on self-efficacy of both students and their mentors, many are in formal

education or physical education settings, as compared to informal, out-of-school settings.

Self-efficacy was considered as a variable in this study due to the practical application of career development event assessments and the perception of confidence as a constructive outcome of FFA contesting (Blakely et al., 1993). With the event's reflection of horticultural academic programs and certifications, it was decided to assess youths' confidence in horticultural competencies. As mentioned previously, literature has vocalized the role of coaches in youth's learning and motivation. As such, coaches' self-efficacy of competence in coaching a team for the Horticulture CDE was assessed.

2.7. Related Studies

Several studies have investigated career development events by exploring demographic characteristics, teacher motivation of students, students' perceptions, preparation, and participation in CDEs, and youth outcomes. First, Alfed et al. (2007) conducted a longitudinal study regarding the value of Career and Technical Student Organizations (CTSOs) for youth. They found that being in a CTSO (vs. CTE-without CTSOs) was associated with higher beginning levels of academic engagement, civic engagement, career self-efficacy, and employability skills and that the increased participation in CTSOs increased all but civic engagement. Of the four specific organizational elements of CTSOs (leadership, community service, competitions, and professional development), they found that competitions had the most constructive effects.

There have been a few studies identifying youth's satisfaction and motivation in 4-H competitive activities and programs. A study by Norland and Bennett (1993) identifying factors of youth satisfaction in 4-H activities found a moderate relationship between positive experiences in competition and satisfaction, however negative experiences were not identified or investigated. Arnold, Meinhold, Skubinna, and Ashton (2007) conducted a study to determine the motivations of youth for participating in the 4-H county fair. In Arnold et al. (2007), youth reported "having fun" as their number one motivation, followed by goal achievement, social aspects, challenges, and self-efficacy. Competition was ranked 11th out of 16 different factors. A study by Keith (1997) studied the value of 4-H competitive activities in the eyes of parents of 4-H members. Keith (1997) discovered that parents had positive attitudes towards competitive activities in 4-H and felt that participating in competitions helped to enhance youth's development of skills, self-confidence, motivation to succeed, and setting personal goals. Parents also mentioned concerns of unethical practices and excessive parental participation. Though this study viewed competition and values of youth participating, it was the perspectives of the parents and not youth.

One of the main objectives or outcomes thought to come from CDEs is that youth gain knowledge which they can use in their future career aspirations. Talbert and Blaschweid (2006) investigated youth outcomes of FFA members. They found that one-third of FFA members pursued agriculture and natural resources as a career choice and nearly one-third of FFA members did not

participate in a CDE. However, Talbert and Balschweid did not study the relationship between career interest in agriculture and CDE participation.

Russell, Robinson, and Kelsey (2009) completed a qualitative case study to determine how Oklahoma secondary agriculture teachers motivated their students to participate in CDEs. The themes identified to motivate students were: (1) drawing upon the traditions and successes of the chapter, (2) providing opportunities for students to compete, (3) promising students that they will gain life skills, (4) enabling students to have fun, (5) actively recruiting members who show potential for doing well with CDEs, and (6) making CDEs an integral part of classroom curriculum. The results of this study were limited because the youth advisors were asked to identify what they thought motivated their students to participate rather than asking students directly.

Croom, Moore, and Armbruster (2005) sought to determine why students participate in national CDEs and to examine factors related to their participation. They found that students were typically pleased with their participation in the CDE and found them valuable to their education. Croom et al. (2005) found students' motives to participate in CDE were different than their teachers' motives. Teachers believed that the most important reason for student participation was competition whereas the students indicated that their most important reason was that the event related to their career interests. Moreover, Croom et al. also found no consistent pattern when youth spent time preparing for CDEs.

Poskey, Igo, Wliczek, Briers, and Zajicek (2005) assessed preparation methods used by participants in a nursery/landscape CDE. They concluded that visits to garden centers and greenhouses were the main preparation aid, followed by videos and slides, websites, textbooks, and university's living laboratories; concluding that hands-on, active preparation and technological resources were most used and that further research concerning the most effective training resources for competitive career development events should be conducted (Poskey et al., 2005).

Theiman, Bird, Vincent, and Terry (2010) conducted a study to determine the demographic differences between low and high performers at a Livestock Evaluation Career Development Event. The researchers concluded that higher performers were markedly different than low performers. Higher performing CDE contestants were primarily upperclassmen who had a grade point average of B or higher without specific education needs, higher performers also had two parents in their households and were not within the bracket for free/reduced lunches. This study was limited because the researchers compared the low performers to high performers based on the dependent variable--overall CDE performance, and were not able to establish any relationship between demographic characteristics and youth performances.

2.8. Need for Study

Bell (1985) mentioned that in order to illustrate the benefits of participating in out-of-school career development competitions "the question must

occasionally be asked, why are these students participating? Is it in support of their occupational objectives or is it for other reasons? If other reasons, what are they?" (p. 5). Along will Bell, it has been vocalized that research concerning student motivations to participate in out-of-school career development experiences, such as CDEs needs to be executed (Parsons, 1976; Talbert & Balschweid, 2004; Russell et al., 2009). Although youth motivation plays an important role in students' self-efficacy and how they perform in CDEs and it has been suggested that this motivation be studied, existing research studies have not explored the relationships between youth motivation and performances.

Within CDE research, there are limited studies exploring variables such as demographic characteristics, motivation of teachers or students, and performances. The lack of research is the relationships among variables to determine what leads to high performance. If exploration of the variables of motivation were completed in studies, relationships between those variables to the youth's performance at the event were not noted. Russell et al. (2009) discovered motivation techniques that coaches used to motivate their students, however there was no measurement of coach motivation or student motivation. While Croom et al. (2005) did assess youth and coaches, coaches' personal motivation was not assessed and a relationship between youth motivation and their performance was not explored.

Youth motivation for participating in competitive out-of-school events can include a wide array of contexts. They may be inspired to join because of the competitive aspect, their family peers, a desire to participate in activities or

competitions that are career-related, or to connect with students who have common interests (Brown, 2002; Gartin, 1985). Eccles and Wigfield (1985) suggested more attention be directed towards an association between individual's personal variations in motivation and their achievement as well as motivational relations between teacher expectancies and youth motivation. Having a better understanding of the relationship between expectancy value motivation of youth and CDE competencies could help coaches provide more positive learning experiences, helping students fulfill the purpose of CDEs—"…motivate students and encourage leadership, personal growth, citizenship and career development" (National FFA Organization, 2006, p. 5).

CHAPTER 3. METHODOLOGY

3.1. Purpose of the Study

The purpose of this research study was to describe youth's knowledge, motivation, and learning experiences in a competitive out-of-school horticulture career development experience. The researcher was interested in determining the relationships that may exist between youth outcomes and instructional variables such as coaches' motivation and learning resources used.

3.2. Research Questions

1. How did youth perform in the Horticulture CDE (Knowledge Exam, Identification Exam, Product Evaluation, and overall score)?
2. What learning resources were utilized in preparation for the Horticulture CDE?
    a. What was the relationship between youth's learning resources and preparation with performance in the Horticulture CDE?
3. To what extent were coaches motivated (intrinsic value, utility value, attainment value, cost, and sense of self-efficacy) regarding their youth's participation in the Horticulture CDE?

   a. What was the relationship between coach motivation and youth performance?

4. To what extent were youth motivated (intrinsic value, utility value, attainment value, cost, and sense of self-efficacy) to participate in the Horticulture CDE?
   a. What was the relationship between youth motivation and youth performance?
   b. What was the relationship between youth motivation and coach motivation?
   c. What was the relationship between youth motivation and learning resources and preparation?

3.3. Institutional Review Board Approval

The Purdue University Institutional Review Board approved the participation of youth and coaches in this research study on July 27, 2010 as IRB Protocol Ref. # 1007009518 (Appendix B).

3.4. Research Design

This was an exploratory descriptive study of the educational experiences of youth who participated in the 2010 Indiana 4-H/FFA Horticulture Career Development Event. A descriptive study with a quantitative drive was chosen because the researcher sought to study all participants, establish valid and consistent measures of youth motivation that could be used across other CDEs, and explore relationships between variables of interest (Schutt, 2009).

Qualitative items (open-ended questions) were also included to support quantitative data and provide an opportunity for participants to share their opinions regarding the CDE.

The study was a census of youth and coaches attending the 2010 Indiana 4-H/FFA Horticulture CDE. Both youth and coaches were asked to complete a questionnaire with assigned identification numbers so that their identities remained confidential, but matching of coaches and youth could be completed for data analyses. Each coach was given a number in coordination with the team of students they coached. Normal contest identifiers were used for the youth and were assigned by an administrative assistant. An administrative assistant then matched the coach and youth identification numbers according to their teams for analysis purposes. This design had three sets of independent variables: (a) youth motivation, (b) coach motivation, and (c) learning and preparation prior to the event, and a dependent variable of student performance (i.e., general knowledge exam, identification exam, product evaluation).

3.5. Participant Selection

All youth participants (N = 59) in the senior division (i.e., Grades 9-12) and their coaches were asked to complete the questionnaire. The Horticulture CDE was chosen because it is the first Career Development Event of the academic year and the researchers involved have educational degrees and job

responsibilities in plant sciences and horticulture. As such, they were interested in the outcomes of the research as a means to inform practice.

3.6. Background of Participants

The youth participants were 51% male and 49% female with 2 responses missing from the population (*n* = 57). The majority of youth were underclassman with 20% reporting as freshman and 34% as sophomores (29% juniors, and 17% seniors). For a majority of the youth, 59% participated in their first year of the Horticulture CDE, in comparison to their peers who participated in multiple years of the CDE (2 years – 19%, 3 years – 14%, and 4 years – 9%). Moreover, 66% of the youth had previously participated in other CDEs other than the Horticulture CDE.

Coach participants were 50% male and 50% female with one response missing from the population (*n* = 6). There were 5 coaches (83.3%) that reported participating in career development events as youth, with 100% of those respondents participating in the state of Indiana. Agriculture teacher/FFA advisor described 100% of the respondents (*n* = 6) and they had coached a Horticulture CDE team for an average of 11.33 years (*SD* = 14.82).

3.7. Educational Experience: Horticulture CDE

Planning and registration for the Horticulture Career Development Event began on August 24, 2010 when an e-mail was sent to all Indiana agriculture

teachers and 4-H Extension Educators informing them of the event and the cost of registration ($7 per person [Appendix C]). The coaches were asked to send their registration forms to the administrative assistant, and identification numbers were created for each registered team and individual.

Youth and coaches arrived on September 11th, 2010, to the Horticulture Greenhouses on Purdue University campus and were greeted by the hostesses at the registration table while assistants and event coordinators prepared the event. Upon check-in at the registration table, coaches received their youth's packets which contained their pre-printed examination materials (i.e., Scantron® sheets, Hormel® cards, and identification lists [Appendix D]). All teams and individuals were checked in for the event by 9:30 a.m. If youth arrived early and waited until the conclusion of check-in for other teams, they could walk throughout the Horticulture Gardens and do last-minute review by looking at plant specimens.

At 9:30 a.m., the youth and coaches were asked to assemble in a classroom inside the Horticulture building, where a brief orientation of the day's events took place. Youth were informed of the three rotations and that the information given to them by their coaches contained letters next to their assigned identification number. This letter signified what rotation the youth were assigned to participate in for the CDE–either A, B, or C. The students were asked to stay with their rotation for the entire event, and were then introduced to their group leaders who guided them to each of the examination rooms. After introductions were made, the youth were informed about the pizza lunch that was

provided upon completion of the questionnaire at the conclusion of their final rotation of the CDE.

Youth then followed their group leaders through the various rotations of the general knowledge exam, identification exam, or product evaluation exam. Each rotation lasted up to 45 minutes and the rotation times were recorded by a facilitator who went to each examination room to check and see if all youth completed the exam for that section of the CDE.

3.8. Outcome Measures and Instrumentation

The youth questionnaire was adapted from an instrument that was previously developed by a team of youth education specialists to measure similar variables. The items describing motivation on the previous instrument were developed using self-determination theory, therefore adjustments were made to reflect expectancy-value theory variables. The adapted questionnaire given to youth measured motivation (i.e., intrinsic value, utility value, attainment value, cost, and sense of self-efficacy), learning resources and preparation that occurred prior to the event and demographics. The questionnaire included both quantitative and qualitative measures. Examination materials were created for the day of the event to evaluate youth horticulture knowledge. A questionnaire was also developed for coaches and was adapted from the youth questionnaire; this questionnaire contained items to measure motivation (i.e., intrinsic value, utility value, attainment value, cost, and self-efficacy) for having youth participate in the Horticulture CDE, the learning resources they used to help their youth

prepare for the CDE, demographics, and prior experiences of coaching the horticulture and other CDEs.

3.8.1. Independent Variable Measures

The independent variables for this study were youth's motivation (intrinsic value, utility value, attainment value, cost, self-efficacy), coaches' motivation (intrinsic value, utility value, attainment value, cost, self-efficacy) for having youth participate, and the learning and preparation that took place prior to the horticulture CDE.

3.8.1.1. Youth Motivation

Youth's motivation (intrinsic value, utility value, attainment value and cost) for attending the Horticulture CDE was measured by assessing responses to the motivation statements on the questionnaire. The questionnaire included 22 questions that asked students to indicate their level of agreement to statements using the following scale: 1 = None, 2 = A little, 3 = Somewhat, 4 = Quite a Lot, and 5 = A Great Deal. Sample items are listed for each variable (Table 3.1).

Table 3.1

Sample Youth Motivation Items

Motivational Factors	Sample Items
Intrinsic Value (8 items)	I am interested in learning about horticulture I like plants and flowers
Utility Value (7 items)	I am interested in a career in horticulture I wanted to develop new career skills
Attainment Value (4 items)	I wanted to gain more confidence in Horticulture I already knew the information from taking a course and thought I would do well
Cost (3 items)	I was willing to take time to study alone I was willing to take time to study with my team I was willing to take time to come on a Saturday

3.8.1.2. Youth's Sense of Self–Efficacy for Horticulture Competence

The independent variable of youth's sense of self-efficacy for horticulture competency was measured by assessing self-efficacy scores on the self-efficacy statements on the questionnaire. These questions asked participants to indicate their level of agreement with 8 items using the following scale: 1 = None, 2 = A Little, 3 = Somewhat, 4 = Quite a Lot, and 5 = A Great Deal. Table 3.2 includes Sample items are listed for the variable (Table 3.2).

Table 3.2

Sample Youth's Sense of Self-Efficacy Items

I am confident in my ability to…
Answer general knowledge questions about horticulture.
Identify trees and shrubs.
Choose the best quality plant at a nursery.

3.8.1.3. Coach Motivation

Coaches' motivation (intrinsic, utility, attainment value, and cost) for attending the Horticulture CDE was measured by assessing motivation scores on the motivation statements on the questionnaire. The questionnaire included 21 questions that used the following scale: 1 = None, 2 = A Little, 3 = Somewhat, 4 = Quite a Lot, and 5 = A Great Deal. Table 3.3 contains sample items for each variable.

Table 3.3

Sample Coach Motivation Items

Motivational Factors	Sample Items
Intrinsic Value (4 items)	I want my students to be interested in learning about horticulture. I want my student to have interests in plants and flowers.
Utility Value (8 items)	I want my students to be interested in a career in horticulture. I want my student to develop career skills.
Attainment Value (6 items)	I want my students to gain more confidence in their horticulture knowledge.
Cost (2 items)	I was willing to take time to help them study I was willing to bring them to the event on a Saturday.

3.8.1.4. Coaches' Sense of Coaching Self-Efficacy

The independent variable of coaches' sense of coaching self-efficacy was measured by assessing scores on the self-efficacy statements on the questionnaire. These questions asked coaches to indicate their level of

agreement with 8 items using the following scale: 1 = None, 2 = A Little, 3 = Somewhat, 4 = Quite a Lot, and 5 = A Great Deal. Sample items for the variable are listed in Table 3.4.

Table 3.4

Sample Coaches' Sense of Self-Efficacy Items

I am confident in my coaching ability to…
Motivate my student to study.
Provide key resources to students.
Create a team spirit and sense of camaraderie.

3.8.1.5. Learning and Preparation

The youth and coach questionnaires had the same options for the learning resources the youth used to prepare, which included 16 items and a scale indicating their level of use: 1 = None, 2 = A Little, 3 = Some, 4 = A Lot, and 5 = Always. Example resources included: old tests or quizzes, invitational contests, flashcards, or field trips.

The time spent preparing for the CDE was also asked to both groups. However, the youth questionnaire including the time the youth spent studying with a team and as individuals, whereas the coach questionnaire only asked about the time they spent with their team.

3.8.1.6. Qualitative Data

Youth and coaches were asked open-ended questions to get feedback regarding their experiences with the CDEs and to support the quantitative data. Youth questions were related to motivation, learning, and to determine if youth felt value from participating in the CDE. Motivation was supported qualitatively with two open-ended questions: (1) *What was your primary reason for attending the Horticulture CDE?* and, (2) *Overall, was preparing for and attending the Horticulture CDE beneficial? Why or Why not?* Learning was supported with one open-ended question: *What is one thing you learned from participating in the Horticulture CDE?* Coaches were asked one qualitative question to assess motivation: *What was your primary reason for having students prepare and participate in the Horticulture CDE?*

3.8.2. Dependent Variable Measures

The dependent variables for this study were the performance of youth at the Horticulture Career Development Event (general knowledge exam, identification exam, product evaluation).

3.8.2.1. Performance

The dependent variable of youth performance was measured by assessing youth's scores on the Career Development Event assessments. The three assessments used were a general knowledge exam, identification exam, and product evaluation exam. The guidelines for the three assessments were

based on the National Junior Horticultural Association (NJHA) contesting guidelines and all assessments were approved by event officials and coaches.

3.8.2.1.1. General Knowledge Exam

A general knowledge exam (Appendix E) was created using Extension publications developed by the Purdue University Department of Horticulture and Landscape Architecture and the Department of Agronomy. The exam contained 80 questions concerning twelve categories: 1) Plant Nomenclature, 2) Environment and Horticulture Plants, 3) Plant Nutrition, 4) Vegetables, 5) Garden Flowers, 6) Fruit and Nut Production, 7) Turf, 8) Landscaping, 9) Managing Trees and Shrubs in the Landscape, 10) Plant Propagation, 11) Greenhouse Structure, and 12) Commercial Horticulture Production. The first 20 questions of the exam were true-false questions, and the last 60 questions were multiple–choice. There were a total of 80 questions with a total of 800 points for the general knowledge exam.

3.8.2.1.2. Identification Exam

Youth participants also completed an identification exam, which included identifying 100 specimens broken down into four categories. There were 25 specimens each of: 1) flowers and indoor plants, 2) landscape ornamentals, 3) fruits, nuts and berries, and 4) vegetables. Identification could have been any part of the plant (leaves, flowers, fruits, stems). This examination was worth 1000 points.

3.8.2.1.3. Product Evaluation Exam

The third station of the Horticulture CDE contained a product evaluation of plant material. There were two classes each of: 1) fruits, nuts, and berries, 2) vegetables, 3) flowers and indoor plants and 4) landscape ornamentals. As such, there was a total of eight classes: celosia, petunias, kale, potatoes, blueberries, holly, blue spruce, and strawberries. Students then rated four specimens based on characteristics that represented quality in each category. The product evaluation examination was worth a total of 400 points.

3.9. Role of the Researcher

The researcher in this study grew up in production agriculture and received her bachelor's degree in Landscape Horticulture and Design. She was a ten-year participant of the 4-H program and a 4-H Junior Leader for five years. Due to her background and interests, the researcher decided to study a Career Development Event in the context of horticulture. As such, she assisted the plant science youth development specialist in creating the examination materials and facilitating the Horticulture CDE. In order to monitor her biases, the researcher would often debrief with her co-advisors and review her work with a more objective point of view. The researcher received critical feedback from the expert panel regarding the questionnaire to ensure face and content validity. This feedback also helped the researcher assess her potential biases and how they might have influenced the validity of the results.

3.10. Instrument Validity and Reliability

Validity and reliability of the instruments were established to execute a quality research study. Validity and reliability of the instruments were established using several methods.

3.10.1. Expert Panel

An expert panel with expertise in plant science education, career development, and, motivation and student engagement in agricultural education helped establish content validity (Appendix F). Readability and consistency throughout were considered and adjustments were made to ensure face and content validity.

3.10.2. Field Test

A previous version of the questionnaire was field and pilot-tested to establish face validity and reliability. This questionnaire was based on a similar motivation theory; however, items were edited and added in order to align more closely with Expectancy-Value Theory. Due to the changes of the original, field-tested questionnaire, the questionnaire used in the current study was considered a pilot test for the revised instrument. Cronbach's post-hoc alpha reliability coefficients for youth motivation were: Intrinsic = 0.89, 7 items; Utility = 0.69, 6 items; Attainment = 0.64, 4 items; Cost = 0.70, 3 items; Self-efficacy = 0.50, 8 items. Cronbach's post-hoc reliability coefficients for coach motivation were:

Intrinsic = 0.90, 4 items; Utility = 0.77, 8 items; Attainment = 0.64, 6 items; Cost = 0.82, 2 items; Self-efficacy = 0.90, 8 items. Difficulty and discrimination indices of previous years' exams were computed to aid in the development of the knowledge test and a question database was established for future development of examinations.

3.11. Data Collection

During the final rotation, group leaders reminded the youth that there was a questionnaire for them to complete and that they should be certain to put their identification numbers that had been assigned to them on the questionnaire and on the Scantron®. At the conclusion of the final rotation, group leaders had the youth turn in their last examination score sheet, and then handed the youth the questionnaire and Scantron® sheet to complete.

After the youth completed the questionnaires, the group leaders checked and ensured that the youth identification numbers were on both the Scantron® and questionnaire. Youth were then released after completion of their questionnaire and were able to reconvene with their coaches and teams out in the hallway of the Horticulture building, or outside in the Horticulture Gardens.

After all youth completed the rotations, pizza was provided for the youth and coaches. The youth and their coaches could either stay to hear the results or return home. If the youth and coaches stayed to hear the results, they waited in the Horticulture Gardens or in the classroom in the Horticulture building where the orientation presentation occurred. The results were read after the final

scores were tabulated and then all youth and coaches returned to their respective homes.

3.12. Data Analysis

All quantitative data were entered into Predictive Analytics Software (PASW) statistical software version 18. Level of measurement, central tendency, and variance were identified for each variable (Table 3.5). Pearson's Correlation and Spearman's Rank were used to determine relationships of variables (Table 3.6), and relationships were explained using conventions by Hopkins (2000; Table 3.7).

Table 3.5

Level of Measurement, Central Tendency, and Variance Related to Each Dependent and Independent Variable

Variable	Level of Measurement	Central Tendency	Variance
Gender	Nominal	Frequency	
Youth Demographics	Nominal	Frequency	
Coach Demographics	Nominal	Frequency	
Youth Performance	Ratio	Sum/Percentage	Standard Deviation
Learning and Preparation	Ordinal	Frequency	
Coach Motivation	Item: Ordinal Scale: Interval	Frequency Mean	Standard Deviation
Youth Motivation	Item: Ordinal Scale: Interval	Frequency Mean	Standard Deviation

Table 3.6

Statistical Tests Used to Describe Each Relationship

Dependent and Independent Variable Relationships	Statistical Test	Measure of Association
Youth's Learning and Preparation and Youth Performance	Spearman Rank	Rank Order
Coach Motivation and Youth Performance	Pearson's correlation	Linear
Youth Motivation and Youth Performance	Pearson's correlation	Linear
Youth Motivation and Coach Motivation	Pearson's correlation	Linear
Youth Motivation and Learning and Preparation	Spearman Rank	Rank Order

Table 3.7

Conventions for Relationships (Hopkins, 2000)

Relationship Coefficient (*r)*	Convention
0.9 - 1.0	Nearly Perfect
0.7 - 0.9	Very Large
0.5 - 0.7	High
0.3 - 0.5	Moderate
0.1 - 0.3	Low
0.0 - 0.1	Trivial

The descriptive statistics used to analyze the data included frequencies, means, standard deviations, and percentages due to a small number of

respondents and that the results were not to be generalized to a larger population. Means, standard deviations, relationship sizes, percentages, and effect sizes were rounded to the nearest 1/100th. Effect sizes concerning relationships were calculated using Cohen's (1988) r^2 and were described by Cohen's (1988) conventions (Table 3.8).

Table 3.8

Conventions for Effect Sizes of Relationships (Cohen, 1988)

Effect Size Coefficient (r^2)	Convention
0.01 - 0.08	Small
0.09 - 0.24	Medium
>0.25	Large

Qualitative data were analyzed by using open coding, which assisted the researchers in developing primary categories (Trochim, 2006). After data collection, the researcher typed all responses into Microsoft Excel so that the questions and responses could be viewed as a whole. After responses were organized, the researcher identified themes and patterns that emerged. Themes were found by identifying patterns consisting of recurring topics, vocabulary, meanings or feelings (Taylor & Bogdan, 1989). Frequencies were reported for recurring themes, and each theme identified was also supported with quotes from the participants.

CHAPTER 4: RESULTS

4.1. Purpose of the Study

The purpose of this research study was to describe youth's knowledge, motivation, and learning experiences in a competitive out-of-school horticulture career development experience. The researcher was interested in determining the relationships that may exist between youth outcomes and instructional variables such as coaches' motivation and learning resources used.

4.2. Research Questions

1. How did youth perform in the Horticulture CDE (Knowledge Exam, Identification Exam, Product Evaluation, and overall score)?
2. What learning resources were utilized in preparation for the Horticulture CDE?
    a. What was the relationship between youth's learning resources and preparation with performance in the Horticulture CDE?
3. To what extent were coaches motivated (intrinsic value, utility value, attainment value, cost, and sense of self-efficacy) regarding their youth's participation in the Horticulture CDE?

   a. What was the relationship between coach motivation and youth performance?

4. To what extent were youth motivated (intrinsic value, utility value, attainment value, cost, and sense of self-efficacy) to participate in the Horticulture CDE?
   a. What was the relationship between youth motivation and youth performance?
   b. What was the relationship between youth motivation and coach motivation?
   c. What was the relationship between youth motivation and learning resources and preparation?

4.3. Performance

On average, youth scored 63.20% on their overall scores (Total points = 2200; *M* = 1390.37; *SD* = 128.38; Table 4.1). Using a conventional grading scale in formal education (i.e., 90-80-70-60), youth earned a “D-” grade on their overall CDE score. On average, youth participants correctly identified half of the plant specimens in the identification exam with an average score of 52.00% (Points possible = 1000; *M* = 520.00; *SD* = 210.72), and earned a 61.27% (Points possible = 800; *M* = 490.17; *SD* = 128.38), on the general knowledge exam. However, youth earned an “A” grade (95.05%; Points possible = 400; M = 380.20, *SD* = 10.29) on the product evaluation exam and were able to distinguish the difference between good and poor quality of different plant products.

Table 4.1

Youth Performance in Horticulture CDE (N = 59)

Exam	Mean Score	Mean Percent
General Knowledge (800 points)	490.17 (*SD* = 128.38)	61.27 (*SD* = 16.05)
Identification (1000 points)	520.00 (*SD* = 210.72)	52.00 (*SD* = 21.07)
Product Evaluation (400 points)	380.20 (*SD* = 10.29)	95.05 (*SD* = 2.57)
Overall Score (2200 points)	1390.37 (*SD* = 327.54)	63.20 (*SD* = 14.89)

4.4. Learning and Preparation

Youth reported using various resources to prepare for the Horticulture CDE, such as old tests and quizzes, flashcards, websites, coach-created materials, and classroom aids/real-life materials as their top five learning resources (Table 4.2). The top five resources coaches used to help youth prepare included: websites, flashcards, old tests or quizzes, coach-created materials, and publications (Table 4.3). On average, youth reported they prepared 16.50 hours with their team (*SD* = 15.14), 11.69 hours by themselves (*SD* = 11.13), and 28.19 hours total (*SD* = 10.70; Table 4.4). Coaches reported coaching an average of 25.36 hours (8.07 hours a week for 3.29 weeks) to help their students prepare for the Horticulture CDE. The different responses in preparation time could be due to the varying preparation of youth and their

teams. A youth may have started preparing for the event months prior to the event, whereas another team may not have been aware of the event until the e-mail was sent out one month in advance. Coaches may have reported hours they spent gathering resources as well as their team practices, whereas youth reported their team's practice time. Finally, self-reported responses may have varied some due to the respondents estimating the time spent.

Table 4.2

Learning Resource Frequencies for Youth

Learning Resources	Percent Reported				
	None	A Little	Some	A Lot	Always
1. Old Tests or Quizzes (*n* = 56)	9.1	9.1	13.6	28.8	24.2
2. Flashcards (*n* = 59)	27.3	6.1	7.6	16.7	31.8
3. Websites (*n* = 58)	12.1	15.2	22.7	27.3	10.6
4. Classroom Aids/Real-Life Materials (*n* = 58)	27.3	9.1	15.2	19.7	16.7
5. Coach-Created Materials (*n* = 59)	19.7	12.1	21.2	24.2	12.1
6. Student-Created Collections (*n* = 59)	42.4	6.1	13.6	15.2	12.1
7. Practice Judging or Judging Workshops (*n* = 59)	22.7	25.8	16.7	12.1	12.1
8. Publications (Extension or 4-H) (*n* = 59)	31.8	18.2	19.7	12.1	7.6
9. Field Trip (*n* = 54)	39.4	10.6	16.7	7.6	7.6
10. Outside Experts (*n* = 59)	40.9	22.7	13.6	6.1	6.1
11. Judging Kits (*n* = 59)	57.6	10.6	9.1	7.6	4.5
12. Videos/DVDs (*n* = 58)	57.6	13.6	7.6	6.1	3.0
13. Textbooks (*n* = 59)	54.5	12.1	13.6	4.5	4.5
14. Student-Created Management Plans/Scenarios (*n* = 59)	57.6	13.6	10.6	6.1	1.5
15. Invitational Contests (*n* = 59)	68.2	9.1	6.1	4.5	1.5
16. Judging Camps (*n* = 59)	75.8	10.6	1.5	1.5	--

Note. Frequencies were calculated by adding the percent of responses in the “Always” and “A Lot” categories and placing the resources in descending order.

Table 4.3

Learning Resource Frequencies for Coaches

Learning resources	Percent Reported				
	None	A Little	Some	A Lot	Always
1. Websites (*n* = 7)	--	--	--	14.3	85.7
2. Flashcards (*n* = 7)	14.3	--	14.3	28.6	42.9
3. Old Tests or Quizzes (*n* = 7)	14.3	--	14.3	--	71.4
4. Coach-Created Materials (*n* = 7)	14.3	14.3	--	--	71.4
5. Publications (Extension or 4-H) (*n* = 7)	--	14.3	14.3	71.4	--
6. Practice Judging or Judging Workshops(*n* = 7)	14.3	14.3	14.3	14.3	42.9
7. Classroom Aids/Real-Life Materials (*n* = 7)	--	14.3	28.6	--	57.1
8. Field Trip (*n* = 7)	--	42.9	14.3	28.6	14.3
9. Student-Created Collections (*n* = 7)	28.6	14.3	28.6	14.3	14.3
10. Judging Kits (*n* = 7)	42.9	--	42.9	14.3	--
11. Textbooks (*n* = 7)	14.3	42.9	28.6	14.3	--
12. Videos/DVDs (*n* = 7)	71.4	--	14.3	14.3	--
13. Outside Experts (*n* = 7)	57.1	28.6	--	14.3	--
14. Student-Created Management Plans/Scenarios (*n* = 7)	71.4	14.3	14.3	--	--
15. Invitational Contests (*n* = 7)	85.7	--	14.3	--	--
16. Judging Camps (*n* = 7)	85.7	14.3	--	--	--

Note. Frequencies were calculated by adding the percent of responses in the “Always”, “A Lot”, and “Some” categories and placing the resources in descending order.

Table 4.4

Youth and Coach Preparation

Preparation Time	Youth Mean (*n* = 59)	Coach Mean (*n* = 7)
Hours Preparing with Team	16.5 (*SD* = 15.14)	25.36 (*SD* = 13.08)
Hours Preparing Alone	11.69 (*SD* = 11.13)	
Total Hours	28.19 (*SD* = 10.70)	

There were 17 practically significant relationships between learning and preparation variables and youth CDE performance with eight between learning resources used and youth CDE performance (Table 4.5). There were moderate correlations between youth's general knowledge exam scores and old tests or quizzes (r = .42) and classroom/real-life materials (r = .31). These relationships had medium effect sizes (old tests or quizzes: r^2 = .18, classroom/real-life materials: r^2 = .10). There were moderate correlations between youth's identification exam scores and old tests or quizzes (r = .40), flashcards (r = .31), and classroom aids/real-life materials (r = .36). These relationships had medium effect sizes (old tests or quizzes: r^2 = .16, flashcards: r^2 = .10, classroom/real-life materials: r^2 = .13). There were moderate correlations between youth's total CDE exam scores and old tests or quizzes (r = .42), and classroom aids/real-life materials (r = .34). These relationships had medium effect sizes (old tests or quizzes: r^2 = .18, classroom aids/real-life materials: r^2 = .12). Student-created management plans/scenarios was negatively correlated to the product evaluation exam (r = - .30), and had a medium

effect size (r^2 = .09). There were two negative, small relationships between product evaluation and student-created collections (r = -.24) and outside experts (r = -.28). These relationships had small effect sizes (student-created collections: r^2 = .06; outside experts: r^2 = .08).

There were nine practically significant relationships between preparation time variables (with team, alone, total preparation hours) and CDE performance. There were moderate relationships between youth's preparation time with their team and general knowledge (r = .30) identification (r = .31), and total exam (r = .32) scores. These relationships had medium effect sizes (general knowledge: r^2 = .09; identification: r^2 = .10; total CDE score: r^2 = .10). There were moderate relationships between youth's preparation time alone and general knowledge (r = .30) identification (r = .34), and total exam (r = .32) scores. These relationships had medium effect sizes (general knowledge: r^2 = .09; identification: r^2 = .12; total CDE: r^2 = .10).

Table 4.5

Relationships between Learning Resources and Youth CDE Performance

	Exam			
	General Knowledge	Identification	Product Evaluation	Total CDE Score
Learning Resources				
1. Old Tests or Quizzes-	.42*	.40*	-.14	.42*
2. Flashcards	.22	.31*	-.00	.29
3. Websites	-.13	-.08	-.13	-.10
4. Classroom Aids/Real-Life Materials	.31*	.36*	-.06	.34*
5. Coach-Created Materials	.17	.17	-.13	.18
6. Student-Created Collections	.14	.15	-.24	.14
7. Practice Judging or Judging Workshops	.22	.26	.01	.25
8. Publications (Extension or 4-H)	-.12	-.02	.02	-.07
9. Field Trip	-.09	.03	.01	-.01
10. Outside Experts	.01	.07	-.28	.04
11. Judging Kits	.06	.05	-.11	.08
12. Textbooks	-.10	-.07	-.21	-.10
13. Videos/DVDs	.10	.13	-.02	.14
14. Student-Created Management Plans/Scenarios	.00	.01	-.30*	.01
15. Invitational Contests	-.15	-.21	-.00	-.19
16. Judging Camps	-.08	-.07	-.05	-.08
Preparation Time				
1. With Team	.30*	.31*	-.07	.32*
2. Alone	.30*	.34*	.01	.32*
3. Total Hours	.39*	.43*	.04	.42*

Note. *Practically significant = medium effect size

There were seven themes of learning outcomes reported by youth in response to the open-ended question: *What is one thing you learned from participating in the Horticulture CDE?* Learning identification of plants and general horticulture knowledge was reported by 67.24% (n = 39) of youth (Table 4.6). Other themes of learning indicated by youth included learning the event was difficult (17.24%, *n* = 10), fun (6.9%, *n* = 4), learning more about judging practices (5.17%, *n* = 3), learning they knew more than they thought (5.17%, *n* = 3), learning more about themselves (5.17, *n* = 3), and learning about plant care (3.45%, *n* = 2).

Table 4.6

Themes Regarding Youth Learning

Theme	Frequency (*N*=58)	Example Quotations
Identification/Plants/Horticulture	67.24% (*n* = 39)	"Types of plants" 3012 "I learned more about all of the different flowers and trees out there. Like what they look like how you can tell ex." 3051 "To identify many plants, flowers, fruits, veggies, nuts." 3123
It's Hard/Difficult/Takes Time	17.24% (*n* = 10)	"This is the first year our chapter has done it in awhile and we needed to practice a little more" 3001 "That its kind of hard to tell what plants are what sometimes." 3101 "I learned that it takes a lot of time and dedication." 3121
It was Fun	6.9% (*n* = 4)	"It is a lot funner than I thought it would be. Learning about fruits and vegetables and plants is awesome" 3152 "It was fun though." 3021

Product Evaluation/Judging	5.17% (*n* = 3)	"Judging the plants, fruits, & vegetables." 3031 "How to properly judge a class of plants based on certain characteristics of the plant itself" 3061
I know a Lot/Did Well	5.17% (*n* = 3)	"I knew and understood a lot about plants and plant maintenance already." 3062 "That hard work and studying pays off" 3072
I Learned About Myself	5.17% (*n* = 3)	"To trust in my own ability" 3044 "I learned more about what my strengths are and what I'm not so good at" 3073
Plant Care	3.45% (*n* = 2)	"I have learned many new care & maintenance practices." 3071

Note. Open-coded themes to the question: "What is one thing you learned from participating in the Horticulture CDE?"

4.5. Coach Motivation

Based on the five point, Likert-type scale, coaches were "quite" motivated their students participated in the Horticulture CDE based on intrinsic value (*M* = 4.25, *SD* = .54), attainment value (*M* = 3.82, *SD* = .62) and utility value (*M* = 3.43, *SD* = .69). Coaches were willing to expend "quite a lot" of effort (cost value: *M* = 4.36, *SD* = .80) to coach youth and bring them to the Horticulture CDE. Coaches were "somewhat" self-efficacious (*M* = 3.77, *SD* = .71) to coach and prepare a Horticulture CDE team (Table 4.7).

Table 4.7

Coach Motivation (N = 7)

	Mean	Standard Deviation
Coach Motivation		
Intrinsic	4.25	0.54
Utility	3.82	0.62
Attainment	3.43	0.69
Cost	4.36	0.80
Self-Efficacy	3.77	0.71

Note. Scale: 1 = None, 2 = A Little, 3 = Somewhat, 4 = Quite a Lot, 5 = A Great Deal

There were 12 practically significant relationships, with three moderate relationships and nine high relationships between coach variables and CDE outcomes (Table 4.8). Coaches' intrinsic value, utility value, and attainment value motivation variables were related to youth's general knowledge exam, identification exam, and total CDE scores. There were moderate relationships between the general knowledge exam score and coaches' utility value (r = .48), and attainment value (r = .48). These relationships had medium effect sizes (utility: r^2 = .23; attainment: r^2 = .23). There was a high relationship between youth's general knowledge exam scores and coaches' intrinsic value (r = .50). This relationship had a large effect size (r^2 = .25) and youth's general knowledge exam scores and coaches' intrinsic value shared co-variance by 25%. There were high relationships between youth's identification exam scores and coaches'

intrinsic value (r = .57), utility value (r = .50), and attainment value (r = .53). These relationships had large effect sizes (intrinsic: r^2 = .32; utility: r^2 = .25; and attainment: r^2 = .28). As such, youth's identification exam scores and coaches' intrinsic value co-varied by 32%, youth's identification exam scores and coaches' utility value co-varied by 25%, and youth's identification exam scores and coaches' attainment value co-varied by 28%. There were high relationships between youth's total CDE exam scores and coaches' intrinsic value (r = .56), utility value (r = .51), and attainment value (r = .53). These relationships had large effect sizes (intrinsic: r^2 = .31; utility: r^2 = .26, and attainment r^2 = .28). As such, youth's total CDE exam scores and coaches' intrinsic value co-varied by 31%, youth's total CDE exam scores and coaches' utility value co-varied by 26%, and youth's total CDE exam scores and coaches' attainment value co-varied by 28%. Coaches' cost had trivial to low relationships ranging from r = .07 to r = .26 and small effect sizes ranging from r^2 = .00 to r^2 = .07) with all four CDE performance scores. Self-efficacy was negatively correlated with all CDE performance exams scores. There was a negative, moderate relationship between self-efficacy and youth's general knowledge exam scores (r = -.39). This relationship had a medium effect size (r^2 = .15). There was a negative, high relationship between coaches' self-efficacy and youth's identification exam (r = -.57), and total exam (r = -.53) scores. These relationships had large effect sizes (identification r^2 = .32, total exam r^2 = .28).

Table 4.8

Relationships between Coach Motivation and Youth CDE Performance

	CDE Performance			
	General Knowledge Exam	Identification Exam	Product Evaluation Exam	Total CDE Exam Score
Coach Motivation				
Intrinsic	.50**	.57**	-.03	.56**
Utility	.48*	.50**	-.02	.51**
Attainment	.48*	.53**	-.03	.53**
Cost	.25	.26	.07	.26
Self-Efficacy	-.39*	-.57**	-.07	-.53**

*Note. Practically significant = *medium effect size or **large effect size*

In response to open-ended questions, four coaches (57.15%) indicated they prepared youth to participate in the Horticulture CDE because their students were interested in plants and horticulture (Table 4.9). Three coaches (42.96%) noted that they had youth attend to develop skills for careers or enjoyment. Two coaches (28.57%) coaches shared that they attended for social/competitive reasons (28.57%, n= 2), and one coach mentioned that participating in the CDE was an extension of one of their agricultural education courses.

Table 4.9

Themes Regarding Coaches' Reasons for Having Youth Participate in the Horticulture CDE (N = 7)

Theme	Frequency	Example Quotations
Students had an interest in horticulture	57.14% (*n* = 4)	"They are interested in this subject area, so we pursued this contest" 3080 "My students really want to compete in this contest and they push me" 3110 "They have the interest" 3130
To develop skills for careers or enjoyment	42.86% (*n* = 3)	"To provide them with the opportunity to develop usable skills for employment and leisure" 1000 "To gain knowledge about horticulture knowledge on their way to a career." 1010 "Help them to learn skills/competencies that could be used in agricultural hobbies/careers.
Social/Travel/Competitive reasons	28.57% (*n* = 2)	"There have been other side benefits. Our students like to meet other students. They enjoy travelling to national contests." 1010 "I have a group of student that love participating in different CDE's." 3000
As part of a class	14.29% (*n* = 1)	As a component of the Horticulture Class" 3150

Note. Open-coded themes to the question: "What is your primary reason for having students prepare and participate in the Horticulture CDE?"

4.6. Youth Motivation

Youth were “somewhat” motivated to participate in the Horticulture CDE based on intrinsic value (*M* = 2.76, *SD* = .89), attainment value (*M* = 3.06, *SD* = .85) and utility value (*M* = 3.30, *SD* = .77). Youth were willing to expend “quite a lot” of effort (cost value: *M* = 3.68, *SD* = .84) to participate in the Horticulture CDE and were “somewhat” self-efficacious (*M* = 3.08, *SD* = .76) to complete the tasks of the Horticulture CDE (Table 4.10).

Table 4.10

Youth Motivation (N = 59)

	Mean	Standard Deviation
Youth Motivation		
Intrinsic	2.76	0.89
Utility	3.29	0.77
Attainment	3.06	0.85
Cost	3.68	0.84
Self-Efficacy	3.08	0.76

Note. Scale 1 = None, 2 = A Little, 3 = Somewhat, 4 = Quite a Lot, 5 = A Great Deal

There were 10 practically significant relationships with moderate effect sizes between youth variables and CDE performance (Table 4.11). Youth’s intrinsic value and self-efficacy were moderately related to general horticulture knowledge (*r* = .35 and *r* = .33, respectively). These relationships had medium effect sizes (intrinsic r^2 = .12, self-efficacy r^2 = .11). There were moderate

relationships between youth's identification of plants and intrinsic value (r = .34), utility value (r = .32), attainment value (r = .33), and self-efficacy (r = .33). These relationships all had medium effect sizes (intrinsic: r^2 = .16; utility: r^2 = .10; attainment: r^2 = .11; and self-efficacy: r^2 = .11). There were moderate relationships between youth's total CDE score and intrinsic value (r = .36), utility value (r = .30), attainment value (r = .32), and self-efficacy (r = .34). These relationships all had medium effect sizes (intrinsic r^2 = .13, utility r^2 = .09, attainment r^2 = .10, and self-efficacy r^2 = .12). There were low to trivial relationships between youth's ability to evaluate plant quality and all motivational variables (intrinsic: r = .02; utility: r = -.04; attainment: r = .07; cost: r = .15; self-efficacy: r = .05), and overall horticulture knowledge and skills to the motivational variable of cost (general knowledge exam: r = .06; identification: exam: r = .17; product evaluation exam: r = .15; total CDE score: r = .14). These relationships had small effect sizes and were not considered practically significant.

Table 4.11

Relationships between Youth Motivation and Youth CDE Performance

	CDE Performance			
	General Knowledge Exam	Identification Exam	Product Evaluation Exam	Total CDE Exam Score
Youth Motivation				
Intrinsic	.35*	.34*	.02	.36*
Utility	.26	.32*	-.04	.30*
Attainment	.28	.33*	.07	.32*
Cost	.06	.17	.15	.14
Self-Efficacy	.33*	.33*	.05	.34*

Note. *Practically significant = medium effect size

There were three practically significant relationships between youth motivation and coach motivation variables (Table 4.12). There was a high relationship between coaches' intrinsic value and youth's utility value (r = .52). This relationship had a high effect size (r^2 = .27). As such, coaches' intrinsic value and youth's utility value co-varied by 27%. There was a moderate relationship between coaches' intrinsic value and youth's self-efficacy (r = .33). This relationship had a medium effect size (r^2 = .11). As such, coaches' intrinsic value and youth's self-efficacy shared co-variance by 11%. There was a moderate relationship between coaches' attainment value and youth's utility value (r = .36). This relationship had a medium effect size (r^2 = .13). As such, coaches' attainment value and youth's utility value co-varied by 13%. Coaches' utility value and cost variables had trivial to low relationships with all of the youth motivation variables. There were negative, low correlations between coaches' self-efficacy and youth's motivation variables (intrinsic: r = -.08; utility: r = -.23; attainment: r = -.03; cost: r = -.05; self-efficacy: r = -.09). These relationships had small effect sizes (intrinsic: r^2 = .01; utility: r^2 = .05; attainment: r^2 = .00; cost: r^2 = .00; self-efficacy: r^2 = .01) and were not considered practically significant.

Table 4.12

Relationships between Youth Motivation and Coach Motivation

	Coach Motivation				
	Intrinsic	Utility	Attainment	Cost	Self-Efficacy
Youth Motivation					
Intrinsic	.15	.14	.11	.14	-.08
Utility	.52**	.28	.36*	.05	-.23
Attainment	.21	.09	.08	.09	-.03
Cost	.25	.06	-.10	.12	-.05
Self-Efficacy	.33*	.10	.10	.05	-.09

Note. Practically significant = *medium effect size or **large effect size

The open-ended questions regarding youth's motivation to participate in the Horticulture CDE resulted in ten themes (Table 4.13). Of 58 responses, 36.21% (*n* = 21) of youth reported that their primary reason for attending the Horticulture CDE was to learn. Other top reasons for participating included to win (15.5%, *n* = 9) or because external voices such as coaches, parents or friends encouraged them to participate (13.79%, *n* = 8). Students also mentioned they were interested in or liked horticulture (10.24%, *n* = 6) and thought it would be fun (8.62%, *n* = 5).

Table 4.13

Themes Regarding Youth's Reasons for Participating in the Horticulture CDE (N = 58)

Theme	Frequency	Example Quotations
To learn	36.21% (*n* = 21)	"To learn more about horticulture" 3011 "to learn something new" 3133 "My primary reason was to gain knowledge in the field of Horticulture." 3204
To win/compete	15.5% (*n* = 9)	"I like participating in contests with my FFA Chapter." 3021 "to win." 3151 "I enjoy the competition and with experience of attending National at different levels." 3191
Because of coach/ parents/friends	13.79% (*n* = 8)	"My coach wanted me to."3031 "My parents and friend thought I could do well" 3122
Because of an interest in horticulture	10.34% (*n* = 6)	"I like plants and flowers, and being able to identify them" 3064 "I raise mums and horticulture interests me." 3113
To get involved with the FFA	10.34% (*n* = 6)	"It was my first chance to actually get involved with the FFA" 3044 "Participate in FFA activities." 3083 "and get more active in FFA" 3134
To try something new	10.34% (*n* = 6)	"It sounded interesting" 3041 "I wanted to see what it was about because I have never done this before" 3142 "I thouth [sic] it would be good to try it out" 3183
Because it is fun/enjoyable	8.62% (*n* = 5)	"I thought it would be fun" 3084 "My primary reason for attending was to have fun" 3153

Because it relates to a career/future	6.9% (*n* = 4)	"I want to be a landscaper when I grow up. My dad is a landscaper I work with him in the summer." 3181 "Because I want to do floweraculture [sic]." 3051 "Also, maybe I can use this information later in life." 3193
To receive FFA incentive points	6.9% (*n* = 4)	"not going to lie it was for points." 3004 "to earn points for a white water rafting trip"3042
To be social	5.17% (*n* = 3)	"to be involved with other FFA chapters" 3043 "meet new people" 3152 "I like travelling to new places, & the CDE lets me do that. I can go to new placed & meet new people during national competitions" 3193

Note. Open-coded themes to the question: "What was your primary reason for attending the Horticulture CDE?"

An overwhelming majority (93%, *n* = 50) of youth answered that preparing for and attending the Horticulture CDE was beneficial, with 6% (*n* = 3) having mixed feelings and saying that it took time away from other things, not learning enough information, and that they did not do well on the test (Table 4.14). One youth stated that it was not beneficial because they did not have enough preparation. Of those youth who provided positive responses, seven themes of why attending the Horticulture CDE was beneficial were found, and 68.0% (*n* = 34) of youth reported that it was beneficial because they learned something. Other themes of why it was beneficial for the youth to attend included competitive aspects and earning FFA points (22.0%, *n* = 11), that is was fun/cool to attend

(18.0%, *n* = 9), that it was related to their future (18.0%, *n* = 9), and that they had more social/family connections (8.0%, *n* = 4).

Table 4.14

Themes Regarding Youth's Perceptions of the Benefits of Horticulture CDE (N = 57)

Theme	Frequency (*N*=57)	Example Quotations
Yes	93.0% (*n* = 50)	
Learning	68.0% (*n* = 34)	"Yes, I have learned so many new things" 3041 "Yes, I learned a lot from preparing for the Horticulture CDE." 3181 "yes. It helps me widen my knowledge and makes me more educatable [sic] about my environment." 3194
Competition/felt prepared	22.0% (*n* = 11)	"Yes, I felt more prepared for this CDE." 3064 "Yes, because without it you would not know any thing to be identified and you would fail" 3183 "Yes, if I did not prepare for the Horticulture CDE I would not have known practically any plants to classify or judge. I would also lack in the quiz categories and would have failed miserably." 3204
Fun/cool	18.0% (*n* = 9)	"Yes. Whether I use this information or not in the future, it was fun while I was doing it." 3021 "Also I got to go somewhere I haven't been in Indiana." 3123
Career/Future	18.0% (*n* = 9)	"Yes, because to prepare for attend H. CDE will really help a person in facing its future. I mean, he could

		know what surrounds him (plants etc.) Horticulture is a very good thing to know." 3093 "Yes, because now I can make my garden for next year better" 3042 "and could help me with a job in the future" 3201
Learning about myself	10% (*n* = 5)	"Yes it helped me learning more things not only about plants but about what I'm capable of," 3051 "yes, it helped me with study skills." 3084 "Yes it taught me you have to work hard and commit to what you do" 3141
Social/Family	8.0% (*n* = 4)	"now I have something in common to talk about with my Grandmother." 3062 "Yes, my mom loves plants and so her influence has rubbed off on me." 3112 "and I made new friends." 3114
FFA Points	4.0% (*n* = 2)	"yes because I enjoy it and get FFA points for it." 3063
Yes and No/Somewhat	6.0% (n = 3)	"Yes and No. I did learn a lot but it took time away from things that needed to be done." 3022 "Somewhat, I didn't learn all I needed to" 3122 "Yes and no. Yes because there were a lot of specimen that I recognized. No because I feel I did not do well on the test." 3134
No	2.0% (n = 1)	"No, because we only had like a week of practice" 3094

Note. Open-coded themes to the question: Overall, was preparing for and attending the Horticulture CDE beneficial? Why or why not?

There were 18 practically significant relationships between youth motivation and learning and preparation variables (Table 4.15). There was a positive moderate correlation between youth's intrinsic value and student-created collections (r = .45), student-created management plans/scenarios (r = .45), and youth preparation time alone (r = .40). This relationship had medium effect sizes (student-created collections: r^2 = .20, student-created management plans: r^2 = .20, youth preparation time alone: r^2 = .16). There were positive moderate correlations between youth's utility motivation and flashcards (r = .31), classroom/real-life materials (r = .44), coach-created materials (r = .32), student-created collections (r = .40), field trips (r = .39), videos/DVDs (r = .40), and student-created management plants/scenarios (r = .40). These relationships had medium effect sizes (flashcards: r^2 = .10, classroom/real-life materials: r^2 = .19, coach-created materials: r^2 = .10, field trips: r^2 = .15, videos/DVDs: r^2 = .16, student-created collections: r^2 = .16). There were positive moderate correlations between youth's attainment value and student-created collections (r = .35), and student-created management plans/scenarios (r = .35). These relationships had medium effect sizes (student-created collections: r^2 = .12, student-created management plans/scenarios: r^2 = .12). There was a positive moderate correlation between youth's cost motivation scores and publications (r = .35). This relationship had a medium effect size (r^2 = .12). There were a positive moderate correlations between youth's sense of self-efficacy and student-created collections (r = .47), student-created management plans/scenarios (r = .47), invitational contests (r = .38), and youth's preparation time alone (r = .41), and

youth's total preparation time (r = .31). These relationships had medium effect sizes (invitational contests: r^2 = .14, youth preparation time alone: r^2 = .17, youth's total preparation time: r^2 = 10). Without being redundant, it is important to note the two learning resources that had moderate relationships with the majority of the motivational factors. Student-created collections and management plans/scenarios each had moderate correlations with the motivational factors of intrinsic value, utility value, attainment value, cost, and self-efficacy.

Table 4.15

Relationships between Youth Motivation and Learning Resources and Preparation

	Youth Motivation				
	Intrinsic	Utility	Attainment	Cost	Self-Efficacy
Learning Resources					
1. Old Tests and Quizzes (*n* = 56)	.27	.23	.20	.17	.12
2. Flashcards (*n* = 59)	.16	.31*	.24	.08	.23
3. Websites (*n* = 58)	.01	.08	-.06	-.02	-.02
4. Classroom Aids/Real-Life Materials (*n* = 58)	.29	.44*	.14	.21	.20
5. Coach-Created Materials (*n* = 59)	.20	.32*	.19	-.01	.06
6. Student-Created Collections (*n* = 59)	.45*	.40*	.35*	.28	.47*
7. Practice Judging or Judging Workshops(*n* = 59)	.21	.25	.25	.17	.10
8. Publications (Extension or 4-H) (*n* = 59)	.17	.15	.25	.35*	.09
9. Field Trip (*n* = 54)	.20	.39*	.12	.11	.15
10. Outside Experts (*n* = 59)	.14	.21	.08	.04	.09
11. Judging Kits (*n* = 59)	.09	.24	.05	-.05	.07
12. Videos/DVDs (*n* = 58)	.04	.40*	.14	-.02	.15
13. Textbooks (*n* = 59)	.08	.29	.00	.23	.23
14. Student-Created Management Plans/Scenarios (*n* = 59)	.45*	.40*	.35*	.28	.47*
15. Invitational Contests (*n* = 59)	.26	.14	.14	.08	.38*
16. Judging Camps (*n* = 59)	.13	.07	.07	.06	.22
Preparation Time					
1. With Team	.12	.25	.09	.01	.13
2. Alone	.40*	.09	.19	.26	.41*
3. Total Hours	.28	.23	.17	.15	.31*

Note. Practically significant = *medium effect size

CHAPTER 5: CONCLUSIONS

5.1. Purpose of the Study

The purpose of this research study was to describe youth's knowledge, motivation, and learning experiences in a competitive out-of-school horticulture career development experience. The researcher was interested in determining the relationships that may exist between youth outcomes and instructional variables such as coaches' motivation and learning resources used.

5.2. Research Questions

1. How did youth perform in the Horticulture CDE (Knowledge Exam, Identification Exam, Product Evaluation, and overall score)?
2. What learning resources were utilized in preparation for the Horticulture CDE?
    a. What was the relationship between youth's learning resources and preparation with performance in the Horticulture CDE?
3. To what extent were coaches motivated (intrinsic value, utility value, attainment value, cost, and sense of self-efficacy) regarding their youth's participation in the Horticulture CDE?

   a. What was the relationship between coach motivation and youth performance?

4. To what extent were youth motivated (intrinsic value, utility value, attainment value, cost, and sense of self-efficacy) to participate in the Horticulture CDE?
   a. What was the relationship between youth motivation and youth performance?
   b. What was the relationship between youth motivation and coach motivation?
   c. What was the relationship between youth motivation and learning resources and preparation?

5.3. Conclusions for the Study

There were three conclusions for this study. Each conclusion was discussed below regarding its contribution to the body of knowledge.

5.4. Conclusion 1: Youth Motivation

Youth were motivated to participate in a competitive horticulture career development event and youth motivation was related to performance of horticultural competencies.

5.4.1. Discussion

Youth were willing to spend time preparing for and participating in the Horticulture CDE and felt that participating would help them accomplish their

personal and career goals. Youth participants reported cost and utility value as the highest means among the motivation variables. Tenably, youth likely weighed the benefits alongside the costs of participating in the Horticulture CDE and determined participation in the event outweighed an alternative activity. Overall, nearly all of the youth participants agreed that "preparing for and attending the Horticulture CDE was beneficial." This conclusion supported Eccles and Wigfield's (2002) theory of expectancy value motivation because utility and practicality of the event were appraised by youth and deemed beneficial after they decided to participate in the event. This conclusion also supported Norland and Bennett's study (1993) of youth satisfaction in 4-H activities where a moderate relationship between competition and satisfaction was found and Keith's (1997) study where parents found the benefits of competitive events, although Keith's study did not view competition from the perspective of youth.

Youth had a higher utility value than intrinsic value. As such, youth motivation was most closely related to more external factors such as career interests, coach encouragement, or being competitive for scholarships or awards. In comparison, youth were less motivated by intrinsic values such as interest in horticulture or plants and flowers. Although youth were motivated by more outward factors, they still had internal reasons for participating in the career development event, such as enjoying the competitive environment or wanting to learn new things. Qualitatively, one-third of the participants reported they attended to learn, and one out of six participants agreed they participated to win

or compete as their primary reason for attending the Horticulture CDE. This supported the expectancy of doing well on a task and the value the task has for the individual (Wigfield & Eccles, 2000), as well as individuals exertion of effort and perseverance (Bandura, 1989). This conclusion also supported the findings in Arnold et al. (2007) where youth reported factors aside from competition as motivation for participating in a 4-H county fair—another venue of out-of-school youth competition.

Youth motivation was related to how well the youth performed the horticultural competencies in the career development event. This conclusion supported Wigfield and Eccles' (2000) theory that an individual's expectations of the event and the value of the event influence performance, effort and determination. The lack of a significant relationship of cost to the exams could be because all youth were willing to put forth the effort to participate in the Horticulture CDE regardless of their level of performance. Moreover, youth's evaluation of horticulture products was not significantly related to the motivational factors, which could be due to the ease of the exam. Youth's self-efficacy was related to horticultural competencies, which supports a study by Bandura et al. (1996) where children's self-efficacy was related to their academic achievement.

5.5. Conclusion 2: Coach Motivation

Coaches' motivation was related to youth motivation and youth performance of horticulture competencies. However, this conclusion should be considered carefully because it was based on seven participants.

5.5.1. Discussion

Coaches were motivated to have youth participate in the Horticulture CDE, and their motivation was related to youth's performances of horticultural competencies. As such, coaches were able to have a role in youth's learning process. This conclusion supported the findings reported by Abrose and Goar (2009) and Thompson et al. (2003) that coaches have significant roles in the successes of their teams because coaches were able to build a learning environment to create competencies.

Coaches were willing to spend time preparing youth to participate and perform in the Horticulture CDE. Of the motivational factors, cost and intrinsic values were the highest means, which suggests coaches were willing to take time to prepare youth and wanted their students to have an interest in participating. Coaches had higher means in intrinsic value factors than utility value, which means that coaches wanted their students to have more interest in horticulture and enjoyed teaching their youth about horticulture, rather than participating to attend a state contest or to build their coaching reputation. Qualitatively, over half of the coaches' primary reasons for having youth attend were based on their youth's interests. Within the qualitative data, one out of four coaches' primary reason for having youth attend was for competitive reasons, which did not support Thompson et al. (2003) or Croom et al.'s (2005) findings, where coaches mentioned competition was the primary reason youth participated in career development events.

Coaches who were less self-efficacious about their coaching abilities had teams and individuals with higher performance of horticultural competencies.

This conclusion did not support literature, which stated a more self-efficacious coach will directly related to higher performances of youth (Eccles & Wigfield, 1985; Beekley & Moody, 2002). However, this conclusion should be carefully considered due to seven participants being a major limitation in quantitative research. Coaches' motivational factors of intrinsic value, utility value, and attainment value were related to youth's performance of horticultural competencies. As such, coaches who had a desire for their youth to have an interest in the competitive event found usefulness in having their youth attend, and thought that it was important for their youth to do well did indeed coach youth with higher competencies. This conclusion supported Beekley and Moody's (2002) finding that teachers who found more usefulness in competitions had more successful teams.

5.6. Conclusion 3: Educational Experiences and Performance

Time spent preparing for the horticulture career development event and learning resources used by youth were related to youth's overall performance of horticultural competencies. However, youth did not perform horticultural competencies at a level required to be a certified horticulture manager or technician in the horticulture industry.

5.6.1. Discussion

Although youth used old exams, flashcards, and collections, they still performed below scores reflecting horticultural industry competency. Old exams

and quizzes, flashcards and websites were the top resources noted by youth, whereas videos/DVDs, invitational contests, and judging camps were used the least. These findings have mixed results in comparison to the Poskey et al.'s (2005) study, where field trips, videos and websites were the most used resources.

Overall, youth did not perform to a level required by the horticulture industry. According to landscape certification programs, a 70% or better is required for certification as a landscape technician (Professional Landcare Network, 2011). According to youth horticultural competencies, one-third of the youth performed at a level that is considered passing by industry certifications. However, with the majority of youth performing at the Horticulture CDE for the first time and the high level of content presented within the assessment preparation materials, the average score reflected youth having adequate horticultural competencies. Youth also performed well on the product evaluation exam and were able to distinguish the good and poor quality examples used, though this high competency could be a reflection of the ease of the exam.

5.7. Implications for Practice

This research is pertinent because it illustrates the need to 1) build youth competencies and motivation through coaching strategies, and 2) improve programs to develop career competencies. As mentioned earlier, CDEs were created to "motivate students and encourage leadership, personal growth, citizenship and career development" (National FFA Organization, 2006, p. 5).

Coaches participating in this study wanted youth to participate, and youth were motivated to participate in the CDE. In the qualitative research, youth noted personal growth and being informed on career exploration and content knowledge, albeit the majority of youth did not demonstrate proficiency in horticulture competence that would be expected for certification in the horticulture industry.

For the most part, students felt that they could be successful and were confident in their abilities to complete the event's tasks. Though it is important that youth have confidence to prepare and compete at out-of-school competitive events, the purpose of events such as CDEs is for youth to demonstrate proficiency in industry-based competencies. Coaches of youth competitive events should ensure they build youth's competencies as it relates to not only assessment tools of the event, but also to career and certification guidelines.

5.7.1. Coaching Strategies

The present research concludes that motivated coaches are more likely to have motivated students, and motivated students are more likely to reach a higher level of horticultural competence. As such, youth should have coaches with strong motivation to help them prepare and participate in out-of-school competitive events. As identified earlier, out-of-school competitive events may use a more teacher-centered, direct-instruction model to build youth competencies; however, there are prospects within this model to increase learner

motivation (Eggen & Kauchak, 2000). One prospect found in this study to increase youth motivation was coach motivation.

This study identified relationships between coaches' intrinsic value and youths' utility value and self-efficacy. This means that coaches should consider their motivations and recognize that the more interested they desire their youth to have interest in the content, the more youth find utility in the subject and feel more competent related to the content. Coaches should then use their positive motivations to create learning environments that allow youth to build competencies and self-efficacy. This implication supports a statement from Elliot and Knight (2005) that coaches are responsible for creating environments which yield student learning and performance.

In order to build youth competencies, coaches should educate themselves of the purposes and content of out-of-school competitive events and determine what learning and preparation practices will create a more confident and knowledgeable youth participant. It was identified through this research that aside from old tests and quizzes, classroom aids and real-life materials had the strongest relationships with youth competencies; and that student-created collections were related to youth's motivation. These aids and real-life materials reflect the multi-modal process of active learning (Knobloch, 2009) in which students are actively engaged in material and can recall the information (Bruner, 1961). As such, coaches of competitive events with similar assessments should consider implementing more authentic preparation strategies and teaching pedagogies. Preparation time was also related to youth competencies. As such,

coaches should be certain they are committed to coaching youth and increasing their proficiency in career applications and knowledge.

5.7.2. Program Improvements to Develop Career Skills

Program administrators of youth competitive events can benefit from this study in regards to program improvement and communication. Administrators with competitive events reflecting career development should review their program's assessments and ensure the program's goals and objectives are preparing youth for careers and industry certifications. As part of this research, a review of courses taken by students in the Department of Horticulture and Landscape Architecture were reviewed to identify related coursework to the event's assessments. Alignment with university course requirements and industry certification programs should be identified and learning resources and event assessments should be a reflection of those career preparation tools. These alignments may ensure youth gain competencies that will assist them in their future career preparations.

More direct communication of the event's content and purpose to coaches may allow coaches to build stronger learning environments to support youth motivation and learning. This increase in youth motivation and learning may motivate youth to explore career options through other events or industry certifications. Program administrators with similar events can use the conclusions of this study to reanalyze the importance and goals of their programs

and realize the importance of preparing coaches to build youth performance and motivations, resulting in development of career skills.

5.8. Recommendations for Further Study

There are two salient areas of recommendations for future studies regarding participants and contexts, and measurements and impacts. Each area is discussed in the paragraphs below.

5.8.1. Participants and Contexts

Due to the small number of respondents (youth: *N* = 59; coaches: *N* = 7), data analyses were limited to being descriptive and are not generalizable to a larger population. In Indiana, there are opportunities for youth to participate in events with similar assessments, such as the Indiana 4-H/FFA Forestry & Wildlife CDE and the FFA Nursery and Landscape CDE. These events hold similar assessments and contain contexts similar to the Horticulture CDE. Replications of this study into events with similar contexts can help to make more generalizations of youth who participate in plant or environmentally-based competitive events and the motivations of their coaches' who prepare them to participate. Additionally, further research should be conducted in other career development events (e.g., livestock, dairy meats) so that responses can be accumulated and more statistical analysis can be conducted. These analyses may include factor analysis and multiple regression, which will allow for more rigorous analyses of relationships. Also, replication into other contexts will allow

for exploration of differences in youth participants and their coaches in various contexts of competitive career development events.

5.8.2. Measurement and Impacts

Improvements in measurement can assist in stating impact of out-of-school competitive events on youth career development. These improvements can include the timing of research and research methodology.

Although there was no evidence, youth may have been affected by the timing of the questionnaire. Because the participants completed the questionnaires directly after they completed the CDE, their emotions and interpretations of their experience could have influenced their answers and self-perceptions as they completed the questionnaire. For example, youth who participated and felt that they performed poorly may have reported a lower sense of self-efficacy, when in reality they may have actually performed well. It is recommended that researchers continue to use mixed methods to create triangulation and support of youth and coach motivations and perceptions of youth experiences.

The uncertainty of commonly-used resources identified in this study suggests a need for exploratory research focused on the educational experiences of youth prior to the event. The research may contain more qualitative research methods, such as interviews or focus groups so that a list of resources can be more focused on that event and less broad. It is recommended that more evaluation of coaching strategies and learning resources occur prior to

the day of the event, as opposed to after the event occurs. These explorations of teaching strategies would again be more qualitative analysis through observations of learning environments and should ensure that the preparation of youth for competitive events like the Horticulture CDE is indeed developing youth for future careers; and successful coaching strategies for career development should be identified and marketed to other programs and coaches. It is also recommended that specific learning resources be identified. For example, it was stated that youth used websites to prepare, however, the researcher is unsure of what specific websites were used. This information could be gained via focus groups or interviews and would assist in the development and distribution of learning resources.

Future studies should not only continue to study youth and coach motivation, but also build upon this study to determine if programs are preparing youth for future careers. These studies should explore youth participant's career choices and college majors to determine if participating in competitive career development events encouraged their interest in that career path. An exploration into careers may contain longitudinal methodology to determine the differences between participants through the years and their different career choices. It is also recommended that studies be conducted comparing youth in similar degree programs who participated in competitive career development events to those who did not participate to determine if participation in competitive career development events does indeed prepare youth for a specific degree or prepare for a certain course. Studies of this nature allow for organizations such as 4-H

and FFA to more accurately explore their impact on career exploration and development, and determine whether their program's activities are reflections of their organization's missions and goals.

5.9. Summary

In summary, this study focused on youth's knowledge, motivation and educational experiences in a competitive, out-of-school career development event. It was identified that youth motivation and coach motivation were related to youth competencies and that youth did not reflect strong horticultural knowledge. It was suggested that this study be continued to other contexts and youth-serving organizations and that more exploratory research be conducted. Given the results of this study, there are new recommendations for research in this field as well as suggestions for coaches and program administrators.

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LIST OF REFERENCES

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APPENDICES

Appendix A. Horticulture CDE Assessments' Alignment with Purdue Courses

	Exam		
Course	General Knowledge	Product Evaluation	Identification
HORT 101 – Fundamentals of Horticulture	XX		
HORT 201 – Plant Propagation	X		
HORT 217 – Woody Landscape Plants			XX
HORT 218 – Herbaceous Landscape Plants			XX
HORT 301 – Plant Physiology	X		
HORT 317 – Landscape Contracting and Maintenance	X	X	
HORT 360 – Flower Arrangement and Indoor Plant Management	X		
HORT 420 – Ornamental Plant Production	X	X	
HORT 421 – Fruit Production	X	X	X
HORT 422 – Vegetable and Herb Production	X	X	X
HORT 513 – Nutrition of Horticulture Crops	X		
AGRY 210 – Fundamentals of Turfgrass Culture	X		
AGRY 255 – Soil Science	X		
BTNY 210 – Introduction to Plant Science	X		
BTNY 301 – Introductory Plant Pathology	X		
BTNY 304 – Introductory Weed Science	X		
ENTM 446 – Integrated Plant Health Management for Ornamental Plants	X		

*Note. X = Somewhat Aligned XX = Strongly Aligned

Appendix B. IRB Protocol #1002008985

PURDUE
UNIVERSITY

HUMAN RESEARCH PROTECTION PROGRAM
INSTITUTIONAL REVIEW BOARDS

To:	KATHRYN ORVIS AGAD 227
From:	RICHARD MATTES, Chair Social Science IRB
Date:	09/15/2010
Committee Action:	**Exemption Granted** F-YI/A001 EB
IRB Action Date:	09/14/2010
IRB Protocol #:	1007009518
Study Title:	Motivational Factors Influencing Youth Performance in Indiana 4-H/FFA State Horticulture Career Development Event

The Institutional Review Board (IRB) has reviewed the above-referenced protocol and has determined that it qualifies for exemption pursuant to Federal regulations 45 CFR 46.101(b) exempt category(1).

If you wish to revise or amend the protocol, please submit a revision request to the IRB for consideration. Please contact our office if you have any questions.

We wish you good luck with your work. Please retain copy of this letter for your records.

Ernest C. Young Hall, 10th Floor · 155 S. Grant St. · West Lafayette, IN 47907-2114 · (765) 494-5942 · Fax: (765) 494-9911

Appendix C. E-mail alerting coaches of Horticulture CDE

-----Original Message-----
From: inaged-l-bounces@lists.purdue.edu
[mailto:inaged-l-bounces@lis:s.purdue.edu] On Behalf Of Saunders, Terry A.
Sent: Tuesday, August 24, 2010 1:49 PM
To: extydae1@lists.purdue.edu; extanr@lists.purdue.edu; Inaged-l@lists.purdue.edu
Subject: [Inaged-l] Horticulture Contest Invitational

Ag and Extension Educators!

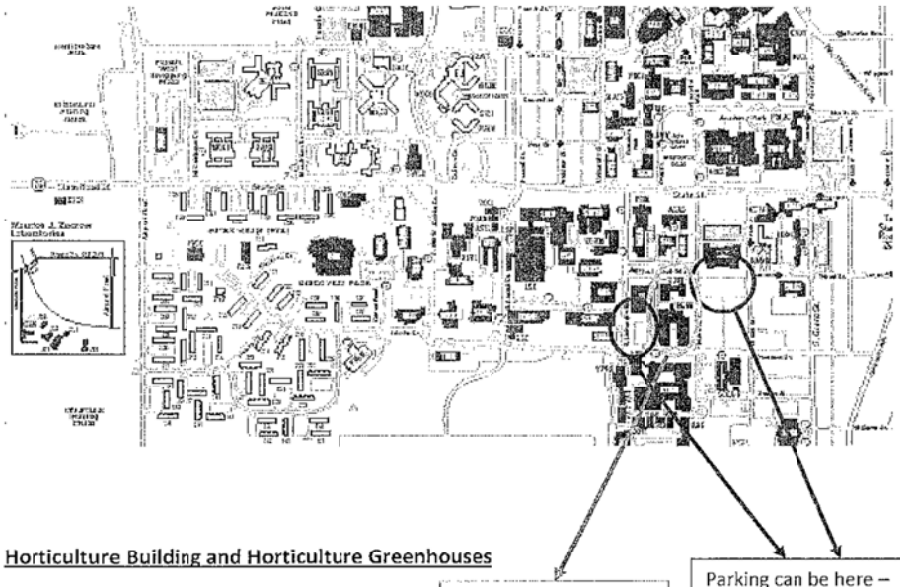
It's time once again to start up the Career Development Events for the year!
The first event, the Horticulture Invitational, will be held on Saturday, September 11th at Purdue University. Pre-Registration for the contest can be sent to:

Purdue University
ATTN: Terry Saunders
AGAD Bldg
615 W State St
West Lafayette, IN 47907

Cost for the invitational is $7 per person and checks should be made out to Purdue University.

Check in and registration will be held in the Horticulture gardens in front of the Horticulture Greenhouses (map attached) and will be completed by 9:30am. After registration, all participants will gather in Horticulture building room 117 for instructions.
We look forward to seeing you all again this year! Good Luck!

Terry Saunders CPS/CAP
Secretary and Graduate Secretary
Dept of Youth Development & Ag Education Purdue University AGAD Bldg
615 W State St
West Lafayette, IN 47907
Phone: 765-494-8439



Horticulture Building and Horticulture Greenhouses

http://www.purdue.edu/campus_map/

This link is the interactive map on Purdue's home page.

Note:
Marstellar St. is one way north, so turn off from Harrison St. to get there. (i.e. you can't turn off from State St.)

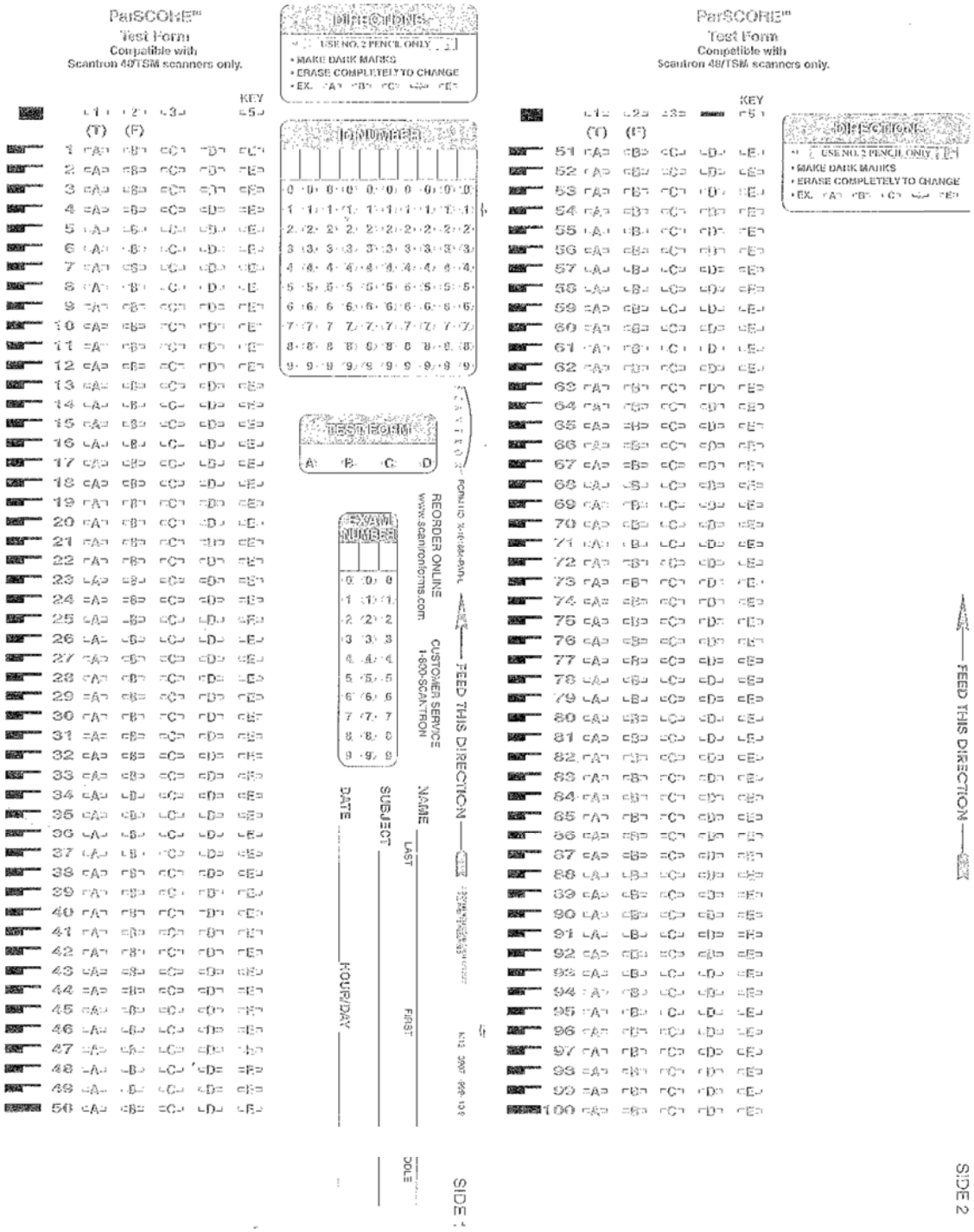
Contest is here – in the Horticulture Building and the Horticulture Greenhouse. Registration is between the two buildings.

Parking can be here – off from Marstellar St. next to (east) Hort bldg. or south of Food Science off from Harrison St.

Assemble in HORT 117

Contest registration starts at 8:00, and the contest won't start until 9:30 am.

Appendix D. Scantron®, Hormel® card, and Identification form used at the Horticulture CDE



4-H 396o

Purdue University
4-H/FFA Judging
Placing Card

Contestant
Number: _____

Class Name: _____

_____

_____

Placing Score: _____

Reason Score: _____

Put a check (√) to the right of one group of numbers to show how you placed the class.

1-2-3-4	A
1-2-4-3	B
1-3-2-4	C
1-3-4-2	D
1-4-2-3	E
1-4-3-2	F
2-1-3-4	G
2-1-4-3	H
2-3-1-4	I
2-3-4-1	J
2-4-1-3	K
2-4-3-1	L
3-1-2-4	M
3-1-4-2	N
3-2-1-4	O
3-2-4-1	P
3-4-1-2	Q
3-4-2-1	R
4-1-2-3	S
4-1-3-2	T
4-2-1-3	U
4-2-3-1	V
4-3-1-2	W
4-3-2-1	X

Ornamentals

_____Arborvitae
_____American Planetree
_____Ash
_____Azalea, Rhododendron
_____Barberry
_____Basswood, Linden
_____Beech
_____Birch
_____Boxwood
_____Camellia
_____Cotoneaster
_____Cottonwood/Poplar
_____Dogwood
_____Elm
_____English Ivy
_____Euonymus
_____Fir
_____Forsythia
_____Ginkgo
_____Hawthorn
_____Hemlock
_____Holly
_____Honey Locust
_____Hydrangea
_____Juniper
_____Lilac
_____Magnolia
_____Mahonia
_____Maple
_____Oak
_____Pachysandra
_____Periwinkle (Vinca spp.)
_____Pine
_____Pittosporum
_____Potentilla
_____Privet
_____Redbud
_____Spirea
_____Spruce
_____Sweetgum
_____Tulip Tree (Tulip Poplar)
_____Viburnum
_____Willow
_____Wisteria
_____Yew (Taxus spp.)

Vegetables

_____Artichoke (Globe/Jerusalem)
_____Asparagus
_____Basil
_____Bean
_____Beet
_____Broccoli
_____Brussels Sprouts
_____Cabbage
_____Carrot
_____Cauliflower
_____Celery
_____Chayote
_____Chinese Cabbage
_____Chives
_____Collard
_____Corn
_____Cucumber
_____Dill
_____Eggplant
_____Endive (Belgian, escarole)
_____Garlic
_____Kale
_____Kohlrabi
_____Leek
_____Lettuce
_____Muskmelon
_____Mustard
_____Okra
_____Onion
_____Parsley
_____Parsnip
_____Peas
_____Pepper
_____Potato (Irish)
_____Potato (Sweet)
_____Pumpkin
_____Radish
_____Rhubarb
_____Rutabaga
_____Sage
_____Spinach
_____Squash
_____Swiss Chard
_____Tomato
_____Turnip
_____Watermelon

11-2009

Appendix E. General Knowledge Exam

Senior 4-H/FFA State HORTICULTURE Exam 2010

Name _____ ID: _____

You will have 45 minutes to complete the exam. Good Luck!

Please fill in the scantron bubbles completely using a #2 pencil only. Make sure your name and number are on the scantron sheet and this exam. Check that you have all the pages. There are 80 questions on this exam.

True or False—On the answer sheet, mark A for True statements or B for False statements

1. Plants that live from one year to the next are called annuals.
2. During winter months fertilizer application should be increased since the plants are not receiving as much light.
3. Cloudy or colored glass containers provide adequate light for plant growth in terrariums.
4. Nut trees are pollinated by wind.
5. Pollen is produced by the pistil.
6. Adequate amounts of nitrogen, phosphorus, and potassium are necessary for a healthy lawn.
7. Tender bulbs require a period of cold temperatures in which to grow roots and initialize flower buds before you can force them to bloom.
8. Someone who wants a low-maintenance landscape should incorporate hedges.
9. Light level is the most important environmental factor to consider when picking a location for planting bulbs.
10. Onions grow best in moderately cool temperatures with abundant moisture
11. Container gardens need to be watered less frequently than garden beds.
12. You should always remove your grass clippings after you mow the lawn.
13. The gas found in bruised or aging plant material that causes rapid decay of cut flowers is called Ethylene.
14. The three most important characteristics that determine how long flowers will remain attractive and useful are high water content, food, and avoiding toxic substances.
15. Cuttings rooted in water will transplant as easy as cuttings rooted in media.

Multiple Choice—On the answer sheet, mark the correct letter answer (A, B, C, D or E)

16. Planting depth for most seeds should be
    A. 5 times the size of the seed.
    B. 3 times the size of the seed.
    C. 1 – 1 1/2 times the size of the seed.

17. The process of gradually exposing seedlings and transplants to outdoor conditions is known as
    A. direct planting
    B. setting out
    C. hardening off

18. Bulbs can be classified as either
    A. weak or strong.
    B. hardy or tender.
    C. dominant or recessive.

19. Which of the following best describes powdery mildew:
    A. light brown stripes on stems and petioles.
    B. sappy residue found underneath leaves and on plant nodes.
    C. white blotches on stems, leaves, and fruit.

20. Branches that are over 1" in diameter should
    A. be pruned using the "Double Cut" pruning method.
    B. not be touched unless they have fallen down.
    C. not be pruned until they are 3" in diameter.

21. This sterile material is frequently used to root plant cuttings
    A. Sand
    B. Perlite
    C. Water

22. The hardiness of a plant indicates its ability to
    A. thrive in minimum rainfall.
    B. flower throughout the growing season.
    C. survive winter conditions.

23. Which of the following are applied after weeds are up and growing?
    A. Pre-emergence Herbicide
    B. Post-emergence Herbicide
    C. Neither A or B

24. How can you tell if a tree has suffered from cold injury?
    A. Cut a twig and examine its pith.
    B. Take a sample of the cambial layer.
    C. Cut open the tree's buds and examine them.

25. Seeds should be stored in an area that is:
    A. warm and moist.
    B. dry and cool.
    C. hot and dry.

26. Hardening transplants prior to planting outdoors takes about:
    A. One week
    B. Two Weeks
    C. Three Weeks

27. English ivy is usually started by
    A. hardwood cuttings
    B. leaf-bud cuttings
    C. stem cuttings

28. A localized climate is usually referred to as a
    A. micro-climate
    B. macro-climate
    C. backyard specialty

29. A good annual flower for shady areas:
    A. Ageratum
    B. Zinnia
    C. Impatiens

30. "Allelopathy" is when
    A. two plants work and grow well together.
    B. one plant produces a substance which affects the growth of another
    C. one plant shades out another plant, inhibiting its growth and function.

31. How much of the foliage of an herb can be picked at one time without affecting plant growth?
    A. one-third (1/3)
    B. one-half (½)
    C. one-quarter (¼)

32. Deciduous trees and shrubs are often propagated by this method:
    A. leaf cuttings
    B. hardwood cuttings
    C. root cuttings

33. Vegetable gardens should be located in the
    A. shade.
    B. partial shade.
    C. sun.

34. For cuttings that are difficult to root use
    A. water.
    B. hormones.
    C. vermiculite.

35. Most perennial plants will benefit from
    A. deep cultivation.
    B. tip cuttings.
    C. division every 3-4 years.

36. For the best drainage in your terrarium add a layer of
    A. garden soil.
    B. perlite.
    C. gravel.

37. Generally, narrow-leaved evergreen plants require
    A. less pruning than deciduous hedge plants.
    B. more pruning than deciduous hedge plants.
    C. the same amount of pruning as deciduous hedge plants.

38. The main reason for removing excess foliage from cut flowers is…
    A. to reduce the flower's life.
    B. to allow for more flowers to be put in the vase.
    C. to reduce water loss and decrease microbial growth in the vase.

39. Herbicides are generally not recommended for
    A. trees.
    B. shrubs.
    C. vegetable and flower gardens.

40. Tall growing vegetable plants such as corn and pole beans should be planted on the _____side of the garden.
    A. North
    B. South
    C. East

41. Number of pounds of nitrogen in 50 pounds of 18-24-6
    A. 9
    B. 12
    C. 3

42. Monoecious plants have
    A. separate male and female parts on the same plant.
    B. separate male and female parts on different plants.
    C. none of the above

43. Daffodils are
    A. perennials.
    B. annuals.
    C. neither A or B.

44. Which plants should not be used in a terrarium?
    A. cactus and succulents
    B. mosses and lichens
    C. ferns and tropical plants

45. When measuring fertilizer it is helpful to know that one pound of dry fertilizer is equal to
    A. About 4 Tablespoons
    B. About 2 cups
    C. About 5 cups

46. When flowers are pollinated and fertilization is successful
    A. the plant wilts.
    B. the plants become a richer green.
    C. a fruit forms.

47. Turf fertilizer containing nitrogen, phosphorus, and potassium is referred to as a
    A. slow release fertilizer.
    B. complete fertilizer.
    C. basic fertilizer.

48. Flowers keep best when cut
    A. at mid-day.
    B. before 9:00 a.m.
    C. late afternoon.

49. A build-up of white crusty material on the soil surface or rim of a flowerpot indicates
    A. salt accumulation.
    B. lack of water.
    C. too much sun.

50. When mowing your lawn, you should
    A. mow as close to the soil as you can, so you don't have to disturb the grass as often.
    B. mow so that you only remove 1/3 of the leaf blade at one time.
    C. mow so that you leave 1/3 of the leaf blade.

51. In renewal pruning of shrubs…
    A. Remove 1/3 of the old branches to ground level each season.
    B. You cut the entire shrub to ground level during the first season.
    C. Cut only all the old, large branches to the ground, leaving the new growth.

52. Pinching annuals as well as removing faded blooms promotes
    A. disease problems.
    B. lush heavy foliage.
    C. increased flowering.

53. It is best to water plants
    A. during the early part of the day.
    B. midday.
    C. after dark.

54. For optimum growth and visually pleasing landscapes, hedges should be pruned so:
    A. the top is wider than the bottom.
    B. the bottom is wider than the top.
    C. the top and bottom are the same width.

55. When thinning to one seedling in a pot, it is best to remove all others by _____.
    A. pulling to remove both the shoot and the roots
    B. removing both plants and repotting the healthiest
    C. cutting all but the healthiest at soil level

56. The first symptom of wilt disease in tomatoes is
    A. yellowing of the lower leaves.
    B. blackened fruit.
    C. striping on the older leaves.

57. An effective way to provide houseplants with adequate humidity is to _____.
    A. use a pebble tray.
    B. syringe plants with water.
    C. place them near an air conditioner.

58. Lemon Balm and Mint...
    A. are potentially invasive plants
    B. are edible plants
    C. should be harvested before they flower
    D. all of the above

59. Adding sand or perlite to potting soil
    A. aerifies the soil.
    B. improves root growth.
    C. ensures good drainage.
    D. all of the above

60. The tuber is an underground, modified
    A. fruit.
    B. leaf.
    C. stem.
    D. flower.

61. Mulching perennials will help to
    A. conserve soil moisture.
    B. moderate soil temperatures.
    C. help to control weeds.
    D. all of the above

62. _____ is a tightly intermingled organic layer of dead and living shoots, stems, and roots that accumulate just above the soil surface of turf.
    A. Matting
    B. A compactive layer
    C. Thatch
    D. None of the above

63. Putting cut flowers in your home refrigerator overnight is not okay because…
    A. fruits and vegetables give off ethylene which will cause the cut flowers to die.
    B. cut flowers don't like cold temperatures.
    C. flowers don't like the refrigerator lighting.
    D. none of the above

64. The anther and filament are part of the
    A. stamen
    B. pistil
    C. stigma
    D. ovary

65. Roses should be watered in the morning or early afternoon to prevent
    A. abnormal growth.
    B. overwatering.
    C. foliar diseases.
    D. none of the above

66. What is damping-off?
    A. Letting a plant dry out completely before you water it again.
    B. A disease which affects seedling development.
    C. Putting your seedlings in a tray of water when you first plant them.
    D. None of the above.

67. Photoperiodic is
    A. the plant response to having its photo taken.
    B. the plant response to the amount of light it receives.
    C. the plant response to fertilizer.
    D. none of the above

68. Thatch accumulation on lawn areas is due to
    A. over-fertilization.
    B. overwatering.
    C. soil compaction.
    D. all the above

69. The chemical produced by Black Walnut is known as
    A. Juglone.
    B. Solanine.
    C. Horothane.
    D. Methylglycol.

70. Self- pollination occurs when pollen is
    A. transferred from one plant to another.
    B. transferred on the same plant.
    C. transferred from different species of plants.
    D. self-pollination cannot occur.

71. Which landscape plants have an undisturbed ball of soil around their roots?
    A. Machine-Balled
    B. Bare-Root
    C. Balled and Burlapped
    D. Containerized Plants

72. A general rule for watering lawns is
    A. to water frequently.
    B. to water when you have time.
    C. to water in the heat of the day in 10 minute intervals.
    D. to water deeply and infrequently.

73. Most soil testing labs recommend that you check the status of your soil
    A. every year.
    B. every three to five years.
    C. every ten years.
    D. whenever you start seeing problems in your plants.

74. Plants add moisture to the air through a process known as
    A. wilting.
    B. perspiration.
    C. imbibition.
    D. transpiration.

75. To create balanced attractive floral arrangement, containers should be
    A. bright and much smaller than the arrangement.
    B. neutral in color and proportionate in size to the arrangement.
    C. neutral and three times larger than the arrangement.
    D. small and round to easily cover.

76. Which of the following are not growth classifications of roses?
    A. Bush
    B. Climbing
    C. Shrub
    D. Trailing

77. When digging a hole for a balled and burlapped tree or shrub, it should measure
    A. the exact size of the root ball.
    B. the exact width of the root ball, but twice as deep.
    C. twice as wide and deep as the root ball.
    D. twice as wide as the root ball, but just as deep.

78. When watering African violets, make sure follow which of the following recommendations:
    A. keep the crown dry.
    B. keep cold water off the leaves.
    C. use room temperature water.
    D. all of the above
    E. only B & C

79. Which of the following are considered annual flowers?
    A. Petunias
    B. Zinnias
    C. Marigolds
    D. All the above
    E. None of the above

80. When staking plants, you should be sure that
    A. The stakes are 6-12 inches shorter than the full height of the plant.
    B. You tie the plant loosely to the stake with soft cloth ties or wire covered with paper or plastic.
    C. You place the stake behind the plant and sink it into the ground.
    D. All of the above
    E. B&C only

Appendix F. Expert Panel

Name	Position Title	Related Expertise
Dr. Neil Knobloch	Associate Professor	Motivation
Dr. Kathryn Orvis	Associate Professor	Horticulture CDE Coordinator
Dr. Levon Esters	Assistant Professor	Career Development
Dr. Colleen Brady	Associate Professor	Animal Sciences CDE Coordinator
Dr. Natalie Carroll	Associate Professor	Natural Resources CDE Coordinator