

EFFECT OF PROBLEM-BASED LEARNING ON KNOWLEDGE ACQUISITION,  
KNOWLEDGE RETENTION, AND CRITICAL THINKING ABILITY OF  
AGRICULTURE STUDENTS IN URBAN SCHOOLS

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Doctor of Philosophy

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by  
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MAY 2007

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This work is dedicated to my mom, Adell.  
Thank you for your unconditional love and spiritual guidance.

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**ABSTRACT**

The purpose of this study was three-fold: to determine the effectiveness of instructional strategies on improving the acquisition and retention of leadership content by secondary students in urban agriculture programs; to examine the motivational profile of students who have elected to enroll in an urban agricultural program; and to examine the effect of instructional strategies (problem-based learning and teacher-guided learning) on critical thinking ability which includes the ability to manage resources, acquire and use information, and understand complex systems.

The target population for this study was secondary students enrolled in urban agriculture programs with a primary minority population (60% or more). The accessible population was students attending the Chicago High School for Agricultural Sciences (CHSAS) ( $N = 592$ ) located in urban Chicago, Illinois. CHSAS is a magnet school in the Chicago Public School District ( $N = 109,982$ ). The resulting sample ( $n = 110$ ) consisted of 54 students in the PBL treatment group and 56 students in the TGL control group. The motivational profile indicated that the overall sample was low in amotivation, high in extrinsic motivation, and scored moderately high in intrinsic motivation when measuring their motivation to attend school. The motivational profile also indicated that there were

statistically significant relationships among the students' motivation to attend school, influences in the decision to attend CHSAS, and satisfaction with the decision to attend CHSAS. Those students who had a major influence in the decision to attend CHSAS were more satisfied with their decision as well as more intrinsically motivated to go to school.

Furthermore, this study employed an experimental, pretest-posttest control group research design. The treatment consisted of two instructional strategies: problem-based learning and teacher-guided learning. Analysis of covariance indicated a treatment effect on content knowledge acquisition and retention but not on critical thinking ability. However, student and teacher reflection statements indicated a treatment effect on critical thinking ability.

Students in the teacher-guided learning control group produced higher scores on initial content knowledge test. The difference was both statistically and of practical difference. From the findings it can be concluded that students taught with the teacher-guided learning perform better on content and knowledge type of assessments. However, when students completed a follow-up exam, students in the teacher-guided learning group scores dropped significantly and the mean scores between the two groups were no longer statistically different. These findings indicate that students in the teacher-guided learning group learned the information at a more shallow level and therefore did not retain as much of the content they learned as the students in the problem-based learning group.

In addition, there were no statistical differences between the two group scores on the critical thinking appraisal. However, according to the reflection statements collected from students in the problem-based learning group and the teacher, the PBL students

learned the content at a higher level of cognition than the control group. These findings indicated that although the critical thinking appraisal instrument did not measure changes in critical thinking, observed (anecdotal) differences had been noted by the teacher and the students. This conclusion was supported by the outcome of the measurement of retention.

# CHAPTER I

## INTRODUCTION

### **Dissertation Overview**

This dissertation consists of five chapters. The first chapter, *Introduction*, defines the current educational environment, introduces the problem, addresses the purpose of the study, provides an overview of the procedures, and includes definitions of terms, assumptions, and limitations of the study. Chapter II, *Review of Literature*, reviews literature of related studies, describes the conceptual framework and theories associated with it, and introduces the variables and target population. Chapter III, *Methodology*, includes descriptions of the methods, instrumentation, procedures, and statistical analyses. Chapter IV, *Findings*, provides the results of the procedures used to answer the research objectives and test the hypotheses of this study. Finally, Chapter V, *Summary, Conclusions, Implications, and Recommendations*, provides a synthesis of the results, implications as related to the literature, and recommendations based on the findings. The appendices contain support materials.

### **The Current Educational Environment**

Over the past several years, there has been a decline in the academic motivation and achievement of students in urban public schools. This decrease has had social implications for the United States of America. It has been noted that adolescents today are less respectful of authority, have a low attention span, and have more of a propensity to drop out of school (Janowitz, 1978; Wehlage, Rutter, Smith, Lesko, & Fernandez, 1989; Finn & Rock, 1997; Modell & Elder, 2002). Consequently, students with the most extreme cases of disengagement are more likely to have poor grades and a higher

propensity to drop out of school (Finn & Rock, 1997; Modell & Elder, 2002). Although the national dropout rate has decreased, those dropping out in urban public schools are disproportionately higher than those of other school systems. Furthermore, part of the decline in the national dropout rate is attributed to the increase in the incarceration of urban high school aged males, who are not counted in the school population (Childtrends, 2006).

In addition, some popular books have portrayed students' perceptions of schooling as boring or a mere grade game in which they try to get by with as little effort as possible (Burkett, 2002; Pope, 2002). These observations are troubling because the fast-changing global market requires knowledgeable workers who can synthesize and evaluate new information, think critically, and solve problems (Fredricks, Blumenfeld, & Paris, 2004). Although attendance is compulsory, establishing a commitment to education is paramount if youth will benefit from school and acquire the capabilities needed to succeed in the current marketplace (Fredricks et al.).

Researchers (Fredricks et al., 2004) proposed that a possible solution to this problem in public school systems is increasing school engagement. The phrase "school engagement" means students have an emotional involvement or commitment to their school and thus to their education which is observed through the behavior of participation (Fredricks et al.). Consequently, it is observed that in urban areas, particularly with minority students, a disproportionate amount of students are not demonstrating an emotional involvement or commitment to their school or community (Rumberger, 1987). It is believed that one way to increase school engagement and civic accountability is through leadership development (Shanahan, Mortimer, & Krüger, 2002; Anderson,

Torres, & Ulmer, 2007). Researchers have concluded that positive associations exist between leadership development and academic achievement (Pope, 1983) and extra curricular school activities (Holland & Andre, 1987). Therefore, an increase in opportunities to participate in leadership development activities would allow students the chance to gain a sense of responsibility and ownership (Anderson et al., 2007). This may be a way to improve these low levels of academic achievement, high levels of student boredom and disaffection, and disproportional dropout rates in urban areas (National Research Council & Institute of Medicine, 2004).

Mckinley, Birkenholz, and Stewart (1993) conducted research on factors that effect student involvement. They found a significant relationship between four factors (interpersonal relations, administration, self management, and communications) and participation in extra curricular activities (e.g. sports, religious groups, and student organizations) with students enrolled in the College of Agriculture, Food, and Natural Resources at the University of Missouri-Columbia. Other investigators (Wingenbach & Kahler, 1997) found that participation in student organizations at the secondary level increased students' leadership ability in communications, decision making, getting along with others, self management, understanding of self, and working with groups. With the goal of enhancing these skills, agricultural educators have focused on leadership development and career preparation for many years (Esters & Bowen, 2005; Anderson et al., 2007).

The mission to prepare and support individuals for agricultural careers (Case & Whitaker, 1998) has not only affected students in rural America, but has also been far reaching into many urban areas across the country. In the late twentieth century,

agriculture programs in urban public schools had a successful record of aiding students in goal setting and career and academic achievement (Bajema, Miller, & Williams, 2002). This was possible because the goal of the urban program was to effectively build a relationship between students, the school, and the community (Ellibee, 1990). The hands-on nature of the curriculum in urban agriculture programs, allowed students to be active learners, and as a result of the hands-on education, developed career and educational goals that aided them in becoming leaders and productive contributors to the community and business sector (Ellibee).

Unfortunately, recent literature was not found as to the impact of comprehensive secondary urban agriculture programs on urban students' academic achievement and career aspirations. However, a study by Anderson et al. (2007) found that students in two urban agriculture programs reported receiving the most opportunity to learn and practice leadership at home or in their community and not in class through formal education or through student organizations that purport to focus on leadership development.

According to Ryan and Powelson (1991), this phenomenon may be explained by looking at the current educational structure. They conducted a meta-analysis on research that examined the effects of autonomy support and quality of relatedness with respect to motivational orientations and learning outcomes. As a result, Ryan and Powelson argued that for many centuries before compulsory public education was created, the transmission of cultural competencies, such as leadership skills, were taught to children through social interaction with adults. This was accomplished through joint problem solving activities between the inexperienced and the experienced. Children were able to engage in activities they normally would not have been able to handle by themselves and develop

skills through internalization and mastery. The key was that the learning process was an intimate partnership between the apprentice and the mentor (usually someone who has a strong connection to the child). This apprenticeship allowed the child to learn relevant tasks at a self-paced, gradual manner with experts guiding and modeling appropriate behaviors. These lessons had visible and probably immediate utility within the larger society (Ryan & Powelson).

Today children are isolated from adults and to some degree children of other ages (Ryan & Powelson, 1991). Ryan and Powelson argued that this creates an environment that is not in touch with the work and social worlds of adults and therefore is perceived to be irrelevant by youth. Students are now being asked to learn in a fabricated environment that contradicts how humans naturally learn. They are expected to develop skills over the years that often have no intrinsic meaning or purpose for them based on the promise that it will be useful and relevant in the future. In addition, learning is arranged as an individual and competitive affair that is more evaluation-laden, rather than a process of human exchange and communication.

Dewey (1938) highlighted two strong and opposing viewpoints about what motivates learners and how to structure education in accord with each viewpoint. First, there is the theory that motivation for learning comes from outside the learner. They must receive structures, rewards, and incentives in order to be successful in school. This viewpoint emphasizes the teacher providing extrinsic controls to motivate students. The other theory assumes that motivation is already present and can be catalyzed or facilitated in the context of school. The teacher provides encouragement or nurturing of students educational interests. This school of thought is called the *organismic* perspective (Ryan

& Powelson, 1991). The organismic perspective assumes that students have an innate tendency towards assimilating new information, exploring novel terrain, and internalizing and integrating ambient practices and values (Ryan & Powelson).

Therefore, because students spend a large amount of time in school, it is important to find ways to incorporate the innate tendencies in which students learn into the educational process. Using leadership as a relevant and immediately useful skill, this study investigated which of two instructional strategies might be most effective at engaging students. To that end, a conceptual framework, the *organismic social cognitive theory*, was created for this study using the social cognitive theory with *self-determination* as the key personal variable for motivating students to learn and perform. More specifically, this framework was based on the hypothesis that a student's behavior in a learning environment is a product of the relationship among *environmental factors* (e.g. instructional strategies, teacher & peer interactions, and availability educational resources), *personal factors* (e.g. factors influencing self-determination), and *behavioral factors* (e.g. prior cognitive, emotional, and behavioral engagement). The following section provides a brief description of the organismic social cognitive theory by exploring how it relates and differs from Bandura's (1986) *social cognitive theory*. A more thorough explanation of the conceptual framework is found in Chapter II.

## **Conceptual Framework**

### *Social Cognitive Theory*

Bandura (1986) established a conceptual framework for student learning and performance. This conceptual framework called the social cognitive theory is a modern adaptation of the *social learning theory*. Bandura's social cognitive theory postulates that

motivational processes influence both learning and performance of cognitive skills, social skills, motor skills, strategies, and behaviors (Pintrich & Schunk, 2002). He used *self-efficacy* as a key variable and integrated the motivational process with *self-regulation* (Bandura, 1986, 1988). Zimmerman (1998) described self-regulation in a social cognitive context as a cyclical process that is comprised of three phases: *the forethought phase*; *the performance (volitional) control phase*; and *the self-reflection phase*. Simply stated, with each learning task, students analyze how the task relates to their *self-image*, decide on a path of action, and reflects on the internal and external factors that influenced the outcome. As students go through this cyclical process of self-regulation due to changes in personal, behavioral, and environmental factors, their strategies, cognitions, affects, and behaviors for learning will change as well (Pintrich & Schunk).

#### *The Organismic Social Cognitive Theory*

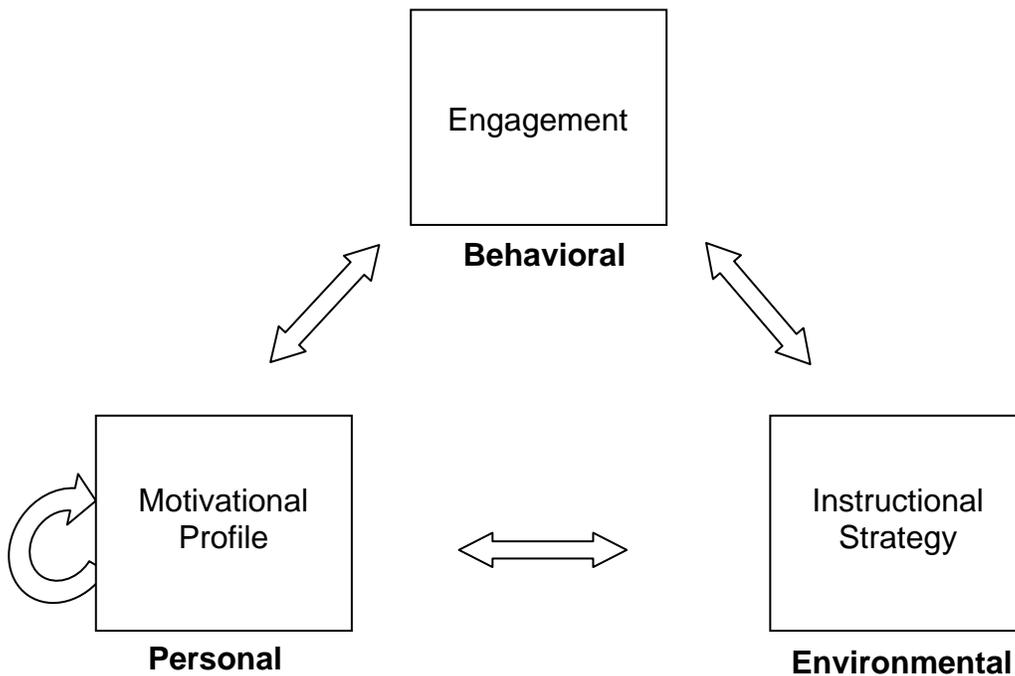
The conceptual framework for this study borrows from the aforementioned social cognitive theory. However, instead of self-efficacy as the key variable for motivating the student, this theory used self-determination from an organismic perspective (innate human drive for psychological growth based on the satisfaction of the three basic needs) to explain personal factors of motivation. The difference is due to the fact that self-efficacy focused specifically on the extent to which people believed they were capable of engaging in behaviors that would lead to desired outcomes (Deci & Ryan, 2000). This belief of self-capability was formed by past extrinsic rewards or consequences and is driven by the desire to either obtain more rewards or avoid consequences. Unfortunately, this assertion did not take into account the complexity of motivation by addressing intrinsic motivation and amotivation (Deci & Ryan).

However, the use of self-determination as the key personal variable allows one to predict behavior based on identifying the goal content (desired or undesired outcome) and the process used to regulate the behavior (controlled or self-regulated) (Ford, 1992; Deci & Ryan, 2000). This conceptual framework is ideal because the organismic perspective better addresses the innate needs of humans and how these needs impact the motivation to learn and perform.

It must be noted that this change is not met without some opposition. Self-determination theory and social cognitive theory have some similarities in that both have a self-regulatory component for motivation as well as address the effects of the environment on student behavior. However, self-determination theory and social cognitive theory are two distinct theories with inherent differences and should be treated as such. It is for this reason that the organismic social cognitive theory was developed to respect the inherent differences but address the effects of educational interventions on student motivation and engagement from a more holistic perspective.

Figure 1 displays the conceptual model for the organismic social cognitive theory. Similar to Bandura's (1986) triadic reciprocity model, this model demonstrates the interaction between personal, environmental, and behavioral factors which influence students' interests, engagement, and *volition* to learn. The term, motivational profile, was used to identify the personal factors associated with self-determination as either influences or outcomes. These factors are related to the satisfaction of the three basic psychological needs (autonomy, relatedness & competence). *Autonomy* and *relatedness* were measured using influences in the decision to attend CHSAS. *Competence* was measured using academic aptitude (7<sup>th</sup> grade reading *T*-score), knowledge (leadership

theory unit test), and critical thinking ability (WGCTA<sup>®</sup>). In addition, outcomes of self-determination were measured using types of motivation to attend school, satisfaction with decision to attend CHSAS (prior to the beginning of classes and after three months), and perceived effort during the study. This study explored how an environmental factor (instructional strategy) and personal factors (knowledge acquisition and critical thinking ability) affect student behavior (cognitive, emotional, and behavioral engagement) when controlling for other personal factors (perceived autonomy support, academic aptitude, prior knowledge and critical thinking ability).



**Figure 1.** Conceptual Model for the Organismic Social Cognitive Theory

### *Need for the Study*

Although the benefits to leadership development in youth have been identified (McKinley et al., 1993; Dormody & Seevers, 1994; Wingenbach & Kahler, 1997), substantial evidence to support these assertions has not been generated due to the limited number of empirical studies conducted on the topic. Furthermore, little evidence exists as to the most effective methods for teaching leadership to youth. Although youth differ in many ways such as social economic status, ethnicity, personality types, experience, and education (Snow & Yallow, 1982; Rudd, Baker, Hoover, & Yermal, 1998; van Linden & Fertman, 1998), which may lead to barriers when creating leadership interventions, there are some commonalities that one should keep in mind. These commonalities, according to van Linden & Fertman include:

1. A desire for autonomy from parents
2. The need for a time for self discovery and definition
3. The need for time to gradually learn and develop skills
4. The need for exploration
5. Their unpredictable nature

The question remains, what factors should be taken into account when creating these leadership interventions? Is it the teacher's ability and perception, the students' abilities and perceptions, environmental factors, or the interaction of them all? Using the aforementioned commonalities, in conjunction with the elements identified by DesMarais, Yang, and Farzenhkia (2000) as important to the development of youth leadership, effective leadership interventions may be created that not only engage students, but prepare them for future success through content acquisition and retention.

These elements include partnerships between youth and adults, granting youth decision making power and responsibility for consequences for their actions, providing a broad context for learning and service, and recognition of their experience, knowledge and skills.

The study by Anderson et al. (2007) on the leadership development needs of urban agriculture students supported these elements. The study concluded that urban agriculture students indicated that leadership was important in various aspects of their life. Areas of most importance, as identified by the respondents, were in their future career, school and student organizations respectively. Although the respondents stated that they learned and practiced leadership at home or in their communities, they indicated they preferred to learn in their agriculture class. The respondents wanted classroom interventions that consisted of real-world application, interactive activities, fun, and allowed them to work in groups. There is such an instructional strategy that has emerged as one of the premier methods for using the aforementioned characteristics.

Problem-based learning (PBL), originally developed for teaching students in the medical field, is purported to be an effective method for instructing students using real-world application, interactive activities, and group work. However, the majority of research on PBL is associated with education in the medical field (Norman & Schmidt, 1992; Burris, 2005). Furthermore, the research on PBL has yielded variety of contradictory conclusions. This is partly due to the fact that the term “problem-based learning” has many different meanings depending on the design of the educational method employed and the skills of the teacher (Barrows, 1998). The inconsistency in facilitation of PBL has produced a wide variation in outcome and educational objectives

achieved and therefore yielded mixed results. For the purpose of this study, the constructivist PBL approach will be investigated.

Herman and Knobloch (2004) recommended that future studies be conducted to investigate the effects of constructivist PBL approaches on learning outcomes in agriculture classrooms. This recommendation was addressed with a study by Burris (2005) that looked at the effects of PBL on critical thinking ability and acquisition of content knowledge. Burris found that there was a statically significant difference in content knowledge gained for students who participated in the PBL strategy versus those who did not. Students who were taught using participated in the PBL strategy scored lower on the content knowledge test than their counterparts. Furthermore, students who participated in the PBL strategy did not score statistically significant different in the critical thinking ability test than their counterparts. It was concluded that the lack of differential performance may have been due to confounding variables such as the short length of the treatment, the similarities in the instructional strategy (supervised study and problem-based learning are both forms of the problem solving approach), and the possibility that the instrument measured critical thinking skills that were not affected by the treatment. In light of this possibility, Burris (2005) recommended his study be replicated with a longer treatment duration, conduct an investigation to determine the differences between problem solving, higher-order thinking, and critical thinking, design and/or identify other instruments for measuring critical thinking ability, and conduct research to determine the effects of instructional strategies on performance and knowledge retention.

In addition to providing the much needed insight into potential strategies for

effectively teaching leadership at the secondary level, this study investigated three of Burris' 2005 recommendations. This study doubled the treatment duration, identified other methods for measuring critical thinking ability in addition to using the Watson-Glaser Critical Thinking Appraisal, and studied at the effects of instructional strategies on content acquisition and retention.

### **Statement of the Problem**

As baby boomers retire, a need for people with leadership skills will increase in the coming decades (Morgan & Rudd, 2005). Teachers today are faced with the question of how to motivate students to learn in an increasingly difficult learning environment. In spite of the difficult conditions, teachers are expected to not only teach content, but also transferable skills that will better prepare students to be successful in the increasingly competitive world market. The 1992 SCANS report identified the workplace competencies needed by all workers as the ability to manage resources, work productively with others, acquire and use information, understand complex systems, and work comfortably with a variety of technologies (Brock, 1992). To that end, how will teachers be able to prepare students to have these leadership and workplace competencies when classroom engagement is limited?

In order to get disenfranchised students involved, they must be introduced to interventions that are new and perceived relevant to their vocational aspirations. More focus must be placed on creative methods for teaching content and workplace skills in the classroom. These interventions should promote the development of civic investment and competencies by getting students involved in their school and communities and empowering them with the ability to make informed decisions. However, it is important

that these interventions be created so students not only learn the content, but are able to apply it to current and future situations. Leadership education is a great arena to teach transferable skills, provide relevance to future career aspirations, and is easily incorporated into any curriculum. However the question remains, what is the most effective instructional strategy used to teach leadership concepts, principles and practices for maximum knowledge acquisition and retention among secondary students enrolled in urban agriculture programs? In addition, how can this instructional strategy be used to motivate students to learn and perform? Finally, what effect does instructional strategy have on the competencies discussed in the 1992 SCANS report (e.g., ability to manage resources, work productively with others, acquire and use information, and understand complex systems)?

### **Purpose of the Study**

The purpose of this study was three-fold: to determine the effectiveness of instructional strategies on improving the acquisition and retention of leadership content by secondary students in urban agriculture programs; to examine the motivational profile of students who have elected to enroll in an urban agriculture program; and to examine the effect of instructional strategies (problem-based learning and teacher-guided learning) on critical thinking ability which includes the ability to manage resources, acquire and use information, and understand complex systems.

### **Objectives and Hypotheses**

1. Describe subjects on gender and motivational profile (academic aptitude, prior leadership theory knowledge and critical thinking ability, type of motivation to attend school, influences in the decision to attend CHSAS, satisfaction with the decision to attend CHSAS, and perceived effort during the study).

2. Determine the relationships between factors influencing perceived autonomy support (influences in the decision to attend CHSAS) and the outcomes of self-determination (type of motivation to attend school, satisfaction with decision to attend CHSAS, and perceived effort during the study).
3. Describe written insights from student and teacher reflections about the PBL instructional strategy.
4. Determine the variables that best account for variance in knowledge acquisition test scores.
  - H<sub>1</sub>: Students' prior leadership theory knowledge, academic aptitude, and perceived autonomy support will account for statistically significant variance in academic performance on knowledge test.
5. Compare the effect of instructional strategy (Problem-Based Learning and Teacher-Guided Learning) with regard to students' knowledge acquisition and critical thinking ability.
  - H<sub>2</sub>: Students taught using the TGL instructional strategy will have a statistically higher mean score on the knowledge acquisition test than students taught using the PBL instructional strategy when accounting for prior knowledge, academic aptitude, and perceived autonomy support.
  - H<sub>3</sub>: Students taught using PBL will demonstrate greater critical thinking ability than students with TGL when accounting for prior critical thinking ability.
6. Compare the level of knowledge retention by instructional strategy.
  - H<sub>4</sub>: Students taught using PBL will retain more content than students taught using TGL as measured by the knowledge retention score when accounting for prior knowledge, academic aptitude, and perceived autonomy support.

### **Definition of Terms**

*Amotivation*: The motivational construct that states that an individual is neither intrinsically motivated nor extrinsically motivated. Individuals experience incompetence and a lack of control over their behavior and outcomes (Deci & Ryan, 1985).

*Autonomy Support:* The interpersonal behavior one person provides to involve and nurture another person's internally controlled, volitional intentions to act, such as when a parent or teacher supports a student's psychological needs, interests, preferences, and values (Reeve & Jang, 2006).

*Constructivism:* A theoretical learning approach that human learning is *constructed*, that learners build new knowledge upon the foundation of previous learning. The two important concepts involved in this theory is that students construct new knowledge from prior knowledge and that learning is active instead of passive (Hoover, 2003).

*Critical thinking:* The intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness (Scriven & Paul, 1992).

*Extrinsic motivation:* The motivational construct that states that an individual is engaged in a behavior as a means to an end and not for the activity itself. This form of motivation can be self-determined and perform through self-regulation or not. There are four types of extrinsic motivation that can be order along the self-determination continuum. They are (a) external, (b) introjected, (c) identified, and (d) integrated regulation (Deci, 1975; Kruglanski, 1978; Vallerand & Bissonnette, 1992).

*Instructional (learning) objectives:* The desired behaviors/content the instructor intends for the students to acquire.

*Instructional strategy:* A method of delivering content that guides students toward learning the instructional objectives (Bott, 1998).

*Intrinsic motivation:* The motivational construct that states that an individual is engaged in a behavior for their own sake. They voluntarily perform the activity for pleasure and satisfaction and not because of material reward or constraints (Deci, 1971).

*Knowledge acquisition:* The attainment of information due to instruction. Successful acquisition is measured by the amount of information the student is able to immediately recall based on predetermined learning objectives. Knowledge should extend beyond rote memory. For this study, knowledge acquisition is operationally defined as the score on a unit assessment administered after instruction (post-test).

*Knowledge retention:* The maintenance of knowledge acquire through instruction for an extended amount of time. The amount of content retained signifies the level of thinking at which the student acquired the information. For this study, knowledge retention is operationally defined as the difference score on the unit assessment administered after instruction (post-test and follow-up post-test).

*Motivational Profile:* Term used to identify the personal factors associated with self-determination as either influences or outcomes. These factors are related to the satisfaction of the three basic psychological needs.

*Organismic Perspective:* The assumption that students have an innate tendency towards assimilating new information, exploring novel terrain, and internalizing and integrating ambient practices and values. Students are motivated to act in an effort to satisfy three basic psychological needs of autonomy, competence, and relatedness (Ryan & Powelson, 1991).

*Problem-based learning:* An instructional strategy that challenges students to "learn to learn," working cooperatively in groups to seek solutions to real world problems. These problems are used to engage students' curiosity and initiate learning the subject matter. PBL prepares students to think critically and analytically, and to find and use appropriate learning resources (Dutch, 2006).

*Problem-solving approach:* An instructional approach that consist of a six step process for solving ill-structured problems. The steps are 1) interest approach; 2) group objectives; 3) questions to be answered; 4) problem situation; 5) test solutions through application; and 6) evaluate proposed solutions (Newcomb, McCracken, & Warmbrod, 1993).

*School engagement:* A multi-faceted construct that is presumed to be malleable, responsive to contextual features, and amenable to environmental change. The three facets of school engagement are behavioral, cognitive, and emotional (affective) engagement (Fredricks, Blumenfeld, & Paris, 2004).

*Self-efficacy:* One's perceived capabilities to learn or perform actions at designated levels (Bandura, 1993, 1997).

*Social cognitive theory*: A learning theory that stemmed from the Social Learning Theory. It defines human behavior as a triadic, dynamic and reciprocal interaction of personal factors, behavior, and the environment (Bandura, 1977; 1986; 1989).

*Social cognitivism*: A learning theory based on the ideas that people learn by watching what others do and that human thought processes are central to understanding personality. The main principles of social cognitivism are (a) people learn by observing others, (b) learning is an internal process that may or may not change behavior, (c) people behave in certain ways to reach goals, (d) behavior is self-directed, and (e) reinforcement and punishment have unpredictable and indirect effects on both behavior and learning (Ormrod, 2003).

*Teacher-guided learning*: The instructional strategy where the teacher guides learning. This strategy uses the 4-step approach which is 1) establish set; 2) communicate objectives; 3) provide instruction; and 4) check comprehension. This is the most commonly used instructional strategy in Illinois, which is where the school used in this study is located.

*Volition*: The perception of high psychological freedom during an activity; it's opposite is feeling pressured or ego involved (Reeve & Jang, 2006).

### **Assumptions**

The following delimitations are assumed true for this study.

1. The instructor was an appropriate choice to facilitate this study based on sufficient prior experience with both instructional strategies.
2. The instructor facilitated the prescribe treatments as designed and maximized variation between treatments.

3. Students participated in the treatment and completed all instruments to the best of their ability and all responses are accurate.
4. In the motivational profiles, the motivation to go to school is synonymous with the motivation to go to CHSAS.
5. The Hawthorne effect was not present during the study.

### **Limitations**

1. Steep learning curve for understanding the Problem-Based Learning Instructional Strategy.
2. Short treatment time may not have maximized the effect on critical thinking ability.
3. The content was created to be used with all grade levels of high school and therefore the material may be cognitively challenging for younger students.

## **CHAPTER II**

### **REVIEW OF LITERATURE**

This chapter presents a review of the literature organized into four sections. The first section is the introduction discussing urban students' attitude towards school and vocation, followed by a description of school engagement, and concluded with a description of outcomes of engagement. In the second section, urban agricultural education is discussed to set the foundation for this study. The third section introduced the organismic social cognitive theory with descriptions of the two motivation theories from which it was created. The fourth section describes the variables of interest in this study which are motivation, problem-based learning, teacher-guided learning, and critical thinking ability and how they affect knowledge acquisition and retention. Finally, a synthesis of the literature concluded this chapter.

#### **Urban Education**

##### *Urban Students' Attitude towards School and Vocation*

Scholars have suggested that high school students become disengaged from school and post-school planning because they do not view their current academic situation as related to their future or as a conduit for obtaining their career aspirations (Ogbu, 1989; Blustein, Phillip, Jobin-Davis, Finkelberg, & Roarke, 1997; Worthington & Juntunen, 1997). Therefore, perceived barriers to academic and career success could be one factor why students view school as irrelevant and thus disengage from school (Kenny, Blustein, Chaves, Grossman & Gallagher, 2003). It is important to note that these problems associated with the urban school system have been observed more frequently in ethnic minorities than in their White counterparts (Rumberger, 1987).

Unfortunately this problem has been perpetuated for ethnic minorities who, through social comparison and personal experiences, perceive career success as lower for them than for their majority race counterpart (Carter & Cook, 1992). Due to the fact that many urban high school students do not attend college or drop out of high school (U.S. Department of Education, 2000), developing interventions for the classroom that will assist in overcoming these perceived barriers and provide support are of the utmost importance in order to increase school engagement, post secondary enrollment, and career success. One purposed area of instruction is leadership education. Researchers (Pope, 1983; Holland & Andre, 1987) concluded that positive associations exist between leadership development, academic performance and involvement in extra curricular school activities. Therefore, an increase in opportunities to learn theories of leadership and participate in leadership development activities would allow students the chance to gain a sense of responsibility and ownership over outcomes in their lives.

### *School Engagement*

In order to construct interventions to improve engagement in a learning context, the term school engagement must be defined and described. According to research literature, engagement can be defined three ways - behavioral, emotional, and cognitive engagement (Fredicks et al., 2004). These engagement constructs correlate with the three major learning domains in which learning occurs – the psychomotor, the affective, and the cognitive (Bott, 1998). Behavioral engagement (psychomotor domain) is where students actively participate in class, school and social activities. Students who are behaviorally engaged will ask and answer questions in class, participate in sports or student government, and attend dances and other school events. Emotional engagement

(affective domain) is described as how students respond to teachers, classmates, course work, and school. Students who have a positive emotional engagement will have a positive attitude about participating in school-related activities, whereas those with a negative emotional engagement will have a negative perception of school and become withdrawn. Finally, cognitive engagement (cognitive domain) is where students “buy into” their education. Students with cognitive engagement are willing to work harder or spend more time on the learning process until the skill is learned or task is accomplished to a satisfactory degree (Fredricks et al.).

Due to the fact that engagement can be used to research how students act, feel, and learn, there is a challenge in trying to narrow down constructs for clarification. If one is to look at how students act (behavioral engagement), one would research conduct and on-task behavior which would yield a distinct set of constructs (Peterson, Swing, Stark, & Wass, 1984; Karweit, 1989). If one was to research how students felt (emotional engagement), one would focus on student attitudes (Yamamoto, Thomas, & Karns, 1969; Epstein & McPartland, 1976) and, student interest and values which would yield another set of constructs (Eccles, Midgley, Wigfield, Buchanan, Reuman, & Flanagan, 1993). However, if one was to research how students learn (cognitive engagement), one would focus on motivational goals and self-regulated learning, yielding yet again more constructs (Zimmerman, 1990; Boekarts, Pintrich, & Zeidner, 2000). In the case of school engagement, one is looking at all three components which could yield an abundance of constructs, definitions, and measures that differ slightly, thus worsening conceptual clarity instead of improving it (Fredricks et al., 2004).

Although a complex topic, school engagement is considered appealing to study for two reasons. First, it is a qualitative concept (Fredricks et al., 2004). Due to the fact that it is synonymous with commitment, it implies that there are varying degrees to which one can commit. For instance, a student could have some behavioral engagement and sit quietly in class and demonstrate polite behavior to the teacher or conversely, that student could be very behaviorally engaged and assist the teacher when ever possible, answers questions in class, and serve as the president of the student government. This also means that engagement can not only change in intensity, but also in duration (Fredricks et al.). For example, the student could be very engaged for a particular project and then engagement diminishes, or the student could become engaged and maintain that engagement.

The second reason why school engagement is considered appealing is that engagement is presumed to be compliant with the environment (Connell, 1990; Finn & Rock, 1997). It is believed that students become engaged in school because of opportunities given to them that offer them the chance to be successful in academic endeavors, develop interpersonal relationships, or participate in various academic or social activities. Erik Erikson, a German developmental psychologist and psychoanalyst known for his theory on social development of human beings, and for coining the phrase *identity crisis*, described this period of adolescence as a time of identity formation with the three key areas being love, work, and ideology (as cited by Arnett, 2004). Since school is one of the dominant places of identity formation because relationships, work, and definitions of ones worth in society are predominantly formed there, it is important to make sure that the environment is one that will foster a positive self concept.

## *Outcomes of Engagement*

### *Academic Achievement.*

Several studies have reported a positive relationship between behavioral engagement and achievement outcomes (e.g. standardized tests, grades) for high school students (Skinner, Wellborn, & Connell, 1990; Connell & Wellborn, 1991; Spencer, & Aber, 1994; Connell, Marks, 2000;). Discipline problems have also been associated with lower school performance (Finn, Pannozzo, & Voekl, 1995; Finn & Rock, 1997). Students who were disengaged were reported to be disruptive, inattentive, and/or withdrawn and scored lower on achievement tests in comparison to students who did not display these behaviors (Finn et al., 1995). Furthermore, Finn and Rock (1997) reported large, significant differences on behavioral engagement measures among high school students classified as resilient (in school and academically successful), nonresilient completers (in school but not academically successful), and noncompleters (dropped out of school). In longitudinal studies conducted on behavioral engagement and academic achievement, results showed that teachers' ratings of behavioral engagement in the first grade were related to achievement test score gains, grades over the first four years, and decisions to drop out of high school (Alexander, Entwisle, & Dauber, 1993; Alexander, Entwisle, & Horsey, 1997).

Less research exists on the relationship between emotional engagement and academic achievement (Fredricks et al., 2004). Some studies (Connell et al., 1994; Skinner et al., 1990) have combined emotional and behavioral engagement and show a positive correlation between the two and academic achievement. Emotional and behavioral engagement are linked because emotional engagement is the student's

attitude, beliefs, perceptions and behavioral engagement is how the student materializes these emotions in a behavioral form. However, studies that have investigated specific constructs (e.g. interest and value) under the term emotional engagement purported varying levels of associations with academic achievement (Pintrich & De Groot, 1990; Schiefele, Krapp, & Winteler, 1992). Furthermore, in the area of cognitive engagement, Nystrand and Gamoran (1991) reported that substantive (cognitive) engagement in the classroom was positively related to scores on an achievement test that was developed to measure students' in-depth understanding and synthesis. Students that use metacognitive strategies by regulating their attention and effort, relating new information to existing information, and monitoring their comprehension of information, do better on various indicators of academic achievement (Zimmerman, 1990; Boekarts et al., 2000).

#### *Dropping Out.*

Early interventions that engage students may help to further lower student dropout rates in urban settings, which remain a barrier to attaining career aspirations (Fredricks et al., 2004). Ekstrom, Goertz, Pollack, and Rock (1986) reported that students that eventually drop out complete fewer assignments, exert less effort in school, participate less in school activities, and have more discipline problems. Studies of urban minority samples demonstrate a correlation between low behavioral engagement and the frequency of cutting class, truancy from school, suspension, and retention (Connell, Spencer, & Aber, 1994; Connell, Halpen-Felsher, Clifford, Crichlow, & Usinger, 1995). Student involvement in extracurricular activities has been associated with a decreased likelihood of dropping out of school which may be particularly important for academically at-risk populations (Ekstrom et al.).

Emotional engagement has an impact on a student's decision to drop out as well. Some scholars (Newmann, 1981; Finn, 1989) claimed that alienation, feeling of estrangement, and social isolation, contribute to the dropout problem. Ethnographic research reports that perceiving an emotional connection to the school or teachers may be a factor that keeps at-risk students in school (Wehlage et al., 1989; Fine, 1991; Mehan, Villanueva, Hubbard, Lintz, Okamoto, & Adams, 1996).

#### *Career Aspirations.*

Early in this decade, two studies were conducted that provided further insights into the developmental contextual framework of urban high school life. The results from the first study indicated that both family support of student decisions and the perception of barriers were predictive of school engagement and career aspirations (Kenny et al., 2003). Building on these findings, Kenny et al. sought to extend and deepen their understanding of the educational and vocational development of urban high school students in a second study. The researchers discovered that students that perceived higher levels of support from family, as well as support from others within their environment such as peers, teachers and school administrators, maintained more positive attitudes about the value of school and their fit within the school (Kenny et al.). These students self-reported that they were more behaviorally engaged in school. They also reported to be emotionally engaged and reported work as important in their lives, aspired to leadership positions in their field, and expected that their future career planning would lead to success and satisfaction in their future work. These findings seem to indicate that adolescents' perceived autonomy support has a strong contribution to their attitude towards school and work, and helps them feel more engaged in their educational and

vocational lives (Kenny et al.). Supporters of agricultural education in public schools may argue that secondary agriculture programs are designed to provide students autonomy support.

### **Urban Agricultural Education**

Agricultural education is a systematic program of instruction available to students desiring to learn about the science, business, and technology of plant and animal production and/or about the environmental and natural resources systems (The Council, 2007). Agricultural education first became a governmentally funded part of the public education system in 1917 when the U.S. Congress passed the Smith-Hughes Act. Today, over 800,000 students participate in formal agricultural education instructional programs offered in grades seven through adulthood throughout the 50 states and three U. S. territories (The Council, 2007).

In pursuit of this well-rounded program, agricultural educators have focused on career exploration and preparation as a major component of secondary agriculture programs for many years (Esters & Bowen, 2005). This mission to prepare individuals for agricultural careers (Case & Whitaker, 1998) and provide continuous support has not only affected students in rural America, but has reached urban area programs as well. Agricultural education in urban public schools has had a successful record of aiding students in goal setting and career and academic achievement (Bajema, Miller, & Williams, 2002). This may be due to the variety of instructional approaches used to instruct agriculture students (e.g. problem-solving, interactive, independent study, and experiential). Successful agriculture education programs challenge students to “inquire into” instead of being “instructed in” the subject matter (Rosenshine & Furst, 1971).

Students enrolled in agriculture programs have access and exposure to numerous learning experiences that are relevant to their agricultural occupational goals (Ellibee, 1990) and therefore provide motivation for why students should learn.

Although there are numerous approaches to teaching agriculture at the secondary level, one of the leading approaches is the problem-solving approach (Brown, 1998; Ball, Knobloch, & Settle, 2003, Burris, 2005). This approach refers to an instructional strategy where an individual or group make decisions or go through a series of steps in order to arrive at answers to questions or the solution to a problem (Saskatchewan Education, 1994). It is noted that in the process of solving one problem, the learner may discover other problems leading them to jump back and forth between steps (Newcomb, McCracken, & Warmbod, 1993). This interactive process allows students to become active learners (cognitively and behaviorally engaged), and as a result of their participatory education, develop career and academic skills that aid them in becoming productive contributors to society (Ellibee, 1990).

According to Margaret Ellibee, Iowa Department of Education (1990), to allow for maximum potential of all students enrolled in secondary agriculture programs, including special needs and academically disadvantaged students, a focused, articulated curriculum should be offered with a variety of delivery methods and instructional tools which promote higher ordered thinking skills, learning skills, communication and technology skills. Over the past decade, numerous educational interventions for leadership development and career exploration have been created for agricultural educators to provide this well-rounded program for all students both in rural and urban areas. These interventions include the National FFA Organization's Lifeknowledge<sup>®</sup> and

Reaching New Heights<sup>®</sup> programs, and CAERT's Agricultural Curriculum Lesson Plan Library.

The problem remains that these resources are only available to agricultural educators, who predominately teach in small towns and rural settings. This means that a majority of the US youth population, who lives in urban settings, does not have access to resources for leadership development and career exploration which have proven to be very successful in engaging students in agricultural programs all across the country. Furthermore, although urban agricultural educators have access to these resources, it is not known if they are incorporating them into their agriculture programs. Therefore, it is imperative to develop interventions that allow students without access to these effective resources an opportunity to receive exposure. These interventions would include topics on leadership, written and verbal communication, and career exploration in areas of agriculture that are relevant to urban students. The following conceptual framework will introduce the organismic social cognitive theory which provides a guide for developing interventions to engage students during learning. This conceptual framework is adapted from Bandura's (1986) social cognitive theory but uses self-determination as a key variable in the motivational process.

### **Conceptual Framework**

Bandura (1986) established a conceptual framework for student learning and performance. This conceptual framework called the *social cognitive theory* is a modern adaptation of the *social learning theory*. Bandura's social cognitive theory postulates that motivational processes influence both learning and performance of cognitive skills, social skills, motor skills, strategies, and behaviors (Pintrich & Schunk, 2002). He used self-

efficacy as a key variable and integrated the motivational process with self-regulation (Bandura, 1986, 1988). Although self-efficacy is an important component, it does not address the full complexity of motivation. Bandura's self-efficacy theory focused specifically on the extent to which people believed they were capable of engaging in behaviors that would lead to desired outcomes (Deci & Ryan, 2000). According to Deci and Ryan, self-efficacy theory did not acknowledge intrinsic activity and an innate human desire to expand capabilities (competence) and therefore ignored the more complex and meaningful concepts of motivation (i.e. intrinsic motivation, introjected regulation, identified regulation, integrated regulation, and amotivation).

The organismic social cognitive theory removes self-efficacy as the key personal factor and replaces it with self-determination. The use of self-determination as the key personal factor allows for the prediction of student behavior based on the type of outcome desired and the regulatory process the student used to pursue that outcome (Deci & Ryan, 2000). However, similar to Bandura's theory, this theory is based on three key assumptions: (a) reciprocal interactions among personal, behavioral, and environmental factors; (b) the organismic perspective to motivation; and (c) enactive and vicarious learning.

#### *Reciprocal Interactions among the Three Factors*

The three factors in the organismic social cognitive theory have reciprocal interactions. A change in one factor may cause a rippling effect in the other two factors. For example, the behavioral-environmental factor interaction is when environment factors elicit an action from the student. An example is when the teacher presents information and directs students' attention to instructional aids. The teacher being the

environmental factor influences student behavior. The students will in turn react (behavior) to the teacher causing the teacher to respond (environment) to the behavior of the students. In addition, this interaction between teacher and students will have effects on personal factors.

The behavioral-personal factor interaction is when personal traits of the student elicit an action from the student. Student motivation to act revolves around the concept of intentionality (Deci & Ryan, 1987). An intention is a determination to engage in a particular behavior. The intentions that are fully endorsed by the student are considered self-determined and behaviors of full engagement and persistence will be observed (Reeve & Jang, 2006). According to Deci & Ryan, self-determination is on a continuum in which the level of self-determination is dependent on the student's perception of how participating in the task will satisfy their basic psychological needs. As students work on tasks, they monitor (self-regulation) how the tasks affect their autonomy, exercise their capabilities, and assist them in relating to the environment.

Finally, the personal-environmental factor interaction is when personal traits elicit a reaction from the environment. This environmental reaction to the student may be due to such personal factors such as physical ability or perceptions of competency. Teachers or peers may respond to the student not based on one's actual capabilities but based on perceived capabilities. These positive or negative environmental influences play a role in the student's self-image in terms of competence and relatedness. Effective learning strategies will promote acquisition of skills and can lead to improvement in psychological well-being and increased engagement (Ryan & Powelson, 1991). It must be understood

that interaction between factors is not equal and the predominant factor depends on the individual situation (Pintrich & Schunk, 2002).

### *The Organismic Perspective to Motivation*

The organismic perspective assumes that humans are active, growth-oriented organisms who are naturally inclined toward integration of their psychological elements into a unified sense of self and integration of themselves into large social structures (Ryan & Powelson, 1991). Therefore, the adaptive nature of humans incline them to engage in interesting activities, to stretch their capacities, to pursue connectedness in social groups, and to integrate psychological and interpersonal experiences into a relative unity. Simply stated, humans are motivated by an innate desire to satisfy the need for *autonomy, competence, and relatedness*. The more an individual perceives a course of action will satisfy these needs the more self-determined that individual will become leading to more internally regulated and persistent behaviors (Ryan & Powelson, 1991; Deci & Ryan, 2000).

The term *autonomy* refers to “self-rule.” It describes an individual’s ability to regulate one’s behavior through governing the initiation and direction of actions (Ryan & Powelson, 1991). In autonomous action, one experiences the self to be an agent, the “locus of causality” of one’s behavior (Ryan & Connell, 1989). Deci & Ryan (1985; 1987) used the term self-determination interchangeably with the concept of autonomy because it conveyed the idea that autonomy is an origin for transforming external regulations into self-regulated actions.

The term *competence* refers to the sense of accomplishment and effectiveness towards exercising one’s capabilities under challenging conditions (Ryan & Powelson,

1991). Individuals have an innate need to stretch their skills and schemata just beyond one's current level of functioning. This is to make both developmental gains (Elkind, 1971) and derive a sense of confidence and self-esteem (White, 1960; Harter, 1983). Ryan & Powelson further purported that competence must operate void of external incentives and in the presence of contexts that are autonomous.

Finally, the term *relatedness* refers to the emotional and personal bonds between individuals (Ryan & Powelson, 1991). It reflects the human need for contact, support, and community with others. However, it does not just refer to a connection, it is also refers to the experience of developing well-being and cohesion with all individuals involved. Therefore, relatedness needs play an important role in the process of cultural transmission and internalization of values.

In summary, the three innate psychological needs play a necessary part in optimal development of an individual (Deci & Ryan, 2000). Although the basic needs will give way to the emergence of suboptimal psychological outcomes under conditions of threat or deprivation, it does not come without cost. When an individual's environment is excessively controlling, over-challenging, or rejecting, the natural processes will be replaced with alternative, often defensive or self-protective processes. According to Deci & Ryan, these alternative processes would include the capacity to compartmentalize rather than integrate psychological structures, the tendency to withdraw concern for others and focus on oneself, or engage in psychological withdrawal or antisocial activity. For that reason, the presence versus the absence of environmental conditions that allow satisfaction of these basic needs in an individual's immediate situation and in one's

developmental history is a key predictor of whether they will display behaviors of engagement.

### *Enactive and vicarious learning*

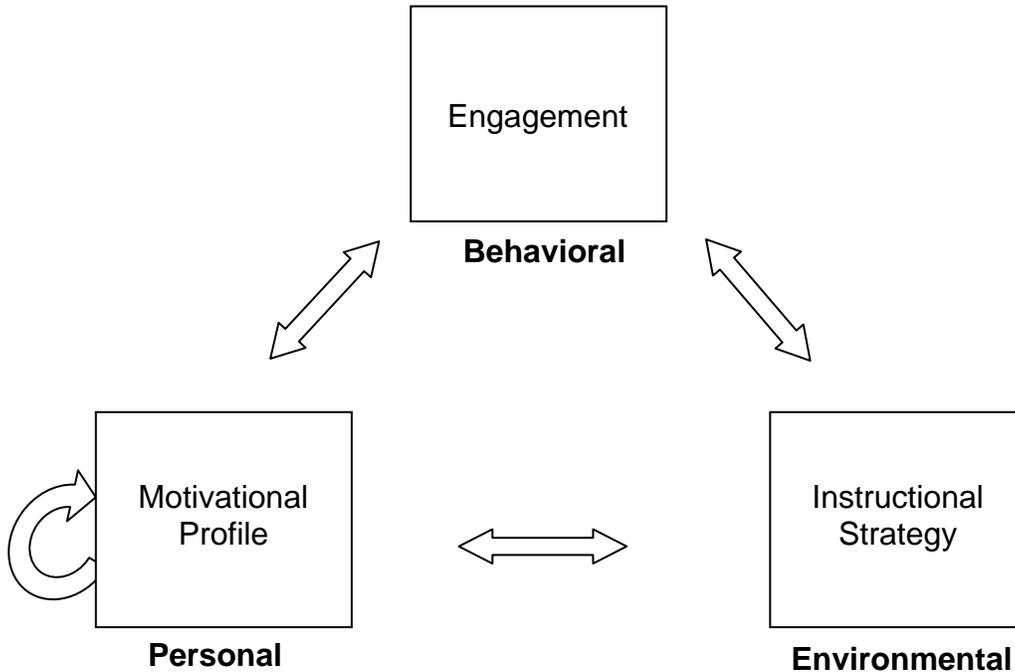
The final key assumption of the organismic social cognitive theory is that of vicarious and enactive learning. Similar to Bandura's theory, vicarious learning occurs when there isn't an overt performance by the learner and derives from observing a model. This model can be a person, symbolic or nonhuman, on electronic sources, or in print. Vicarious learning accelerates learning beyond what occurs when a student performs every action at the time it is learned and saves the student from potential embarrassment from negative consequences. Enactive learning is learning by doing and experiencing the consequences from one's actions. The actions that are successful are retained while others are discarded (Pintrich & Schunk, 2002).

Complex-skill learning typically occurs through both forms of learning. Students learn from observing the skill being demonstrated, this will teach them some skills but not all. Allowing the student to practice the skill will give the teacher the opportunity to evaluate the learner and provide feedback (Pintrich & Schunk, 2002).

### *Conceptual Model*

The conceptual model for the organismic social cognitive theory borrows from Bandura's (1986) triadic reciprocity model (see Figure 1). The organismic social cognitive theory purports that personal, behavioral, and environmental factors interact to influence a student's interest, engagement, and volition toward learning outcomes. For this study, the problem-based learning strategy uses enactive learning for knowledge acquisition; whereas the teacher-guided learning strategy uses vicarious learning. The

environmental factor was the instructional strategy (PBL or TGL), the behavioral factor was engagement, and the personal factor was the students' motivation profiles.



**Figure 2.** Conceptual Model for the Organismic Social Cognitive Theory

### Motivation

The motivational profile is a term to describe the personal factors associated with self-determination (an individual's motivation to act). These factors can be described as *events* that occur in the cognitive, affective, and psychomotor domains. In order to understand how they influence an individual to act, motivation must first be defined and described. Since its inception, motivation has been studied from several perspectives (Vallerand & Bissonette, 1992). The most widely used perspective in recent years suggests that behavior can be seen as intrinsically and extrinsically motivated (de Charms, 1968; Deci, 1971, 1975). However, a third construct, amotivation, was

suggested by Deci and Ryan (1985) in order to fully understand all facets of human behavior.

Intrinsically motivated behaviors are those that are engaged in for one's own pleasure (Deci, 1971). The individual voluntarily performs an act in the absence of material rewards or constraints. They are satisfied just because they were able to perform the task. Conversely, extrinsically motivated behaviors are those that are engaged because they are a means to an end and not because of the internal satisfaction derived from the task (Deci, 1975; Kruglanski, 1978). Originally, it was believed that extrinsic motivation referred to behaviors an individual engaged in due to a lack of self-determination and therefore could only be prompted by external events (Vallerand & Bissonette). However, researchers have proposed that different types of extrinsic motivation exist (Deci & Ryan, 1985, 1987; Ryan, Connell, & Deci, 1985; Ryan & Connell, 1989).

According to Vallerand and Bissonette (1992), four types of extrinsic motivation exist which can be ordered along a self-determination continuum. They are (a) external, (b) introjected, (c) identified, and (d) integrated regulation. *External regulation* occurs when behavior is externally regulated, typically with rewards or constraints (Vallerand & Bissonette). For example, a student may read the homework assignment because he/she does not want to be embarrassed in class the next day for not being prepared. This behavior is not self-determined but occurred to avoid negative consequences. *Introjected regulation* occurs when behavior is internally regulated and the individual is self-imposing rewards or constraints (Vallerand & Bissonette). For example, a student might volunteer to answer a question but is only doing it because no one else will and he/she

“feels bad” for the teacher. Although the student is internally regulating the behavior, it is not true self-determination. The student is performing the task in light of external events.

The final two types of extrinsic motivation occur because of self-determination but are due to external factors. *Identified regulation* occurs when a behavior is valued by the individual and is perceived as self-chosen (Vallerand & Bissonette, 1992). For example, a student decides to take advance placement courses because it will boost their grade point average. The behavior is self-determined because the individual is not being pressured to complete the task; however, it is performed not because of internal satisfaction but as a means to an end. Finally, *integrated regulation* occurs when the behavior is performed because it fits within with the individual’s self concept (Vallerand & Bissonette). For example a student turns in all of their homework and studies for every exam instead of watching television or talking on the phone. They believe that earning good grades will get him/her into a good college yielding future success. The individual values his/her education and have integrated the behaviors needed to be successful in school into other facets of his/her life.

The newest motivation construct, amotivation, occurs when an individual perceives a lack of contingency between their behavior and outcomes (Deci & Ryan, 1985). The individual perceives no rewards or constraints by participating in the task. In this event, the individual will eventually cease participation (Vallerand & Bissonette, 1992). Amotivation occurs because the individual can not identify a sense of purpose and has no expectation for reward or control over changing the course of events (Vallerand & Bissonette). It is likened to learned helplessness since the individual experiences feelings

of incompetence and uncontrollability (Vallerand & Bissonette; Abramson, Seligman, & Teasdale, 1978).

Motivation is important to look at when discussing student academic achievement because research shows that there is a relationship between motivation and students persistence in school. A study done by Vallerand and Bissonette (1992) purported that individuals who persisted in a course had reported being more intrinsically motivated, more identified and integrated, and less amotivated toward academic activities than students who dropped the course. They also revealed that females were more intrinsically motivated, integrated, and identified and less externally regulated and amotivated than males. These results may give claim to the hypothesis that individuals who are more self-determined will be more engaged in school and thus have greater knowledge acquisition and retention and high critical thinking ability.

### **Problem-Based Learning**

Problem-based learning (PBL) is an instructional strategy of "active learning" often used in higher education in such fields as nursing, dentistry and agriculture (Boud & Faletti, 1991; Barrows, 1996, 1998; Savery & Duffy, 2001). The modern history of PBL began at the medical school at McMaster University where Howard Barrows pioneered its use in response to the poor knowledge base that medical students accrued during their neurology clinical residencies (Rhem, 1998; Maudsley, 1999). However, its intellectual history can be traced back through inquiry training, John Dewey, and student apprenticeships (Rhem, 1998; Edweb, 2007). Problem-based learning can be described as “an instructional strategy in which students confront contextualized, ill-structured problems and strive to find meaningful solutions” (Rhem, ¶ 3). In response to an ever-

evolving number of variations on PBL, Barrows (1998) defined “authentic PBL” as addressing several educational objectives:

1. Acquisition of deeply understood knowledge integrated from a variety of disciplines.
2. Development of effective clinical problem-solving.
3. Development of self-directed learning.
4. Development of team and interpersonal skills.
5. Development of a desire to continually learn.

In order to accomplish these objectives, PBL must possess certain characteristics (Barrows, 1998):

*Problem-based.* Learners must be presented a real life (authentic) problem that they might encounter outside of the learning environment. These problems consist of descriptions of events that need explanation and provide limited information (Norman & Schmidt, 1992).

*Problem-solving.* Learners apply problem-solving skills required in their careers to this learner process. The facilitator guides the application and development of effective problem-solving skills.

*Student-centered.* Learners assume responsibility for their own learning. Instructors must avoid making students dependent on them for what they should know.

*Self-directed learning.* Learners develop research skills because they are required to gather current information in order to complete the problem-solving process. This skill is essential to lifelong learning and professional performance.

*Reflection.* Learners, through group discussions, reflect on what was learned concerning the problem, its essential elements, how it relates to previously encountered problems, which in turn enhances the transfer of knowledge to use with future problems.

### *Constructivism Approach for Learning*

The role of the teacher is very important when using PBL and the instructional strategy. As the facilitator, it is important that the learning process be guided rather than the instructor solely providing knowledge (Hmelo-Silver & Barrows, 2006). The learning process begins by asking open-ended questions, encouraging student participation, providing appropriate information to keep students on track, avoiding negative feedback, and assuming the role as a fellow learner (Aspy, Aspy, & Quimby, 1993). This student-centered arrangement reduces the amount of direct instruction allowing students to assume greater responsibility for their own learning (Bridges & Hallinger, 1991). The PBL strategy embodies the tenets of the constructivist pedagogy (Burriss, 2005). John Dewey, an American philosopher and educator whose writings and teachings have had profound influences on education in the United States, is often cited as the philosophical founder of this approach in which the basic premise is that a learner must actively “build” knowledge and skills and that information exists within the built constructs (Huitt, 2003). Fennimore and Tinzmann (1990) suggested a difference exists between a behaviorally-oriented (teacher-centered) curriculum in which knowledge and skills are taught discretely and then inductively connected versus the constructivistically-oriented (student-centered) curriculum in which students acquire content while carrying out tasks requiring higher-order thinking (Huitt).

Bruner (1990) provided the three principles of constructivistic learning: 1) instruction must be concerned with the experiences and contexts that make the student willing and able to learn (readiness); 2) instruction must be structured so that it can be easily grasped by the student (spiral organization); and 3) instruction should be designed to facilitate extrapolation and or fill in the gaps (going beyond the information given). Advocates of constructivism suggest that educators should first consider the knowledge and experiences the students bring to the learning environment and then build the curriculum so that they can connect new information to existing knowledge and experiences (Huitt, 2003). Conversely, advocates of behaviorism suggest that educators should decide what knowledge and skills students should know and build the curriculum to provide this knowledge (Huitt).

#### *Problem-based Learning and Constructivist Theory*

Savery and Duffy (2001) considered PBL one of the best examples of a constructivist learning environment. They identified eight principles for design of a constructivist learning environment and argued that PBL fit all eight. Table 1 compares Savery and Duffy's eight principles to Barrow's characteristics of PBL.

Table 1

*A Comparison of the Characteristics of PBL to the Constructivist Instructional Principles*

<b>Characteristics of PBL</b>	<b>Constructivist Instructional Principles</b>
Problem-based	Anchor all learning activities to a larger task or problem.  Design the task and learning environment to reflect the complexity of the practice environment.  Design an authentic task.
Problem-solving	Encourage testing ideas against alternative views and alternative contexts.  Design the learning environment to support and challenge the learner's thinking.
Student-centered	Support the learner in developing ownership for the overall problem or task.
Self-directed learning	Give the learner ownership of the process used to develop a solution.
Reflection	Provide opportunity for reflection on both the content and the learning process.

*Structure of Problem-based Learning*

PBL is different from other problem-solving strategies because of the type of problem used. Problem-solving strategies use a clearly defined problem with a prescribed order to the steps followed when solving the problem (Newcomb, McCracken, & Warmbrod, 1993). However, PBL uses a messy, ill-structured problem (Jonassen, 1997). Lohman (2002) describe the characteristics of ill-structured problems as: 1) The exact nature of the problem is unclear and some information is provided (not enough to solve

the problem); 2) More than one way to solve the problem exists; and 3) The problem does not have a single right answer.

Students are presented with an ill-structured problem in the same manner they would in the real world, without any prior preparation or studying (Maxwell, Bellisimo, & Mergendoller, 2001). Students work in small groups of typically 4-5 members with the help of a tutor or facilitator. Learning objectives are identified and used to guide individual study. Students must identify what they know and don't know and discover pertinent information in resources other than their textbook (White, 1996). The knowledge that is gathered and skill acquired are then process and applied to the problem. An important component to PBL is that students evaluate/reflect on the effectiveness of the knowledge and skills in the learning process (Maxwell et al.) and integrate the effective learning into their existing knowledge base.

Multiple conceptual models exist for teaching using PBL. Most models contain similar processes, but differ in the delineation of the steps used. The two PBL models that were evaluated for the purpose of this study was Arends' (2004) and Ryan and Millspaugh's (2004) PBL model. Arends described five major phases that can typically be found in PBL (see Table 2). According to Arends, the process begins with orientating students to the problem, followed by the set up of groups, then the facilitation the problem-solving process, and concludes with assisting students with reflection.

Table 2

*Arends' (2004) Problem-Based Learning Model*

<b>Phase</b>	<b>Teacher Behavior</b>
Orient students to the problem	Go over the objectives of the lesson, describes important logistical requirements, and motivates students to engage in self-selected problem-solving activity.
Organize students for study	Help students define and organize study tasks related to the problem.
Assist independent group investigation	Encourage students to gather appropriate information, conduct experiments, and search for explanations and solutions.
Develop and present artifacts and exhibits	Assist student in planning and preparing appropriate artifacts such as reports, videos, and models and helps them share their work with others.
Analyze and evaluate the problem-solving process	Teacher helps students to reflect on their investigations and the processes they used.

Although similar in nature, Ryan and Millspaugh's (2004) PBL model identified 14 major steps in PBL. The major difference between the two PBL models is in the first step where the teacher explains the purpose of problem-based learning. One of the difficulties with PBL is that students are not comfortable with this learning strategy and often become frustrated by the lack of information and order to the problem (Hong, 2001). This introduction to the purpose of PBL will help students to understand their newly defined role in the learning process. The other 13 steps are a more defined version of what is identified by Arends (see Table 3).

Table 3

*Ryan and Millsbaugh's (2004) Problem-Based Learning Model*

<b>Step</b>	<b>Teacher Behavior</b>
1	Explain to students why problem-based learning is used.
2	Establish small teams and assign team member roles.
3	Present the case to students prior to presenting lectures, assigning readings.
4	Guide student teams to identify major problem(s) and stakeholders; discuss “what we need to know” to solve the problem; discuss what they already know; identify concepts, principles, facts that may be used in resolving the case; list terms (jargon) presented in the case to be learned; brainstorm possible resolutions by considering stakeholders perspectives; and generate list of learning objectives.
5	Respond to student requests for more information.
6	Provide list of instructor’s formal learning objectives.
7	Guide student teams to assign learning objectives to members for research and preparation of written summaries.
8	Conduct lectures, discussions, readings, etc. to cover information related to learning objectives, case resolutions, and justifications.
9	Guide students to report within teams on learning objective research.
10	Refocus students on the case and renew discussion of problem, solutions, and justifications as the teams discuss application of learning objectives, lectures, etc. to case.
11	Facilitate an exchange of ideas within teams to generate alternative solutions and justifications.
12	Guide students to individually write their preferred case resolution and justifications. Oral presentations or debates can replace written responses.
13	Debrief the case with class.
14	Facilitate discussion to “generalize” the learning (concepts, principles, thinking processes) from the case experience to other situations.

Both PBL models advocate a step process that leads to a resolution and is concluded with a reflection component. Although the both models are intended for use in post-secondary education, they can be adapted for use at the secondary level. The Ryan and Millspaugh model was used in this study because of the added component of the introduction to PBL and the detail used within the steps. Such detail tends to prove to be beneficial when using this strategy on younger audiences.

### *Educational Outcomes of Problem-based Learning*

One of the attractive points of PBL is its interdisciplinary nature (Putnam, 2001). Solutions developed by students in PBL have multiple outcomes just as they would with problems encountered in the real world. Students learn to overlap skill sets in competency areas often integrating written, verbal, scientific reasoning, social, and math skills into developing solutions. This learning structure places emphasis on metacognitive skills and allows students to think beyond lower-ordered levels of thinking such as knowledge and comprehension (Putnam).

However, according to the literature, the true student outcomes of PBL have not been confirmed. Albanese and Mitchell (1993) conducted an extensive review of literature on PBL in the medical field. They revealed that although PBL students did not typically do as well on basic objective-type exams (e.g., multiple choice, True / False, Matching), which focused on rote memory, there were some exceptions. The variation in how PBL was used yielded different outcomes in student performance. However, in terms of clinical exams where problem solving and critical thinking skills were utilized, PBL students scored higher in these areas. Furthermore, the meta-analysis revealed that PBL students' clinical scores tended to cluster in the middle where conventional students'

scores were on extreme ends of the scale. Finally with performance-based assessments, PBL students received higher rating by the clinical supervisor than their counterparts. Vernon and Blake (1993) conducted a similar meta-analysis and discover results that favored PBL students for performance-based assessments and conventional students for knowledge-based assessments. However, because the studies lack randomization, they would not conclude that these advantages were due solely to the program designs.

Problem-based learning has also been studied at the secondary level. Gordon, Rogers, Comfort, Gavula, and McGee (2001) sought to identify the impact of PBL on urban, minority middle school students. Approximately half of the sixth, seventh, and eighth grade students in a Philadelphia middle school were exposed to PBL activities. Gordon et al. reported that although most were performing below grade level, they responded well to the high academic challenge of PBL. The authors concluded that there was a notable improvement in student behavior, and academic achievement, particularly in science scores.

Furthermore, Dods (1997) conducted a study of secondary biochemistry students to investigate the effectiveness of PBL in promoting knowledge acquisition and retention. The researcher used students from the Illinois Mathematics and Science Academy which is a highly selective magnet school. Dods reported that students acquired knowledge at about an equal rate, regardless of instructional strategy used. This equality in knowledge acquisition may be due to the type of self-regulation used by these high achieving students and their high aptitude for science topics. The researcher also reported that students taught using PBL had greater retention of knowledge. Related, a study of freshmen in an introductory agricultural education course was conducted by Herman and

Knobloch (2004) to compare the impact of instructional strategies (PBL, cooperative learning and illustrated lecture) on knowledge acquisition, retention, and student motivation. They concluded that while findings were mixed on knowledge retention, PBL improved student achievement, understanding, and motivation.

Most recently, Burris (2005) conducted a study conducted to determine the effect of PBL on critical thinking ability and content knowledge of secondary agriculture students. Burris used supervised study (also known as directed study) as the compared method of instruction. In supervised study, students were given study questions and asked to refer to a resource text in order to locate the answers. The act of searching for information without the aid of the teacher provided students with a set of problems in which they must solve. The researcher reported that students in the supervised study group produced higher scores on critical thinking ability and content knowledge. Although there was a statistically significant difference in critical thinking ability scores, Burris reported that there was no practical difference. Burris argued that the content knowledge exam measured student knowledge and comprehension (low-order thinking) and PBL has been reported as more effective with developing higher-order thinking skills. Therefore the instructional method used should depend on the educational objective. In other words, PBL may be most effective for accomplishing educational objectives written and assessed at higher levels of cognition. In terms of the results of the critical thinking appraisal, Burris concluded that the instrument used in the study may have measured a specific component of critical thinking not affected by instructional strategies and that an instrument measuring problem-solving ability may be a more appropriate data collection tool

## Critical Thinking

The promotion of critical thinking skills has long been advocated. In 1983, The National Commission on Excellence in Education conducted a study of the state of the US educational system and concluded that declines in educational performance are in large part the result of disturbing inadequacies in the way the educational process itself is often conducted. The inadequacies were grouped under four categories: content, the information being taught to the students; expectations, the level of knowledge students should possess by graduation; time, the amount of time and rigor students put into the learning process both in school and at home; and teaching, the qualifications and availability of skilled educators. The report identified the risk to the nation's welfare and global dominance as "a redistribution of trained capability throughout the globe" to which America is slow to respond (NCEE, 1983). The report went on further to say:

Knowledge, learning, information, and skilled intelligence are the new raw materials of international commerce and are today spreading throughout the world as vigorously as miracle drugs, synthetic fertilizers, and blue jeans did earlier. If only to keep and improve on the slim competitive edge we still retain in world markets, we must dedicate ourselves to the reform of our educational system for the benefit of all--old and young alike, affluent and poor, majority and minority. Learning is the indispensable investment required for success in the "information age" we are entering (The Risk section, ¶ 2).

Some years later, a report entitled *Learning and Living: A Blueprint for High Performance* (1992), the Secretary's Commission on Achieving Necessary Skills (SCANS) identified critical thinking as a skill needed by all workers. More specifically,

workplace competencies were identified as the ability to manage resources, work productively with others, acquire and use information, understand complex systems, and work comfortably with a variety of technologies (the Secretary's Commission on Achieving Necessary Skills). These reports demonstrate the importance of critical thinking to the success of the country on the global market and the role the educational system plays in developing students' critical thinking skills.

Unfortunately, for many years critical thinking has been diversely defined in the literature because experts were not able to come to a consensus on a central definition (Giancarlo & Facione, 2001). The various definitions and constructs for measuring critical thinking yielded various research outcomes and methods for teaching students critical thinking skills. For instance, Alfaro-LeFevre (1995) stated that critical thinking entails purposeful, goal directed thinking that aims to make judgments based on evidence rather than conjecture. Critical thinking is further based on principles of science and scientific method that requires strategies that maximize human potential and compensate for problems caused by human nature (Alfaro-LeFevre). Bryne and Johnstone (1987) defined it as an ability that develops through experiences. Whereas Pascarella and Terenzini (1991) stated that critical thinking involves the individual's ability to identify central issues and assumptions in an argument, recognize important relationships, make correct inferences from data, deduce conclusions from information or data provided, interpret whether conclusions are warranted on the basis of the data given, and evaluate evidence or authority.

Although definitions differ, many researchers have defined or characterized critical thinking in terms of cognitive skills (Beyer, 1987; Bryne & Johnstone, 1987;

Frye, Alfred, & Campbell, 1999; Burris, 2005). A set of cognitive skills identified by Beyer as necessary for effective critical thinking were the ability to:

1. Distinguish between verifiable facts and value claims.
2. Distinguish relevant from irrelevant information, claims, and reasons.
3. Determine factual accuracy of a statement.
4. Determine credibility of a source.
5. Identify ambiguous claims or arguments.
6. Identify unstated assumptions.
7. Detect bias.
8. Identify logical inconsistencies in a line of reasoning.
9. Recognize logical inconsistencies in a line of reasoning.
10. Determine the strength of an argument or claim.

On the other hand, some researchers have linked critical thinking skills with higher-order thinking and used Bloom's Taxonomy of Education Objectives as the framework for analyzing this form of cognitive skills (Burden & Byrd, 1994; Whittington, Stup, Bish, & Allen, 1997). In Bloom's Taxonomy of Education Objectives, there are six levels of cognition: Knowledge, Comprehension, Application, Synthesis, Analysis and Evaluation (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). According to Bloom et al. *Knowledge* is the recall of specific information, processes, patterns, or structures. Whereas, *Comprehension* represents the understanding of information by an individual such that one can use the information but does not necessarily relate it to other material or use it to its fullest implications. These two levels are commonly considered forms of lower-order thinking (Miller, 1990).

The upper four levels are generally considered forms of higher-order thinking (Miller, 1990). Bloom et al. (1956) defined *Application* as the use of abstraction in particular and concrete situations; *Analysis* as the ability to break down elements into its constituent parts such that the relative hierarchy of ideas is made clear and relationships between the ideas are made explicit; *Synthesis* as putting together parts so that they form a whole; and *Evaluation* as the judgments made about the value of material and methods for given purposes. Although there is an evident link between critical thinking and higher-order thinking, some researchers suggest that although critical thinking encompasses aspects of higher-order thinking the two concepts should not be used synonymously (Ennis, 1985; Facione, 1990). Facione suggested that critical thinking, creative thinking, problem solving and decision-making were all forms of a cognitive process that are closely related to higher-order thinking. Similarly, Ennis stated that critical thinking encompassed a great deal of higher-ordered thinking.

As the nation's educational system puts more emphasis on developing critical thinking skills in students, efforts to define, teach, and measure critical thinking are also intensifying (Kurfiss, 1988; Norris & Ennis, 1989; Jones, 1993). The American Philosophical Association sponsored a Delphi project that yielded a robust conceptualization of critical thinking (Giancarlo & Facione, 2001). They defined critical thinking as a purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation and inference as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which judgment was based (Facione, 1990, p. 3). For the purpose of this study, critical thinking will be simplistically defined as:

A mental process of analyzing or evaluating information, statements or propositions that people have offered as true. It employs a process of reflecting upon the meaning of statements, examining evidence and reasoning, and forming judgments about the facts. Information is gathered from observation, experience, reasoning, and/or communication and requires the thinker to use clarity, accuracy, precision, evidence, thoroughness and fairness (Hmelo-Silver & Barrows, 2006).

In summary, critical thinking is a widely discussed topic in the educational field. For many years, a generally accepted way to define critical thinking has eluded researchers. However, in recent years researchers have more clearly defined it and have established a set of characteristics that are more manageable to measure and teach. It has been agreed upon by educators and employers that critical thinking skills are desired of all individuals entering the workforce. Research suggests that these skills can be influenced by the instructional strategies utilized in the educational process. A study by Mabie and Baker (1996) concluded that experiential learning activities can lead to increased critical thinking skills. Furthermore, Burbach, Matkin, and Fritz (2004) determined that active-learning strategies utilized in an introductory leadership course resulted in improved critical thinking skills as measured by the WGCTA<sup>®</sup>. Unfortunately, a body of knowledge does not exist that states what instructional method is most effective in developing these skills.

### **Summary**

The urban public school system all across the country is suffering from an alarming trend. Students from all ethnic, social, and religious backgrounds are showing signs of boredom, lack of interest in school, and disrespect for authority within the

schools (Janowitz, 1978; Burkett, 2002; Modell & Elder, 2002; Pope, 2002); however this trend is intensified among minority students. The consequence of this attitude toward school and education is low academic performance (Rumberger, 1987). Furthermore, due to the academic failure experienced by some students, disengagement has intensified leading to social isolation, behavioral deviancy and subsequently leading to increased dropout rates and poor educational environments. Consequently, poor performance in school or dropping out are barriers to academic and career goal attainment. This means that barriers to academic and career attainment are more prevalent for a majority of the US youth population. Some researchers believe that by engaging students in school, these negative effects will be mitigated.

In research conducted on urban students enrolled in agriculture programs, the experience was found to have had positive effects. The positive effects included increased attendance, increased performance in agricultural classes, and academic and career aspirations closely related to agriculture (Sutphin & Newsom-Stewart, 1995). When analyzing factors that lead to successful agricultural programs, experiential learning and problem-solving approach to instruction were common factors of why students were engaged in agriculture class. The literature also reported the strong ties to leadership education as another common factor of why agriculture students were successful in other areas of their lives. Researchers found that students who participated in activities that developed leadership skills were more likely to be engaged in academic and extra-curricular activities; an outcome that is desired in all educational environments.

Fortunately for agriculture students, agriculture educators have developed a strong network that yields an abundance of resources (workshops, conferences, curriculum, etc.)

that use a variety of teaching methods that are geared toward teaching agricultural content to students with various learning styles. Students who have been exposed to these resources reap the benefits of a program that develops them academically, personally, and professionally. Unfortunately, these resources are not available to urban students not enrolled in an agriculture program and evidence of frequent use by those enrolled in an agriculture program has not been reported in the literature. Therefore, a study of the effects of instructional strategies on the knowledge acquisition and knowledge retention of leadership theory and critical thinking ability of this unique population was warranted.

## **CHAPTER III**

### **METHODOLOGY**

Chapter III describes the methodology of the current study. It includes the research objectives and hypotheses, the research design, a description of the population and sample, the validity and reliability of the instruments, and treatment, data collection, and data analyses procedures employed.

#### **Purpose of the Study**

The purpose of this study was three-fold: to determine the effectiveness of instructional strategies on improving the acquisition and retention of leadership content by secondary students in urban agriculture programs; to examine the motivational profile of students who have elected to enroll in an urban agriculture program; and to examine the effect of instructional strategies (problem-based learning and teacher-guided learning) on critical thinking ability which includes the ability to manage resources, acquire and use information, and understand complex systems. The following objectives guided this study.

#### **Objectives and Hypotheses**

1. Describe subjects on gender and motivational profile (academic aptitude, prior leadership theory knowledge and critical thinking ability, type of motivation to attend school, influences in the decision to attend CHSAS, satisfaction with the decision to attend CHSAS, and perceived effort during the study).
2. Determine the relationships between factors influencing perceived autonomy support (influences in the decision to attend CHSAS) and the outcomes of self-determination (type of motivation to attend school, satisfaction with decision to attend CHSAS, and perceived effort during the study).
3. Describe insights from student and teacher reflections about the PBL instructional strategy.

4. Determine the variables that best account for variance in knowledge acquisition test scores.

H<sub>1</sub>: Students' prior leadership theory knowledge, academic aptitude, and perceived autonomy support will account for statistically significant variance in academic performance on knowledge test.

5. Compare the effect of instructional strategy (Problem-Based Learning and Teacher-Guided Learning) with regard to students' knowledge acquisition and critical thinking ability.

H<sub>2</sub>: Students taught using the TGL instructional strategy will have a statistically higher mean score on the knowledge acquisition test than students taught using the PBL instructional strategy when accounting for prior knowledge, academic aptitude, and perceived autonomy support.

H<sub>3</sub>: Students taught using PBL will demonstrate greater critical thinking ability than students with TGL when accounting for prior critical thinking ability.

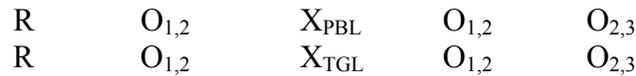
6. Compare the level of knowledge retention by instructional strategy.

H<sub>4</sub>: Students taught using PBL will retain more content than students taught using TGL as measured by the knowledge retention score when accounting for prior knowledge, academic aptitude, and perceived autonomy support.

### **Research Design**

This study employed an experimental, pretest-posttest control group design (see Figure 2). This research design is most appropriate when groups are randomly assigned and one group is administered a treatment (Shadish, Cook & Campbell, 2002). According to Shadish et al., a social lottery is one of the conditions in which a randomized research design can be employed. The participants for this study were chosen among thousands of student applicants to attend the agricultural magnet school used. Students were then randomly placed into four sections of an agricultural careers and leadership course by the school. Standardized reading scores were used to confirm homogeneity between groups. The four groups were then randomly assigned to either the treatment or the control. The effect of instructional strategy on content acquisition and retention and critical thinking

ability was investigated in this study. Therefore if posttests revealed no significant differences between treatment groups, the pretest and posttest scores can be examined to evaluate growth within groups.



**Figure 3.** Pictorial depiction of the pretest-posttest control group design where (1) represents the WGCTA Assessment®, (2) represents the Leadership Theory Knowledge Assessment, and (3) represents the Academic Motivation Scale.

*Variables of Interest*

The dependent variables are knowledge acquisition, knowledge retention, and critical thinking ability, representing changes in competency. Knowledge acquisition was assessed using a leadership theory unit test administered at the conclusion of the unit. The test measured students’ knowledge of leadership, approaches of leadership (trait, skills, and situational), and transformational leadership. The pre- and post-test design was used to control for differences in pre-existing knowledge of leadership education as well as measure growth of knowledge within groups after treatment. Critical thinking ability was used to describe the skills identified by the 1992 SCANS report as the workplace competencies needed by all workers. The competencies were the ability to manage resources, work productively with others, acquire and use information, understand complex systems, and work comfortably with a variety of technologies (Brock, 1992). For this study, critical thinking ability was assessed and operationally defined by the Watson-Glaser Critical Thinking Appraisal®. The instrument measured inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments. Other measurements were collected to account for other forms of critical thinking ability potentially not measured by the WGCTA®. The other measurements were teacher

observations on student engagement and thought processes, student reflections of the PBL method. Knowledge retention, purported to be an outcome of the use of higher-order thinking skills, was measured by using the difference scores between the knowledge acquisition test (posttest) and the knowledge retention test (follow-up posttest).

The independent variable in this study was the instructional strategy used to teach the leadership theory unit. Specifically, the instructional strategy was the method of instruction assigned to the class. The students were randomly assigned to one of two methods of instruction; problem-based learning method or teacher-guided learning method. The unit was delivered within the first 3 weeks of school to minimize the effects associated with intact classes.

The co-variables in this study were identified variables in the student motivational profile. The influence in the decision to attend CHSAS represented autonomy and relatedness (autonomy support). If the student was able to select the school for themselves or played a major roll in the decision to attend, then that individual will perceive the decision as autonomous or autonomy-supported. The students' academic aptitude in reading, prior leadership theory knowledge, and prior critical thinking ability represented competence.

#### *Control Factors*

Internal validity, one of the most important types of research validity, refers to the extent for which error variance (extraneous variables) in an experiment are accounted. It is of the utmost importance that the researcher control model specification error variance in order to conclude that the outcome was due to the independent variable(s) (Parker, 1993). Campbell and Stanley (1963) identified eight extraneous variables that pose

threats to internal validity in experimental studies. The threats were: (a) history, which pertains to the environmental events occurring between observations that are extraneous to the independent variable(s); (b) maturation, which refers to the psychological and/or biological process within the participants that takes place as a function of the passage of time, also extraneous to the independent variable(s); (c) testing, which is sensitization to the posttest as a result of completing the pretest; (d) instrumentation, which refers to changes in the accuracy of instruments, devices or observers used to measure the dependent variable; (e) statistical regression, which occurs when groups are selected based on their extreme scores, because these inconsistent scores tend to regress toward the mean on repeated testing; (f) selection, which refers to the factors involved in placing certain participants in certain groups based on preferences; (g) mortality, which refers to the loss of participants and their data due to various reasons; and (h) interactions of the previous threats with selection (Campbell & Stanley, 1963).

The research design used in this study, (pretest-posttest control group) controlled for many of the threats to internal validity. Random assignment is employed to both groups, and both groups are given a pretest. Differences attributed to history, maturation, testing and instrumentation are equally manifested between the two groups and thus accounted for with use of the pre- and post-test design. Randomization and random assignment of participants protects against statistical regression, selection, mortality and interaction threats (Campbell & Stanley, 1963). The absence of selection bias as a threat to internal validity was also confirmed by comparing groups on a reading aptitude test prior to the treatments.

External validity of experimental research asks the question of generalizability. Generalizability requires the research samples to be representative of the population of interest. When effects of differing magnitude exist, the researcher must explain when and where the effect holds, and when and where it does not (Cook & Campbell, 1979). Cook and Campbell identified two threats to external validity: interaction of selection and treatment, which refers to a treatment having effects on a particular groups such as gender or ethnicity not being generalizable to a differing population; and interaction of setting and treatment, which refers to the participants history (e.g. can data be generalized from one location to another, or one period of time to another). Parker (1993) identified two additional threats to external validity: interaction of treatments with treatments, which refers to the administration of multiple treatment to the same participants potentially leading to cumulative effects; and interaction of testing and treatment, which refers to the increase or decrease in subjects' responsiveness to treatment due to a pretest.

The pretest-posttest control group design presents a threat to external validity because of the pretest. What makes this design strong for internal validity makes it weak for external validity reasons. This means that generalizing the results to a different group without a comparative pretest is ill-advised due to the fact that results may vary (Heppner, Kivlighan, & Wampold, 1992). Therefore to account for this threat to external validity, results of this study will be generalized exercising caution to groups with similar pre-treatment measures.

### **Population and Sample**

The target population for this study was secondary students enrolled in urban agriculture programs with primary minority population (60% or more). The accessible

population was students attending the Chicago High School for Agricultural Sciences ( $N = 592$ ) located in urban Chicago, Illinois and is a magnet school in the Chicago Public School District ( $N = 109,982$ ). Approximately 89% of the students enrolled in the Chicago Public School District are Non-White or Asian/Pacific Islander with 86% categorized as low income. The Chicago High School for Agricultural Sciences has approximately 67% of the students enrolled identified as Non-White or Asian/Pacific Islander with 47% categorized as low income (Chicago Public Schools, 2007).

However, the Chicago High School for Agricultural Sciences was selected because it had the largest accessible number of agriculture students that are randomly selected from students interested in enrolling in comprehensive secondary agriculture programs. From a pool of approximately 1500 students from around the Chicago area, approximately 140 students are selected annually. The students who apply are from the general student population and come from various school structures (public, private, home schooling) and various social economic status levels. The sample, comprised of freshmen students enrolled in the Agricultural Careers and Leadership course ( $n = 110$ ), was selected for this study for two primary reasons: 1) they are the group that is randomly placed into classes; and 2) they have limited formal education in leadership development, and they all take an agricultural careers and leadership class. Another reason freshmen were selected was because of the instructor. The instructor of the leadership class was very familiar with facilitating the PBL strategy. A fifth section of freshmen students was not included in the study because it was instructed by another teacher which could have brought a confounding factor into this study.

## **Instrumentation**

Six measurement instruments were used to collect data to address the purpose and research objectives of this study. Knowledge acquisition and retention was determined by a score on the leadership education paper-pencil test with three data collection points. Students' critical thinking ability was operationalized as a performance score on the Watson-Glaser Critical Thinking Appraisal<sup>®</sup> (Form S), as well as instructor observations and student reflections from participants in the treatment (PBL) group. Students' motivational profile, purported to be a predictor of academic achievement, was measured using the Academic Motivation Scale – High School Version. Students' gender and 7<sup>th</sup> grade reading aptitude stanine was reported by the instructor on the score report form. For each of these data collection instruments and indication of their trustworthiness was addressed. For each data collection tool, a further description is provided with efforts taken to establish validity and determine reliability measures.

### *Leadership Theory Unit Test*

Knowledge acquisition was determined by a score for participants on the posttest administration of the leadership theory unit test. The test was developed from review quizzes provided in the original instructor's manual for *Leadership Theory and Application (3<sup>rd</sup> ed.)* (Northouse, 2004). The test consisted of 50 true-false and multiple choice items. Five true-false and five multiple choice for each of the five selected lessons. The researcher, in consultation with the instructor, decided to keep the questions in their original form in order to provide questions that tested various levels of thinking ability including synthesis and application. The result of a test of moderate difficulty is that it is

applicable for use with various secondary grade levels but lose reliability when administered to young, homogenous groups (Ary, Jacobs, and Razavieh, 2002).

*Validity.* Each of the 50 content items were selected and written by the original author of the instructor's manual and approved by the author of the reference book. The investigator, the instructor, and two additional high school agriculture instructors evaluated the unit test for content and face validity. Each test item corresponded with one of the five lessons.

*Reliability.* The posttest scores of the leadership theory test were analyzed for reliability. The reliability of the instrument was determined post-hoc by assessing inter-item consistency according to Kuder-Richardson's formula 21. According to Ary et al. (2002), Kuder-Richardson's formula 20 or 21 is applicable when test items are scored dichotomously as either right or wrong. In this study, Kuder-Richardson formula 21 was used because only the participants' raw scores were available for the posttest. The estimated coefficient of internal consistency was determined to be .64 for the control group ( $n = 58$ ).

According to Ary et al. (2002), there are certain factors that must be taken into account when interpreting a reliability coefficient: 1) the length of the test, the greater the length of the test the more reliable the measurement; 2) heterogeneity of the group, the more heterogeneous the group in response to the trait being tested the higher the reliability coefficient; and 3) the ability of the individuals being tested, the more difficult the test the lower the reliability coefficient. The length of the test provided a fairly strong representation of the students' true scores. However, due to the homogeneity of the group (age of the students and their limited knowledge of leadership theory) and the intentional

difficulty of the test (standardized for criterion-related validity), the unit test is considered moderately reliable (.60 to .70). Nevertheless, according to Ary et al., “If the measurement results are to be used for making a decision about a group or for research purposes, or if an erroneous initial decision can be easily corrected, scores with modest reliability (coefficients in the range of .50 to .60) may be acceptable (p. 262).”

#### *Watson-Glaser Critical Thinking Appraisal*

The Watson-Glaser Critical Thinking Appraisal<sup>®</sup> was used to assess an estimate of students’ standing in the composite of critical thinking abilities. According to Watson and Glaser (2006), critical thinking is conceptually defined as a combination of attitudes, knowledge, and skills which include:

- The ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true,
- Knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of different kinds of evidence are logically determined, and
- Skills in employing and applying the above attitudes and knowledge. (p. 3)

Furthermore, critical thinking is operationally defined as the ability to correctly perform tasks associated with these skills (Watson & Glaser, 2006). The assessment is available in a long form (80 questions) or the short form (40 questions) and is designed for individuals with at least a ninth grade reading ability.

The short form was used in this study to evaluate students’ standing in the five subsets in order to infer about their ability to demonstrate the competencies mentioned in the SCANS report (ability to manage resources, work productively with others, acquire

and use information, understand complex systems, and work comfortably with a variety of technologies). In each subset of the instrument, the individual is given scenarios in which they must reason analytically and logically to answer the prompt. The five subsets (Watson & Glaser, 2006:3) in which they are tested are:

*Inference.* Discriminating among degrees of truth or falsity of inferences drawn from given data.

*Recognition of Assumptions.* Recognizing unstated assumptions or presuppositions in given statements or assertions.

*Deduction.* Determining whether certain conclusions necessarily follow from information in given statements or premises.

*Interpretation.* Weighing evidence and deciding if generalizations or conclusions based on the given data are warranted.

*Evaluation of Arguments.* Distinguishing between arguments that are strong and relevant and those that are weak or irrelevant to a particular issue.

*Validity.* Watson and Glaser (2006) stated that the content validity of the Watson-Glaser Critical Thinking Appraisal® in classroom and instructional settings may be examined by noting the extent to which the instrument measures the objectives of the learning program. Critical thinking ability is a specified objective of the 1992 SCANS report as identified through the need to “acquire and use information” and “understand complex systems.”

*Reliability.* Watson-Glaser Critical Thinking Appraisal® is a standardized instrument and the reliability has been previously established on a developmental sample ( $n = 1,680$ ). Cronbach’s alpha coefficient was .81 (Watson & Glaser, 2006).

### *Academic Motivation Scale*

A motivation scale was used to determine students' type of motivation to attend school. The purpose was to use the data collected to describe the relationship among the students' perceived motivation to attend school, major influence in their decision to attend CHSAS, level of effort placed on the study, and current satisfaction with attending CHSAS. The data collection instrument is based on the Academic Motivation Scale (AMS) – High School Version by Vallerand, Pelletier, Blais, Brière, Senécal, and Vallières (1992) which was adapted from the College Version (Vallerand, Blais, Brière, & Pelletier, 1989). The Academic Motivation Scale – College Version was adapted from the Self-Regulation Questionnaire developed by Ryan and Connell (1989). The scale has 28 items that ask questions about why they go to school and why they do homework. The seven subscales of the AMS assessed amotivation, intrinsic motivation (to know, to accomplish things, to experience stimulation) and extrinsic motivation (external regulation, introjected regulation, and identified regulation). For this study, five subscales were used: amotivation, external regulation, introjected regulation, identified regulation, and intrinsic motivation composite score. Vallerand et al. (1989; 1992; 1993) conducted numerous studies to determine validity (concurrent, construct, and factorial) and reliability (internal consistency and temporal stability).

*Validity.* Vallerand et al. (1989; 1992; 1993) established validity using confirmatory factor analysis to correlate each AMS subscale among themselves and the tenets of Deci & Ryan's (1985) motivational theory. These studies found that intrinsic motivation and amotivation were negatively correlated ( $r = -.82$ ), which is predicted by self-determination theory.

*Reliability.* Cronbach's alpha coefficients for the subscales ranged from .58 to .84 ( $n = 1,062$ ). Test-retest reliability displayed temporal stability with a mean correlation value of .79 over a one-month period. The scale was determined to be reliable for the purpose of research (Vallerand et al., 1989; 1992).

#### *Methods Triangulation*

Triangulation is the attempt to increase reliability by reducing systematic error through employment of multiple methods of measurement (e.g. survey, observation, interviews). If the alternative methods do not share the same source of systematic error, examination of data from the alternative methods gives insight into how individual observations may be adjusted to come closer to reflecting true measurements, thereby increasing reliability. Furthermore, triangulation may provide deeper insight into the relationship between the method of measurement and the phenomenon being studied (Patton, 2002). A common misconception about triangulation involves thinking that the purpose is to demonstrate that different sources yield the same results. However, different kinds of data may yield somewhat different results due to the varying levels of sensitivity the instrument has to real-life nuances.

Due to the exploratory nature of this study, methods triangulation was employed in order to provide deeper insight into students' engagement and personal factors such as changes in competence variables (knowledge acquisition and critical thinking ability) and relatedness. Teacher classroom observations and reflection of the study provided qualitative data on behavioral factors (cognitive, emotional, and behavioral engagement). Student reflections by the PBL group provided insights into the effect the treatment had on personal and behavioral factors. Finally, the follow-up posttest provided insight into

retention; supporting the claim that students who use higher-order thinking skills during knowledge acquisition retain more information.

### *Student Characteristics*

Descriptive data for the participants in each group was collected by the instructor and placed on the report form. The instructor was asked to provide the gender and 7<sup>th</sup> grade reading stanine for each student based on the school's official records. The stanine was then converted into a *T*-score for use in this study.

### **Treatment and Procedures**

The unit of instruction used for this study, consisting of five two-day lessons, was a leadership theory intervention adapted from the *Leadership Theory and Practice* (3<sup>rd</sup> ed.) by Northouse (2004). More specifically, the lessons were taken from the instructor's manual written by Bowman that was created for use in college leadership courses. Since the first edition, over 300 institutions world wide have adopted the book for use in instruction. The five content topics taught to the students were an introduction to leadership, the trait approach, the skills approach, the situational approach, and transformational leadership. The content in the book was unaltered; however, the handouts and instructional material was adapted to be used on the secondary level. The intent was to make the material challenging enough so that the students would have to use outside resources for some levels of comprehension instead of relying solely on their prior knowledge. This design better insured that the data collection instrument measured the effects of the intervention instead of testing the students' history (threat to validity: interaction to setting and treatment).

Students were also randomly assigned to one of four sections of the Agricultural Careers and Leadership course. Each of the four sections was randomly assigned one of the two instructional methods. The problem-based learning group had one class of 30 students and the other class had 29 students. Although all students participated in the learning activities, five students did not receive parental permission and therefore useable data was returned for only 54 students. The teacher-guided learning group had two classes of 30 students. However, as with the PBL group, useable data for 56 students were returned for analysis.

The instructor had prior experience conducting research using the PBL method as well as extensive experience teaching leadership to students at the ninth grade level. Therefore, an onsite training session was not warranted in this particular situation. However, once the instructor received the materials for the study (see Table 4), the researcher and instructor had a teleconference to go over the use of each item. Included in the materials were instructor's manuals for each instructional method (see Appendix C), reference copies of *Leadership Theory and Practice* (3<sup>rd</sup> ed.) for each problem based learning group, a digital file of PowerPoint presentations for use with the TGL group, copies of the case study and resource aids (see Appendixes G-I) for the PBL group, the leadership education unit test (see Appendix B), the WGCTA<sup>®</sup> and answer form, and data reporting forms (see Appendixes D & F).

An administrator consent form, parental consent form, and student assent form was provided to the instructor prior to the commencement of the study (see Appendix A). Directions for administering the data collection instruments were provided via email and discussed during teleconference. Two forms were developed to assist the instructor in

reporting the data. The Student Identification Form (see Appendix D) was used to assign an identification number to each student in the respective class. This form was used only by the instructor and was not returned to the researcher in order to provide anonymity to the participants. The second form was the Score Report Form (see Appendix E). The instructor was directed to score the leadership education unit tests via Scantron<sup>®</sup> and use the Score Report Form to report each participant's test scores, reading aptitude test score and gender.

The knowledge retention test was administered three months after the knowledge acquisition test during the collection of the student motivational profile data. The investigator was onsite for the administration of the final data collection. Data from both WGCTA<sup>®</sup> administrations, the student motivational profile data, and the knowledge retention test were collected by the investigator and processed at the investigating institution.

Table 4

*Instructional Materials Provided for the Leadership Theory Unit*

Material	Quantity	Appendix
Consent Forms	1 Administrative Permission, Parental Consent (1 per student), Student Assent Statement	A
Leadership Theory Test	3 per student (1 pretest and 2 posttests)	B
Leadership Theory Instructor's Manual	1 Teacher-guided Learning Method Manual 1 Problem-based Learning Method Manual	C
Student Identification Form	4 (1 per class)	D
Score Report Form	4 (1 per class)	E
Study Schedules	1 Teacher-guided Learning Schedule 1 Problem-based Learning Schedule	F
Case Study	1 per student (PBL only)	G
Formal Learning Objectives	1 per student (PBL only)	H
Organizers for Investigation	1 packet per group (PBL only)	I
Leadership Theory PowerPoint Presentations	1 digital file per lesson	-
WGCTA <sup>®</sup> Testing Materials	30 Test booklets, Answer forms (2 per student)	®
Teacher Reference Book	Leadership Theory and Practice (3 <sup>rd</sup> ed.)	®
Student Reference Chapters	1 copy per group (PBL only)	®

### *Problem-Based Learning (Treatment)*

An alternative version of the leadership education intervention was developed by the researcher and based upon *The Problem-Based Learning Process: A model for Undergraduate Courses* by Ryan and Millspaugh (2005). In the PBL model, there are 14 tasks to accomplish in order to effectively conduct this instructional strategy. The steps were:

1. Explain to students why problem-based learning is used
  - Creates meaningful context for learning
  - Enhances long-term retention of principles, concepts, facts
  - Builds critical thinking skills (problem solving, analysis, synthesis, evaluation)
  - Creates opportunity to apply knowledge in authentic scenarios
  - Increases motivation (students see application of material to authentic situations)
  - Improves transfer of knowledge to other contexts including real world situations
2. Establish small teams and assign team member roles
  - Random assignment or stratified based on student expertise, gender, etc.
  - Possible Roles: discussion leader; recorder; assignment coordinator; devil's advocate
3. Present the case to students prior to presenting lectures, assigning readings, etc.
4. Students read the case
  - Identify major problem(s) and stakeholders
  - Discuss “what we need to know” to solve the problem
  - Discuss what they already know (or think they know)

- Identify concepts, principles, facts that may be used in resolving the case
  - List terms (jargon) presented in the case to be learned
  - Brainstorm possible resolutions by considering stakeholders perspectives
  - Generate list of learning objectives
5. Respond to student requests for more information
  6. Provide list of instructor's formal learning objectives
    - The learning objectives form the basis for subsequent lectures, readings, discussions, etc.
    - The learning objectives provide the underlying material needed to address the problem case
  7. Student teams assign learning objectives to members for research and preparation of written summaries
  8. Lectures, discussions, readings, etc. provide coverage of information related to learning objectives, case resolutions, and justifications
    - Case provides context for interpreting and understanding material, spurs questions, provides back ground for discussions
  9. Student report within teams on learning objective research
    - Share written summaries via peer-teaching within groups
    - Instructor reviews reports and select "good" summaries to share with all teams
  10. Teams discuss application of learning objectives, lectures, etc. to case
    - Refocus students on case; renew discussion of problem, solutions, and justifications
    - Collect/analyze additional data related to the case
    - Students collaborate to develop case response
  11. Exchange of ideas among teams
    - Final team discussions on alternative resolutions and justifications

12. Students individually write case resolutions

- Individuals decide on preferred resolution and justify their decision
- Oral presentations or debates can replace written responses

13. Debrief the case with class

- Students want to discuss relative merits of alternate solutions, justifications, etc.
- Students interested in instructor's ideas, opinions, etc.
- If the case was a real-world situation, students want to know what happened, current situation, etc.

14. Facilitate discussion to "generalize" the learning from the case experience

- Prevent focus on specific case outcomes
- Promote transfer of concepts, principles, thinking processes to other situations

The formal learning objectives were taken from the original instructor's manual.

Resources were developed for the students to aid them in teaching the learning objectives (individual organizers for investigation) using the Ryan and Millspaugh (2005) PBL model. The instructor was given a timeline, case study, formal learning objectives, individual organizers for investigation, and copies of the reference book in order to ensure consistency in the administration of the treatment. Although the role of the instructor was to guide and facilitate, the instructor's manual provided her with information to answer questions and better direct the discussions.

*Teacher-Guided Learning (Control)*

The Illinois Learning Standards (ILS) defined what all students in all Illinois public schools should know and be able to do in the core areas as a result of their

elementary and secondary schooling (ISBE, 2007). The standards for each core area are guided by six themes:

*Application of Learning.* Through Applications of Learning, students demonstrate and deepen their understanding of basic knowledge and skills. These applied learning skills cross academic disciplines and reinforce the important learning of the disciplines.

*Solving Problems.* Recognize and investigate problems; formulate and propose solutions supported by reason and evidence.

*Communicating.* Express and interpret information and ideas.

*Using Technology.* Use appropriate instruments, electronic equipment, computers and networks to access information, process ideas and communicate results.

*Working on Teams.* Learn and contribute productively as individuals and as members of groups.

*Making Connections.* Recognize and apply connections of important information and ideas within and among learning areas.

Although agricultural education has a long and rich history in Illinois, there weren't any organized efforts to foster agricultural education for all students (Illinois Ag Education, 2007). Furthermore, instructors were accountable for making the agriculture curriculum match up with the state standards leading to incongruous curricula across the state. However, in 1984, a grassroots movement from the Illinois agriculture industry recognized that agriculture was central to the welfare and economic stability of the state, and required a continued source of trained and qualified individuals for employment in

agriculture. That movement resulted in creation of the Illinois Leadership Council for Agricultural Education (ILCAE) (Illinois Ag Education, 2007).

In 1986, the Illinois General Assembly legislated that a comprehensive program for agricultural education be created and maintained by the public school system for all school districts. The Illinois Committee for Agricultural Education (ICAE) was formed. In 1989, the first legislated agricultural education line item within the Illinois State Board of Education was allocated and Facilitating Coordination in Agricultural Education (FCAE) was created to manage it (Illinois Ag Education, 2007). FCAE has been instrumental in working with educational publishers, agriculture instructors, administrators, and government official to create professional development opportunities that would continue to advance Illinois agriculture education. One of the initiatives developed was a comprehensive set of lessons for agriculture instructors that matched the state standards. Starting as one cd entitled the *Central Core*, FCAE now provides all agriculture instructors in Illinois, free of charge, eight cds that include the *Central Core*; *Horticulture*; *Animal, Plant, and Soil Sciences*; and *Agribusiness Management* to name a few.

According to Lucille Shaw, head of the agriculture education department at CHSAS, the core curriculum cds are widely popular in Illinois and are used at CHSAS to match lessons with the lesson plans (2007). This core curriculum is important to Chicago teachers because all teachers in the Chicago Public School System are required to submit weekly lesson plans, to their local administrators, that are matched to the Illinois Learning Standards (Shaw, 2007). These lesson plans are randomly audited by the district so accuracy and consistency is important. Since Illinois does not have learning standards

specifically for agriculture education, instructors must search through all the standards to find the appropriate match. The core curriculum provides a state approved agriculture curriculum with appropriate state standards and benchmarks in eight of the core agriculture areas, lesson plans with visual aids and references, and for some lessons, computer generated presentations.

The lessons have become so popular in Illinois because they are easy to use and provide a method of instruction for producing individual learning within a group setting. Over the years the lessons have been tested and revised and now resemble the four-step approach to instruction. This approach has been established from research that gives educators some insight on what motivates students, how the senses are used to receive information, and how the mind works to retain and transfer skills and knowledge (Bott, 1998). This method uses four general steps: (1) motivating students; (2) presenting information to them; (3) application of what has been presented; and (4) evaluating what has been learned according to some standard or criterion (Bott, 1998). Since CHSAS uses the core curriculum to instruct students, which is written using the four-step instructional approach, the researcher decided that this method of instruction would be one of the strategies used for this study. Figure 3 provides a graphical portrayal of the four-step instructional approach (Bott, 1998, p. 89). To that end, the instructor was given a timeline, complete lessons and instructional aids in order to ensure consistency in the administration of the content to the control group.

Step	Objective	Actions
Motivation	1. To prepare the mind of the learner by attracting attention, arousing curiosity, creating interest, and stimulating a desire to learn.	1. Ask questions. 2. Give examples. 3. Tell of personal experiences. 4. Relate to previous lessons. 5. Indicate future needs.
Presentation	1. To present new ideas. 2. To provide instructions. 3. To reinforce previously learned information.	1. Explain procedures, principles, concepts. 2. Give demonstrations. 3. Use visuals aids. 4. Use written instruction sheets. 5. Develop and lead discussions. 6. Emphasize key main points. 7. Stress safe practices.
Application	1. To have the learner apply what was learned in step 2. 2. To give the learner practice in application of skills, knowledge, and attitudes. 3. To facilitate retention of materials or skills learned.	1. Have the learner perform the task. 2. Supervise performance closely. 3. Check and correct errors. 4. Check key points and safety procedures. 5. Have learner repeat tasks if necessary.
Evaluation	1. To determine the extent of the students' learning. 2. To determine the efficiency and effectiveness of instruction. 3. To aid in retention and to help reinforce what has been learned.	1. Test students' performance. 2. Give oral tests. 3. Administer written tests. 4. Develop discussions.

**Figure 4.** Four-Step Instructional Approach

### *Procedures*

The instructor was selected based on three criteria that would provide validity to this study. First, the instructor had an extensive background in facilitating the PBL strategy in research settings. Secondly, the instructor was familiar with teaching leadership education to the grade level in question and would be instructing a large number of students during the semester at the time the study was conducted. Finally, the process in which her students were selected would provide the strongest research design for the study. Her students were (1) randomly selected by a social lottery from interested applicants from throughout the metropolitan area; (2) enrolled in a comprehensive urban agriculture program; (3) randomly placed in sections of the leadership course; and (4) provided limited to no leadership theory prior to the beginning of the course.

Student resources were mailed to the instructor via postal mail, while all teacher resources were sent via email. Upon receipt of study material, the investigator and instructor met via conference call. All materials were discussed and a timeline was established (See Appendix F). It was important that the study was conducted within the first three weeks of school to limit the effects associated with intact classes. Furthermore, adherence to the schedule provided was stressed in order to provide equal content exposure for all students.

Consent to recruit was signed by an administrator and returned to the investigator prior to the study (See Appendix A). Consent to participate was given to students the first day of class and returned to the instructor by the end of the week. The instructor was instructed to keep the consent forms on file with her and only provide data for students with consent. The study commenced on Monday of the second week of school which was

the first full week of classes. Table 5 provides a summary of the study schedule for both methods based on 47 minutes of instruction.

Table 5

*Summary of Daily Schedule by Instructional Strategy*

Day	TGL	PBL
1	Prior Knowledge Unit Test Administration	Prior Knowledge Unit Test Administration
2	WGCTA <sup>®</sup> Pretest Administration	WGCTA <sup>®</sup> Pretest Administration
3 -12	Instruction of Lessons 1-5 using lecture and application activities.	Facilitation of Case Study using group investigation of an ill-structured problem.
13	Knowledge Acquisition Unit Test Administration	Knowledge Acquisition Unit Test Administration
14	WGCTA <sup>®</sup> Posttest Administration	WGCTA <sup>®</sup> Posttest Administration
115	Knowledge Retention Unit Test Administration	Knowledge Retention Unit Test Administration
118	Academic Motivation Scale Administration	Academic Motivation Scale Administration

**Data Collection**

The prior knowledge unit test and the WGCTA<sup>®</sup> were administered prior to the commencement of the leadership lessons. Similarly, the knowledge acquisition unit test and the WGCTA<sup>®</sup> were administered following the final day of instruction. Both the prior knowledge unit tests and the knowledge acquisition unit tests were scored by the instructor and placed on the report forms along with the students' gender and reading aptitude stanine. The instructor assigned a study number to each participant and used the number to correspond each student's scores and data. The report forms for each class and

the WGCTA<sup>®</sup> test booklets and answer sheets were returned by postal mail to the researcher at the conclusion of the intervention.

During the intervention, the instructor kept written observations of each class. In addition, the students from the PBL group were asked to reflect on their experience by providing written responses to reflection questions. Finally, the knowledge retention unit test was administered along with the Academic Motivation Scale three months after the intervention was conducted. The researcher was present at this time of the final collection and gathered the data along with the teacher's observations and reflection, and the students' reflections.

### **Data Analysis**

Data were analyzed using the Statistical Package for the Social Sciences<sup>®</sup> (SPSS) version 14.0 computer program for Windows. The alpha level was established *a priori* at .05 for tests of significance. Cohen's *d* (1992) was used to determine effect size on statistically significant tests.

#### *Research Objective One*

Describe subjects on gender and motivational profile (academic aptitude, prior leadership theory knowledge and critical thinking ability, type of motivation to attend school, influences in the decision to attend CHSAS, satisfaction with the decision to attend CHSAS, and perceived effort during the study).

Descriptive statistics were reported of both measures of central tendency and measures of variance. Frequency counts and percentages were used to describe categorical data. Mean scores, standard deviation and ranges were generated to describe continuous data. The individual knowledge scores as measured by the leadership theory

unit test and the critical thinking ability scores as measured by the WGCTA<sup>®</sup> scores were determined by the cumulative number of correct answers. The descriptive statistics were reported by treatment group.

#### *Research Objective Two*

Determine the relationships between factors influencing perceived autonomy support (influences in the decision to attend CHSAS) and the outcomes of self-determination (type of motivation to attend school, satisfaction with decision to attend CHSAS, and perceived effort during the study).

Influences in the decision to attend CHSAS, motivation to attend school, satisfaction with that decision, and perceived effort during the study were correlated using Pearson product-moment correlations to identify relationships between factors influencing perceived autonomy support and outcomes of self-determination.

Furthermore, an intercorrelation was conducted among outcomes of self-determination. Davis' convention (1971) was used to identify the magnitude of correlation. This information was used only to describe the personal factors that influence the students' motivation profile and was not used to make inferences about the population.

#### *Research Objective Three*

Describe insights from student and teacher reflections about the PBL instructional strategy.

This mixed method approach was added to glean further insights into the observations and experiences of both the instructor and the students in the PBL treatment group. This qualitative data might provide information not measured by the WGCTA<sup>®</sup>

concerning the change in critical thinking ability. Statements were analyzed for central themes.

#### *Research Objective Four*

Determine the variables that best account for variance in knowledge acquisition test scores.

Guided by self-determination theory, four variables associated with autonomy and competence were analyzed for strong positive relationships with academic achievement outcomes. Self and family decision to attend CHSAS was chosen to represent student perceived autonomy. In addition, prior leadership theory knowledge and academic aptitude were chosen to represent competence. All four variables were correlated with the knowledge acquisition unit test using Pearson product-moment correlations. The variables with significant positive correlations were then used to test research hypothesis one.

#### *Research Hypothesis One*

Students' prior leadership theory knowledge, academic aptitude, and perceived autonomy support will account for statistically significant variance in academic performance on knowledge test.

Simultaneous General Linear Regression was used to test if prior leadership theory knowledge, academic aptitude, and perceived autonomy support would predict variance in academic performance on knowledge test.

$$\begin{aligned} H_0: R^2_{1,2,3} &= 0 \\ H_1: R^2_{1,2,3} &\neq 0 \end{aligned}$$

### *Research Objective Five*

Compare the effect of instructional strategy (PBL & TGL) with regard to students' knowledge acquisition and critical thinking ability.

Research objective five consists of two research hypotheses. Both research hypotheses were tested using an Analysis of Covariance (ANCOVA).

### *Research Hypothesis Two*

Students taught using the TGL instructional strategy will have a statistically higher mean score on the knowledge acquisition test than students taught using the PBL instructional strategy when accounting for prior knowledge, academic aptitude, and perceived autonomy support.

Research hypothesis two was tested using an Analysis of Covariance (ANCOVA). Students' prior knowledge scores, reading *T*-scores, and family decision to attend CHSAS ratings were used as the covariates to account for differences among students in perceived autonomy support and competence before treatment.

$$\begin{aligned} H_0: \mu_{PBL} &= \mu_{TGL} \\ H_1: \mu_{PBL} &< \mu_{TGL} \end{aligned}$$

### *Research Hypothesis Three*

Students taught using PBL will demonstrate greater critical thinking ability than students with TGL when accounting for prior critical thinking ability.

Research hypothesis three was tested using an Analysis of Covariance (ANCOVA). The students' pretest critical thinking scores were used to account for difference among the students in critical thinking ability prior to the intervention.

$$\begin{aligned} H_0: \mu_{PBL} &= \mu_{TGL} \\ H_1: \mu_{PBL} &> \mu_{TGL} \end{aligned}$$

### *Research Objective Six*

Compare the level of knowledge retention by instructional strategy.

Research objective six consists of one research hypothesis. Research hypothesis four was tested using an Analysis of Covariance (ANCOVA).

### *Research Hypothesis Four*

Students taught using PBL will retain more content than students taught using TGL as measured by the knowledge retention scores when accounting for students' prior knowledge, academic aptitude, and perceived autonomy support.

The difference in scores from the knowledge acquisition unit test and the knowledge retention unit test were used to compute knowledge retention scores. Students' prior knowledge scores, reading *T*-scores, and family decision to attend CHSAS ratings were used as the covariates to account for differences among students in perceived autonomy support and competence before treatment.

$$\begin{aligned} H_0: \mu_{PBL} &= \mu_{TGL} \\ H_1: \Delta\mu_{PBL} &< \Delta\mu_{TGL} \end{aligned}$$

## **CHAPTER IV**

### **FINDINGS**

The purpose of this study was three-fold: to determine the effectiveness of instructional strategies on improving the acquisition and retention of leadership content by secondary students in urban agriculture programs; to examine the motivational profile of students who have elected to enroll in an urban agriculture program; and to examine the effect of instructional strategies (problem-based learning and teacher-guided learning) on critical thinking ability which includes the ability to manage resources, acquire and use information, and understand complex systems. This chapter includes the results of the procedures used to answer the six research objectives and test the four hypotheses. The results include statistical significance when appropriate and whether the null hypotheses were accepted or rejected.

#### **Objective One**

Research objective one sought to describe subjects on gender and motivational profile (academic aptitude, prior leadership theory knowledge and critical thinking ability, type of motivation to attend school, influences in the decision to attend CHSAS, satisfaction with the decision to attend CHSAS, and perceived effort during the study). Data from 110 freshmen were used in the study. Group one consisted of students in the Problem-based Learning (PBL) treatment group. In group one ( $n = 54$ ), 18 students (33%) were male and 36 students (67%) were female. Group two consisted of students in the Teacher-guided Learning control group. In group two ( $n = 56$ ), 30 students (54%) were male and 26 students (46%) were female. For the sample ( $n = 110$ ), 48 students (44%) were male and 62 students (56%) were female.

Academic aptitude was operationally defined as the T-score on the reading portion of the Illinois Standards Achievement Test (ISAT) which was administered in the 7<sup>th</sup> grade. The ISAT reading scores were reported by means, standard deviations, and ranges (see Table 6). The mean ISAT *T*-score for the PBL group ( $n = 54$ ) was 55 ( $SD = 4.8$ ). ISAT *T*-scores from this group ranged from 43 to 63. The mean ISAT *T*-score for the TGL group ( $n = 56$ ) was 53 ( $SD = 5.7$ ). The *T*-scores for the TGL group ranged from 40 to 70. The mean ISAT *T*-score for the sample ( $n = 110$ ) was 53.9 ( $SD = 5.3$ ).

Table 6

*Seventh Grade Reading ISAT T-Scores by Instructional Strategy*

ISAT T Score	<i>n</i>	Mean	<i>SD</i>	Min-Max
PBL	54	55.0	4.8	43 – 63
TGL	56	53.0	5.7	40 – 70
Sample	110	53.9	5.3	40 – 70

The Illinois Board of Education (ISBE) labels ISAT scores using four descriptors to include; academic warning, below standards, meets standards, and exceeds standards (see Table 7). Sixty nine percent ( $n = 76$ ) of the students in the sample were categorized as meeting state reading standards. Whereas 26% ( $n = 29$ ) of the students in the sample were categorized as exceeding the state reading standards. The remainder of the sample, 5% ( $n = 5$ ), were categorized as below state reading standards. None of the students fell into the academic warning category. This is due to the magnet school requirement that the 7<sup>th</sup> grade composite score (math, science, reading) meets state standards for consideration for admission into the school.

Table 7

*Achievement Descriptors of Reading ISAT T-Scores by Instructional Strategy*

Descriptor	PBL ( $n = 54$ )		TGL ( $n = 56$ )		Sample ( $n = 110$ )	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Below Standards (40 – 43)	1	1.9	4	7.1	5	4.5
Meets Standards (50 – 56)	33	61.1	43	76.8	76	69.1
Exceeds Standards (60 – 70)	20	37.0	9	16.1	29	26.4
Total	54	100.0	56	100.0	110	100.0

Table 7 also displays a summary of the two groups' reading *T*-scores by academic descriptor. The majority of the students in the PBL group (61%,  $n = 33$ ) were categorized as meeting the reading state standards. Thirty seven percent ( $n = 20$ ) were categorized as exceeding state standards and 2% ( $n = 1$ ) categorized as below state standards in reading. Likewise, the majority of the students in the TGL group (77%,  $n = 43$ ) were categorized as meeting the reading state standards. Whereas 16% ( $n = 9$ ) exceeded state standards and 7% ( $n = 4$ ) fell below state standards in reading.

Prior knowledge was determined by the score on the leadership theory unit test (see Appendix B). The test was comprised of 50 multiple choice that were summated resulting in a possible score of 0 to 50. The Watson-Glaser Critical Thinking Appraisal<sup>®</sup>

(WGCTA) was used to measure the critical thinking ability of students. The appraisal was comprised of 40 items that were summated resulting in a possible score of 0 to 40. The prior knowledge unit test and critical thinking ability scores were summarized by instructional strategy and by sample (see Table 8). The mean sample score on the prior knowledge unit test was 21.0 ( $SD = 3.8$ ). The PBL group ( $n = 54$ ) mean score for the pretest was 21.4 ( $SD = 3.9$ ). The mean score for the TGL group ( $n = 56$ ) was 20.7 ( $SD = 3.7$ ). The mean sample score on the WGCTA<sup>®</sup> pretest was 20.9 ( $SD = 4.2$ ). The PBL group ( $n = 54$ ) mean score for the pretest was 21.0 ( $SD = 3.9$ ). The mean score for the TGL group ( $n = 56$ ) was 20.8 ( $SD = 4.4$ ).

Table 8

*Prior Knowledge and Critical Thinking Ability Scores by Instructional Strategy*

Group	<i>n</i>	Prior Knowledge Unit Test			WGCTA <sup>®</sup> Pretest		
		Mean	<i>SD</i>	Min-Max	Mean	<i>SD</i>	Min-Max
PBL	54	21.4	3.9	14-31	21.0	3.9	12-32
TGL	56	20.7	3.7	12-27	20.8	4.4	12-30
Total	110	21.5	3.9	12-31	20.9	4.2	12-32

The students' type of motivation to attend school was operationally defined by the score on the five subscales of student motivation as measured by the Academic Motivation Scale. Each subscale was measured using a summated 7-point Likert-type scale with 1 being *does not correspond at all* and 7 being *corresponds exactly*. The sample mean score for the intrinsic subscale was 4.6. The sample mean scores for the extrinsic subscales ranged from 5.7 to 6.2. Finally, the sample mean score for the

amotivation subscale was 2.5. Each group mean was similar to the sample means. Table 9 summarizes the mean score for each of the subscales by instructional strategy and for the sample.

Table 9

*Type of Motivation to Attend School by Instructional Strategy*

Motivational Subscale	PBL ( <i>n</i> = 54)		TGL ( <i>n</i> = 56)		Sample ( <i>n</i> = 110)	
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>
Intrinsic	4.5	0.9	4.7	0.9	4.6	0.9
Extrinsic – identified regulation	5.7	0.9	5.9	1.0	5.8	1.0
Extrinsic – external regulation	6.2	0.8	6.1	0.9	6.2	0.9
Extrinsic – introjected regulation	5.7	1.2	5.7	1.1	5.7	1.2
Amotivation	2.4	1.5	2.6	1.6	2.5	1.5

*Note.* The ratings are as follows: 1 = Does not correspond at all, 2-3 = Corresponds a little, 4 = Corresponds moderately, 5-6 = Corresponds a lot, and 7 = Corresponds exactly.

The influences on the student’s decision to attend CHSAS, their satisfaction with that decision, and their effort in participating in the study was operationally measured using a 7-point Likert-type scale with 1 being *does not correspond at all* and 7 being *corresponds exactly*. Table 10 summarizes the influences on students’ decision to attend CHSAS, satisfaction with that decision, and perceived effort during the study by instructional strategy and sample. The sample (*n* = 110) of students reported self decision (*M* = 4.9, *SD* = 1.9) as the strongest influence in the decision to attend CHSAS followed

by family decision ( $M = 4.2$ ,  $SD = 2.1$ ). The sample of students reported mothers having a slight influence ( $M = 3.6$ ,  $SD = 2.2$ ) and fathers having little influence ( $M = 3.0$ ,  $SD = 2.2$ ) on decision to attend CHSAS.

Table 10

*Influences in the Decision to Attend CHSAS, Satisfaction with the Decision, and Perceived Effort during the Study*

Influence	PBL ( $n = 54$ )		TGL ( $n = 56$ )		Sample ( $n = 110$ )	
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>
Mother	3.5	2.3	3.7	2.1	3.6	2.2
Father	3.0	2.3	3.0	2.0	3.0	2.1
Self	4.8	2.1	5.0	1.6	4.9	1.9
Family Decision	3.9	2.0	4.5	2.0	4.2	2.1
Satisfaction prior to first day	4.7	2.1	4.7	2.1	4.7	2.1
Satisfaction after three months	5.1	2.1	4.3	2.3	4.7	2.3
Effort	5.1	1.5	5.6	1.0	5.4	1.3

*Note.* The ratings are as follows: 1 = Does not correspond at all, 2-3 = Corresponds a little, 4 = Corresponds moderately, 5-6 = Corresponds a lot, and 7 = Corresponds exactly.

Both groups reported that prior to the first day of class, they were moderately satisfied with the decision to go to CHSAS ( $M = 4.7$ ,  $SD = 2.1$ ). Students satisfaction overall remained the same after three month ( $M = 4.7$ ,  $SD = 2.3$ ). However, the PBL group's satisfaction with their decision to attend CHSAS increased ( $M = 5.1$ ,  $SD = 2.1$ ),

while the TGL group's satisfaction decreased ( $M = 4.3$ ,  $SD = 2.3$ ). Students also reported putting a high amount of effort ( $M = 5.4$ ,  $SD = 1.3$ ) into the study with the TGL group reporting a slightly higher mean score (see Table 10).

### **Objective Two**

Research objective two sought to determine the relationships between factors influencing perceived autonomy support (influences in the decision to attend CHSAS) and the outcomes of self-determination (type of motivation to attend school, satisfaction with decision to attend CHSAS, and perceived effort during the study). There were significant relationships between the factors influencing autonomy support and outcomes of self-determination (see Table 11). Self-selection to attend CHSAS and intrinsic motivation ( $r = .39$ ,  $p < .05$ ) had a low and positive relationship and self-selection and introjected regulation ( $r = .26$ ,  $p < .05$ ) had a moderate and positive relationship. There also existed a moderate and positive relationship between self selection and satisfaction before school began ( $r = .45$ ,  $p < .05$ ) and a low and positive relationship between self-selection and satisfaction after three months ( $r = .29$ ,  $p < .05$ ).

There was a low and positive relationship between family decision and external regulation ( $r = .21$ ,  $p < .05$ ) and a moderate and positive relationship between family decision and intrinsic motivation ( $r = .31$ ,  $p < .05$ ). Family decision had a moderate and positive relationship ( $r = .38$ ,  $p < .05$ ) and mother's decision had a low and negative relationship ( $r = -.22$ ,  $p < .05$ ) with satisfaction with the decision to attend CHSAS before school began. Amotivation had moderate and positive relationships with mother's choice ( $r = .35$ ,  $p < .05$ ) as well as father's choice ( $r = .42$ ,  $p < .05$ ) to attend CHSAS. Finally,

there was a low and negative relationship ( $r = -.24, p < .05$ ) between father's choice to attend CHSAS and perceived effort during the study.

Table 11

*Pearson Product-Moment Correlation between Factors Influencing Perceived Autonomy Support and Outcomes of Self-Determination (n = 110)*

Outcome	Self	Family	Mother	Father
Intrinsic	.39*	.31*	-.13	.03
Identified	.11	.14	-.03	-.08
Introjected	.26*	.17	.02	.00
External	.05	.21*	.07	.00
Amotivation	.00	.01	.35*	.42*
Satisfaction Before School Began	.45*	.38*	-.22*	-.08
Satisfaction Three Months Later	.29*	-.04	-.17	-.10
Perceived Effort	.06	.07	-.11	-.24*

\* $p < .05$

There were significant relationships among the influences in the motivation to attend school, the satisfaction with the decision to attend CHSAS, and the perceived effort during the study (see Table 12). There were low and positive relationships between intrinsic motivation and satisfaction before school began ( $r = .20, p < .05$ ) and three months later ( $r = .23, p < .05$ ). There was a moderate and positive relationship between

intrinsic motivation and perceived effort during the study ( $r = .33, p < .05$ ). There were also moderate and positive relationships between perceived effort during the study and identified regulation ( $r = .38, p < .05$ ) and perceived effort and introjected regulation ( $r = .42, p < .05$ ). Finally, there was a low and positive relationship between perceived effort during the study and external regulation ( $r = .20, p < .05$ ) as well as a moderate and negative relationship between amotivation and perceived effort ( $r = -.46, p < .05$ ).

Table 12

*Pearson Product-Moment Correlation among Outcomes of Self-Determination (n = 110)*

Outcome	Satisfaction Before	Satisfaction Later	Perceived Effort
Intrinsic	.20*	.23*	.33*
Identified	-.10	.03	.38*
Introjected	.00	.15	.42*
External	-.06	-.02	.20*
Amotivation	.01	-.14	-.46*

\* $p < .05$

### Objective Three

Research objective three sought to describe insights from student and teacher reflections about the PBL instructional strategy. The students in the PBL group and teacher were asked to provide a written reflection of the experience. Only the students from the PBL group were asked to do the reflection because they received the treatment. These students had received instruction using TGL (traditional method) and PBL instructional strategies. However the students in the TGL group had never received instruction using PBL and therefore could not reflect on both methods. The teacher was

instructed to guide the reflection focusing on four points: 1) Student preference; 2) Aid with preparing for tests; 3) Use of higher-order thinking; and 4) Positive and challenging things about the PBL method. The instructor created a total of six questions using the four key points (see Appendix J). The following tables (see Tables 13 - 16) are summaries of the written reflections by students in the PBL group ( $n = 51$ ). The tables include the students' responses and a compilation of the reasoning for their responses.

Table 13

*Question One: Instructional Strategy Preference for Day-to-Day Learning*

PBL ( $n = 12$ )	TGL ( $n = 36$ )
Like to work in groups <sup>a</sup>	Prefer to work alone <sup>a</sup>
Like to figure things out	It's easier to understand material <sup>a</sup>
Allows you to hear others' ideas	Don't have to rely on others (partners or groups) <sup>a</sup>
More fun	Allows me to focus more
Allows you to build a skill	More help from the teacher
Interesting way to learn	It's more challenging
	Not as much work as PBL
	Like to learn out of books and text
	Allows me to absorb more information
	Teacher is allowed to go over subject until students "get it"
	Allows me to think deeper

*Note.* Three students preferred both.

<sup>a</sup>Indicates a frequent response.

Table 14

*Question Two: Instructional Strategy That Better Prepared Students for the Test*

PBL ( <i>n</i> = 9)	TGL ( <i>n</i> = 18)
Your group can help you with information you can't understand <sup>a</sup>	Don't have to rely on others <sup>a</sup>
Information was not in a book	Notes are better
Had to rely on group	Allows you to learn information needed for test
Allow you to talk and learn more about subject	No interruptions
Allows you to teach each other the material that is going to be on the test	Allow you to retain information better
	You can set your own time frames to study
	You have better notes to study from
	Allows you to learn on your own

*Note.* This question was misinterpreted by a majority of the students due to the prompt given.

<sup>a</sup>Indicates a frequent response.

Table 15

*Question Three: Instructional Strategy That Encouraged Student to Think Deeper*

PBL ( <i>n</i> = 38)	TGL ( <i>n</i> = 11)
Requires more work, you have to work through the problem to get an answer <sup>a</sup>	I'm trying to solve a specific problem instead of several problems
You have to give your opinions and listen to others' opinions <sup>a</sup>	More information to cover and learn
Causes more in-depth thinking <sup>a</sup>	Easier to understand
Questions that are asked are never yes or no	I think better independently
You have to challenge the other people in your group	I learn better with worksheets and review questions
You truly need to think to understand what your group members are trying to get across	
You get little clues and have to figure it out on your own	
It's us looking for the answers	

*Note.* Two reported both strategies make them think equally.

<sup>a</sup>Indicates a frequent response.

Table 16

*Questions Four & Five: Advantages and Challenges of the PBL Instructional Strategy*

Advantages	Challenges
Allowed you to observe others' ways of thinking <sup>a</sup>	Having to work in a group <sup>a</sup>
Allows you to work with a group <sup>a</sup>	People in group not pulling their weight <sup>a</sup>
Allowed people who are less social to become more open and outgoing	You have to get into it
It makes you think	You don't know if you are right or wrong
It forces you to solve other problems before finding the answer to the first problem	You argue about who is right and who is wrong
Not having to sit and listen to a teacher talk	Everything
Breaks up the work	It takes longer
Lots of fun	I didn't understand it
Lots of discussion	Not having an answer for the problem
More independence	More work required
Learning more about the people in my group	The assignments we had to do
Very challenging	Not enough structure
Helps you learn leadership skills	Trying to get everyone's thoughts down without making their ideas unworthy or unimportant
Helps you be more responsible	Confusing
Allows you to hear other opinions	
Can be used on real-life situations	

<sup>a</sup>Indicates a frequent response.

Table 16 *cont.*

*Questions Four & Five: Advantages and Challenges of the PBL Instructional Strategy*

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Advantages	Challenges
I get to express my own opinions	
It shows you what your goal is	
Allowed everyone to have input	
Makes you think deeper	
More understanding	
You can break it down	
Less work	
Independence	
Caused me to be more helpful	
Allows you to see other points of view	
Learn how to work with other people	
Allow you to learn how to look beyond just the questions and answers	

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Question six asked student to report if they would like to study more topics using the PBL instructional strategy. Twenty-two students reported “Yes”, nineteen students reported “No”, and ten students were indifferent. The students who reported no stated that the method made it too hard to comprehend what was going on because the students had to rely heavily on other students in their group for information. One student reported

the process took too much time before a resolution was established and therefore slowed down the learning process. That individual thought that being given the information by the teacher was more efficient.

The instructor wrote her reflection concerning both groups in narrative form. The instructor's observations throughout the study are located in Appendix K. The instructor's narrative is as follows:

This was my first experience in participating in a research study in the classroom. In the past, I have always tried to keep all class periods on the same schedule, so it was very different for me to have two classes using teacher-guided learning and two using problem-based learning. From the beginning, I could see several positive reasons for doing the study, while I also had some concerns.

I was excited about this study because I wanted to see how freshmen in high school would react to problem-based learning. I was anxious to see if students in the problem-based learning classes would take on the responsibility and actually learn better than their peers in the teacher-guided classes. Furthermore, I was simply happy to have two "different" things to do because I knew it would make the day more interesting for me.

Trying to understand where the freshmen were coming from, I was concerned that using problem-based learning at the beginning of the year would be very scary for them. I was worried that a few might even rebel against the idea. (These concerns probably stemmed from observing my peers' reactions to problem-based learning during my own college experience). After reading

through the text, I also felt apprehensive about whether or not freshmen could digest, understand, and use the information presented.

I taught the teacher-guided classes in a very traditional, typical fashion. The class began with a preview/review, followed by notes, an application activity (sometimes in a group), and then an individual homework assignment. Based on results from the above undertakings, I have developed some conclusions.

Students were intimidated by the content of the notes. They felt that the language and concepts were above their heads. I didn't see many students rising to the challenge of understanding. Instead, I reviewed concepts/terms/diagrams and continued to break them down until students seemed to understand. I personally felt defeated by this because it seemed like the students were always confused no matter what I did or how clear I tried to present the info. Finally, with the situational approach, a breakthrough occurred, but it was back to confusion with the final theory. By the time we reviewed for the test, I felt as if students were beginning to understand, or at least memorize, the basics of each theory. Going into the test, I felt fairly confident that I'd done everything in my ability to prepare them. The scores were lower than I expected and I was left wondering whether to blame my teaching ability or the difficulty of the material.

Before beginning the case study with the problem-based learning classes, I spent a lot of time explaining exactly what problem-based learning is and what it is not. To my great relief, very few students seemed intimidated by the process and no one openly rebelled. Although they had difficulty understanding the material and working through their investigation questions, the great majority of

students put a lot of effort into researching their objective. I was very pleased to see so many students taking their role on their team seriously. Unfortunately, some students in each class did not put forth the effort and nothing seemed to motivate them. I was very careful not to use threats in this situation. I am still unclear as to whether they perceived the research as too difficult and therefore didn't try, or whether they were simply unmotivated and didn't care. Overall, most students developed reasonable learning objective reports and taught their objective to the rest of their group. Some groups initially did not understand that their resolution should be based on the theories, but after I clarified, their work went on smoothly. Throughout the study, I tried to remain very conscious of my role as facilitator and not step over boundaries. The students seemed to appreciate that I was not feeding them the information.

As far as the test was concerned, I personally believe that a multiple-choice test is better suited to measure concepts learned during teacher-guided learning. I think the TGL group was better prepared for the test because I tried to teach them the facts of each theory in a very ordered and systematic way. I also looked at the test questions every time we finished a theory. If I found a test question that I hadn't emphasized enough, I went over that particular concept with them again. Before the test, I gave them a review sheet that thoroughly covered each theory; we reviewed together as a whole class, etc. I basically emphasized knowing the facts of each theory.

In the problem-based learning classes, I was pleased that the students interacted so well and learned so much about their own objective. I'm saying the

PBL group probably understood their particular theories better because they really had to dig into the reading. The questions for each learning objective helped to guide them in using higher-order thinking skills. Whereas with the TGL, I just pulled out the important stuff and went through the PowerPoints<sup>®</sup>. Because the students in the PBL group had to spend a large amount of time focusing on their topic, I think they probably learned their assigned theory better than anyone in the TGL group learned any theory. I'm making that statement based on the learning objective reports I received from the PBL group. However, when it came to "teaching" objectives to the rest of the group, I think most people felt uneasy because of the difficulty of the content (this is based on conversations I had with the groups). Most people did not feel confident that they had completely learned the other objectives, but they were very confident in what they knew about their own objective. Although students had trouble understanding the theories that they had not individually researched, each group was able to put together a satisfactory resolution. In my mind, their resolution was more important than their test scores.

In conclusion, I enjoyed my involvement with the study. I learned a great deal about how methods/theories translate into actual practice. It was interesting for me to compare my role during the teacher-guided learning classes with my role during the problem-based learning classes. I think the PBL students learned more content about their objective, specifically, but I tend to think that TGL group learned more content overall--at a more shallow level. I would also assume (based on everything I've said above) that the PBL students would retain the knowledge they learned about their particular objective better than anyone else in

any section. From my perspective, the students in the PBL classes benefited in ways that cannot be accomplished with traditional teaching methods.

### Objective Four

Research objective four sought to determine the variables that best account for variance in academic performance on the leadership theory test. Those variables were then used to test the null hypothesis that prior leadership theory knowledge, reading aptitude, and perceived autonomy support were correlated with academic performance on the leadership theory test. Table 17 shows the Pearson product-moment correlations for these variables. Self selection to attend CHSAS was not significant and therefore removed from the multiple regression model. All other factors had a moderate and positive relationship with performance on the knowledge acquisition test.

Table 17

*Means, Standard Deviations, Ranges, and Pearson Product-Moment Correlations for Knowledge Acquisition Score and selected variables (prior content knowledge, aptitude, self and family decision to attend CHSAS) (n = 110)*

Variable	<i>M</i>	<i>SD</i>	Range	2	3	4	5
1. Knowledge	26.3	5.7	11-39	.36*	.33*	.31*	.01
2. Prior Knowledge	21.1	3.8	12-31	-	.19*	.10	.06
3. Aptitude	53.9	5.3	40-70		-	.09	.01
4. Family Decision	4.2	2.1	1-7			-	.28*
5. Self	4.9	1.9	1-7				-

\* $p < .05$

### *Research Hypothesis One*

Research hypothesis one was students' prior leadership theory knowledge, academic aptitude, and perceived autonomy support will account for statistically significant variance in academic performance on the leadership theory test.

$$\begin{aligned} H_0: R^2_{1,2,3} &= 0 \\ H_1: R^2_{1,2,3} &\neq 0 \end{aligned}$$

Simultaneous multiple regression analysis was used to examine how well prior leadership theory knowledge (pretest), academic aptitude (Reading ISAT *T*-score), and perceived autonomy support (family decision to attend CHSAS) would account for statistically significant variance in students' achievement on the knowledge test. The three identified variables accounted for approximately 24% of the variance in achievement ( $R^2_{\text{adj}} = .24$ ),  $F(3, 106) = 12.71$ ,  $p < .05$ . Prior leadership knowledge was a significant predictor of achievement,  $t(106) = 3.32$ ,  $p < .05$ , which accounted for 10% of the variance in achievement not accounted for by the other variables ( $pr = .31$ ) and uniquely accounted for 8% of the variance in achievement ( $sr = .28$ ). Family decision was a significant predictor of achievement,  $t(106) = 3.09$ ,  $p < .05$ , which accounted for 8% of the variance in achievement not accounted for by the other variables ( $pr = .29$ ) and uniquely accounted for 7% of the variance in achievement ( $sr = .26$ ). Aptitude was a significant predictor of achievement,  $t(106) = 2.97$ ,  $p < .05$ , which accounted for 8% of the variance in achievement not accounted for by the other variables ( $pr = .28$ ) and uniquely accounted for 6% of the variance in achievement ( $sr = .25$ ). Therefore, the null hypothesis that the selected variables do not account for statistically significant variance in academic performance on the leadership theory test was rejected in favor of the research hypothesis.

## Objective Five

Research objective five was to compare the effect of instructional strategy (PBL & TGL) with regard to students' content knowledge and critical thinking ability. Analysis of covariance (ANCOVA) was used to test the null hypotheses of objective five. One of the key assumptions of ANCOVA is homogeneity of variance. Levene's test of equality of variance was used to determine that the assumption had been met. The differences of error variances were not significant for academic performance of the leadership theory test ( $F_{1, 108} = .05, p = .83$ ) nor critical thinking ability ( $F_{1, 108} = .64, p = .43$ ). The null hypotheses were accepted, therefore, meeting the assumption of homogeneity of variance.

### *Research Hypothesis Two*

Students taught using TGL will have a significantly higher knowledge score than students taught with PBL when accounting for autonomy and competence.

$$H_0: \mu_{TGL} = \mu_{PBL}$$

$$H_1: \mu_{TGL} > \mu_{PBL}$$

The null hypothesis was tested using ANCOVA to control for prior leadership theory knowledge (pretest), perceived autonomy support (family decision to attend CHSAS), and academic aptitude (reading ISAT *T*-score) (see Table 18). The mean test score between the two instructional strategies was significantly different ( $F_{1, 105} = 17.33, p < .05$ ) indicating there was a statistically significant difference in content knowledge when accounting for autonomy and competence (prior leadership theory knowledge, perceived autonomy support, and academic aptitude). Analyzing the mean averages (see Table 21) for the posttest indicated that the TGL group scored statistically higher than the PBL group. The null hypothesis stating that no difference existed between instructional

strategies on content knowledge scores was rejected in favor of the research hypothesis. The effect size for instructional strategy on content knowledge was  $d = 0.56$ . Cohen (1992) hesitantly suggested that a  $d$ -value between 0.50 and 0.79 is categorized as “medium.” The power for this comparison was .99.

Table 18

*Analysis of Covariance (ANCOVA) in Knowledge Acquisition by Instructional Strategy*

Source	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i> -value
Instructional Strategy	364.67	1	364.67	17.33	.01*
Reading ISAT	322.77	1	322.77	15.34	.01*
Prior Knowledge	319.35	1	319.35	15.18	.01*
Family Decision	139.09	1	139.09	6.61	.01*
Error	2209.30	105			

*Note.* Adjusted *R* Squared = .35

\*  $p < .05$

### *Research Hypothesis Three*

Research hypothesis was students taught using PBL will demonstrate greater critical thinking ability than students with TGL when accounting for critical thinking ability prior to treatment.

$$H_0: \mu_{PBL} = \mu_{TGL}$$

$$H_1: \mu_{PBL} > \mu_{TGL}$$

The null hypothesis was tested using ANCOVA to control for critical thinking ability prior to treatment (see Table 19). The mean critical thinking score between the two instructional strategies was not significant ( $F_{1, 107} = .04, p > .05$ ) indicating there was not a statistically significant difference in critical thinking ability when accounting for critical thinking ability prior to the treatment. The null hypothesis stating that no difference existed between instructional strategies on critical thinking ability scores was accepted.

Table 19

#### *Analysis of Covariance (ANCOVA) in Critical Thinking Ability by Instructional Strategy*

Source	Sum of Squares	df	Mean Square	F	p-value
Instructional Strategy	.58	1	.58	.04	.84
WGCTA <sup>®</sup> Pretest	352.90	1	352.90	24.13	.01*
Error	1565.06	107			

*Note.* Adjusted R Squared = .17

\*  $p < .05$

## Objective Six

Research objective seven sought to compare the level of retention of content by instructional strategy. Analysis of covariance (ANCOVA) was used to test the null hypothesis of objective seven. The difference in score between posttest and follow-up posttest (3 months) was used to measure retention. The differences of error variances, according to Levene's test of equality of variance, were not significant for content retention ( $F_{1, 108} = 0.72, p > .05$ ). The null hypothesis was accepted, therefore, meeting the assumption of homogeneity of variance.

### *Research Hypothesis Four*

Research hypothesis four was students taught using PBL will retain more content than students taught using TGL as measured by the follow-up content knowledge test when accounting for autonomy and competence.

$$\begin{aligned} H_0: \mu_{PBL} &= \mu_{TGL} \\ H_1: \Delta\mu_{PBL} &< \Delta\mu_{TGL} \end{aligned}$$

The null hypothesis was tested using ANCOVA to control for autonomy and competence (prior leadership theory knowledge, autonomy support, and academic aptitude) (see Table 20). The mean difference in posttest scores between the two instructional strategies was significant ( $F_{1, 105} = 7.75, p < .05$ ), indicating there was a statistically significant difference in the amount of information retained when accounting for academic aptitude. Analyzing the differences in mean posttest scores, the PBL group mean score dropped by 2 points ( $M = -2.1, SD = 4.5$ ) and the TGL group mean score dropped by 5 points ( $M = -4.7, SD = 5.9$ ) (see Table 21). This indicates that the TGL group had a significant higher drop in mean score in comparison to the PBL group. The null hypothesis stating that no statistically significant difference existed between the two

groups change in content knowledge scores after treatment was rejected in favor of the research hypothesis. There was a medium effect size for instructional strategy on retention of content knowledge with Cohen's  $d = 0.5$ . The power for this comparison was .79.

Table 20

*Analysis of Covariance (ANCOVA) in Retention of Knowledge by Instructional Strategy*

Source	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i> -value
Instructional Strategy	187.57	1	187.57	7.75	.01*
Family Decision	208.67	1	208.67	8.62	.01*
Aptitude	114.80	1	114.80	4.74	.03*
Prior Knowledge	21.14	1	21.14	0.87	.35
Error	2542.60	105			

*Note.* Adjusted *R* Squared = .16

\*  $p < .05$

Analyzing the means for each posttest by instructional strategy provides some clarification of the results of the ANCOVA. Table 21 summarizes both posttest means by instructional strategy. The knowledge acquisition test indicated a significant difference  $t(108) = 2.93, p < .05$  in the two groups' mean scores with the TGL group scoring higher. However, the knowledge retention test indicated no statistically significant difference  $t(108) = 0.56, p > .05$  between the two groups' knowledge acquisition mean scores. There was also a significant difference in the means from the knowledge acquisition test to the

knowledge retention test in both the PBL group [ $t(53) = 3.37, p < .05$ ] and the TGL group [ $t(55) = 5.98, p < .05$ ].

Table 21

*Comparison of Knowledge Acquisition Test and Knowledge Retention Test Mean Scores by Instructional Strategy*

Measurement	PBL ( $n = 54$ )		TGL ( $n = 56$ )		Sample ( $n = 110$ )
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>p</i> -value
Acquisition Test	24.8	5.1	27.8	5.7	.01*
Retention Test	22.7	4.3	23.1	4.2	.58
Retention Score	-2.1	4.5	-4.7	5.9	.01*

\*  $p < .05$

## **CHAPTER V**

### **SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS**

#### **Purpose of the Study**

The purpose of this study was three-fold: to determine the effectiveness of instructional strategies on improving the acquisition and retention of leadership content by secondary students in urban agriculture programs; to examine the motivational profile of students who have elected to enroll in an urban agricultural program; and to examine the effect of instructional strategies (problem-based learning and teacher-guided learning) on critical thinking ability which includes the ability to manage resources, acquire and use information, and understand complex systems. The following objectives and hypotheses guided this study.

#### **Objectives and Hypotheses**

1. Describe subjects on gender and motivational profile (academic aptitude, prior leadership theory knowledge and critical thinking ability, type of motivation to attend school, influences in the decision to attend CHSAS, satisfaction with the decision to attend CHSAS, and perceived effort during the study).
2. Determine the relationships between factors influencing perceived autonomy support (influences in the decision to attend CHSAS) and the outcomes of self-determination (type of motivation to attend school, satisfaction with decision to attend CHSAS, and perceived effort during the study).
3. Describe insights from student and teacher reflections about the PBL instructional strategy.
4. Determine the variables that best account for variance in knowledge acquisition test scores.

H<sub>1</sub>: Students' prior leadership theory knowledge, academic aptitude, and perceived autonomy support will account for statistically significant variance in academic performance on knowledge test.

5. Compare the effect of instructional strategy (Problem-Based Learning and Teacher-Guided Learning) with regard to students' knowledge acquisition and critical thinking ability.

H<sub>2</sub>: Students taught using the TGL instructional strategy will have a statistically higher mean score on the knowledge acquisition test than students taught using the PBL instructional strategy when accounting for prior knowledge, academic aptitude, and perceived autonomy support.

H<sub>3</sub>: Students taught using PBL will demonstrate greater critical thinking ability than students with TGL when accounting for prior critical thinking ability.

6. Compare the level of knowledge retention by instructional strategy.

H<sub>4</sub>: Students taught using PBL will retain more content than students taught using TGL as measured by the knowledge retention score when accounting for prior knowledge, academic aptitude, and perceived autonomy support.

### **Limitations of the Study**

Participants in the study had little to no prior experience with the Problem-Based Learning instructional strategy creating a steep learning curve for this method. In addition, the original content was created for the use in post-secondary leadership courses. Although appropriate steps were taken to revise it for use on the secondary level, the content may be difficult for younger students. However, for the purpose of research, it is important to look at the trend with younger students and not their actual scores.

### **Research Design**

This study employed an experimental, pretest-posttest control group design. The participants for this study were chosen among thousands of student applicants to attend the agricultural magnet school used. Students were then randomly placed into four sections of an agricultural careers and leadership course by the school. Standardized reading scores were used to confirm homogeneity between groups. The four groups were then randomly assigned to either the treatment or the control.

## Population and Sample

The target population for this study was secondary students enrolled in urban agriculture programs with primary minority population (60% or more). The accessible population was students attending the Chicago High School for Agricultural Sciences ( $N = 592$ ) located in urban Chicago, Illinois and is a magnet school in the Chicago Public School District ( $N = 109,982$ ). Approximately 89% of the students enrolled in the Chicago Public School District are Non-White or Asian/Pacific Islander with 86% categorized as low income. The Chicago High School for Agricultural Sciences (CHSAS) has approximately 67% of the students enrolled identified as Non-White or Asian/Pacific Islander with 47% categorized as low income (Chicago Public Schools, 2007).

However, the Chicago High School for Agricultural Sciences was selected because it has the largest accessible number of agriculture students that are randomly selected to attend the school. From a pool of approximately 1500 students from around the Chicago area, approximately 140 students are selected. Students come from various school structures (public, private, home schooling) and various social economic status levels. The sample, comprised of freshmen students enrolled in the Agricultural Careers and Leadership course ( $n = 110$ ), was selected for this study for two primary reasons: 1) they are the group that is randomly placed into classes; and 2) they have limited formal education in leadership development, and they all take an agricultural careers and leadership class. Another reason freshmen were selected was because of the instructor. The instructor of the leadership class was very familiar with facilitating the PBL strategy. A fifth section of freshmen students were not included in the study because they were instructed by another teacher which could bring a confounding factor into this study.

## **Instrumentation**

Six measurement instruments were used to collect data to address the purpose and research objectives of this study. Knowledge acquisition and retention was determined by a score on the leadership education paper-pencil test with three data collection points. Students' critical thinking ability was operationalized as a performance score on the Watson-Glaser Critical Thinking Appraisal<sup>®</sup> (Form S), as well as instructor observations and student reflections from participants in the treatment (PBL) group. Students' motivational profile, purported to be a predictor of academic achievement, was measured using the Academic Motivation Scale – High School Version. Students' gender and 7<sup>th</sup> grade reading aptitude stanine was reported by the instructor on the score report form.

## **Data Collection**

The prior knowledge unit test and the WGCTA<sup>®</sup> were administered prior to the commencement of the leadership lessons. Similarly, the knowledge acquisition unit test and the WGCTA<sup>®</sup> were administered following the final day of instruction. Both the prior knowledge unit tests and the knowledge acquisition unit tests were scored by the instructor and placed on the report forms along with the students' gender and reading aptitude stanine. The instructor assigned a study number to each participant and used the number to correspond each student's scores and data. The report forms for each class and the WGCTA<sup>®</sup> test booklets and answer sheets were returned by postal mail to the researcher at the conclusion of the intervention.

During the intervention, the instructor kept written observations of each class. In addition, the students from the PBL group were asked to reflect on their experience by providing written responses to reflection questions. Finally, the knowledge retention unit

test was administered along with the Academic Motivation Scale three months after the intervention was conducted. The researcher was present at this time of the final collection and gathered the data along with the teacher's observations and reflection, and the students' reflections.

### **Data Analysis**

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 14.0 computer program for windows. The alpha level was established *a priori* at .05 for tests of significance. The magnitude of all significant correlations was described using Davis' convention. Furthermore, the effect size of all significant ANCOVA tests was determined using Cohen's *d*. Research objectives one was analyzed using descriptive statistics. Research objective two was analyzed using Pearson's product-moment correlations. Research objective three was analyzed for central themes and reported accordingly. Research objective four was completed using a simultaneous general linear regression model. The factors used were based on motivational theory and confirmed using Pearson's product-moment correlations. Research objective five was completed using an analysis of covariance. The hypothesis on content knowledge was tested by controlling for prior knowledge, academic aptitude, and perceived autonomy support. The hypothesis on critical thinking was tested while controlling for prior critical thinking ability. Finally, research objective six was completed using analysis of covariance on content knowledge retention scores while controlling for prior leadership theory knowledge, academic aptitude, and perceived autonomy support.

## Summary of Findings

### *Objective One*

Data from 110 freshmen were used in the study. The majority of the students in the sample were female (56%). In group one, consisting of the PBL treatment group, 67% were female. In group two, consisting of the control group (TGL), 46% were female. The motivational profile was operationally defined as personal factors associated with self-determination either as influences or outcomes. One of the influences, academic aptitude, was operationally defined as the *T*-score on the reading portion of the Illinois Standards Achievement Test (ISAT) which was administered in the 7<sup>th</sup> grade. The mean ISAT *T*-score for the PBL & TGL groups were 55 & 53 respectively. According to the Illinois Board of Education (ISBE) descriptors, 69% of the students in the sample were categorized as meeting state reading standards. Only 5 % of the students in the sample were categorized as below state reading standards. None of the students fell into the academic warning category. This is due to the magnet school requirement that the 7<sup>th</sup> grade composite score (math, science, reading) meets state standards for consideration for admission into the school.

Another influence in the motivational profile was prior knowledge and critical thinking ability. Knowledge was determined by the score on the 50 item leadership theory unit test. The mean sample score on the prior knowledge unit test was 21.0. The PBL and TGL group mean scores were similar to the sample mean score. The 40 item Watson-Glaser Critical Thinking Appraisal<sup>®</sup> (WGCTA) was used to measure the critical thinking ability of students. The mean sample score on the WGCTA<sup>®</sup> prior to treatment was 20.9. Both groups were similar to the sample mean score.

The final influence in self determination was the influence for students' decision to attend CHSAS. This perceived measure of autonomy support was operationally measured using a 7-point Likert-type scale with 1 being *does not correspond at all* and 7 being *corresponds exactly*. The sample reported self selection as the strongest influence in the decision to attend CHSAS followed by family decision. Students in the sample reported mothers having a slight influence and fathers having little influence on decision to attend CHSAS.

Personal factors that were outcomes of self-determination were the students' motivation to attend school, satisfaction with the decision to attend CHSAS, and perceived effort during the study. These factors were operationally measured using a 7-point Likert-type scale with 1 being *does not correspond at all* and 7 being *corresponds exactly*. The sample mean score for the intrinsic subscale was from 4.6. The sample mean score for the extrinsic subscales ranged from 5.7 to 6.2. Finally, the sample mean score for the amotivation subscale was 2.5. Each group mean was similar to the sample means. The sample reported highly moderate satisfaction with their decision to attend CHSAS with a mean score of 4.7. The sample also reported putting a highly moderate amount of effort into the study with a mean score of 5.3.

### *Objective Two*

Conducting a correlation between factors influencing perceived autonomy support and outcomes of self-determination yielded several significant relationships. Students who self-selected to attend CHSAS also indicated that intrinsic motivation as well as introjected regulation was the major motivation for attending school. Similarly, those students who reported that the decision to attend CHSAS was a family decision were also

more intrinsically motivated. However, they were externally regulated as well. Both groups were satisfied with their decision to attend CHSAS, although, students who self selected were more likely satisfied with their decision three months later. Students who reported their mother or father made the decision to go to CHSAS were more likely amotivated to attend school. There was a significant negative relationship between the decision being made by the mother and satisfaction with that decision before school started. There was also a significant negative relationship between the decision being made by the father and the perceived effort during the study.

Those students who were intrinsically motivated were more likely to be satisfied with the decision to attend CHSAS and therefore reported exerting more effort during the study. There was also a relationship between extrinsic motivation and perceived effort. Those students who were identified with introjected regulation had the strongest relationship and those who were externally regulated had the weakest relationship of the three extrinsic motivation subscales. Finally, in support of the literature, there was a significant negative relationship between amotivation and effort.

### *Objective Three*

Students in the PBL group and teacher were asked to provide a written reflection of the experience. Only students from the PBL group were asked to do the reflection because they received the treatment. Fifty-one students participated in the reflection component. When asked about their preference of instructional strategy with day-to-day learning, a majority of the students preferred TGL. The most common reason for preferring as well as not preferring the PBL method was the amount of group work required.

Students were also asked to reflect on which instructional strategy would better assist them when preparing for a test. The question contained a prompt that was misinterpreted by more than one-third of the students (see Appendix J). Usable data was collected by 27 students. Eighteen students responded that the TGL strategy better prepared them because they didn't have to rely on their peers for information. Those students who chose PBL as the better strategy for test preparation reported group members' help with understanding difficult concepts as the most common reason.

When asked which strategy would require them to think deeper, the majority of the students selected PBL. The most common student responses were that it required more work and forced students to think through the problem, group members had to give their opinion as well as listen to others opinions, and it required more in-depth thinking to answer questions beyond yes or no. Some of the reasons the TGL strategy was selected was because the teacher could cover more information, information is easier to understand, and students can focus on one concept at a time instead of several.

Students reported that positive things about PBL were that it allowed them to observe other ways of thinking, allows them to work in groups, allows people who are less social to become more open and meet people, can be used in real-life situations, and makes you think deeper and get a better understanding. Students reported that frustrating things about PBL were that they had to work in groups with people not pulling their weight, they didn't know if they were right or wrong, takes longer to learn information, not enough structure in the groups, and the process was confusing. In addition, when asked whether or not they would like to study more topics with PBL a majority of the students stated yes or were indifferent. The reason why students would not like to learn

using PBL again was because they had to rely too much on other students for information, the process was confusing, and learning took too long.

The instructor wrote a reflection concerning the entire process and her observations concerning content acquisition and retention as well as improvement in critical thinking ability. Her thoughts can best be summarized using her concluding paragraph.

In conclusion, I enjoyed my involvement with the study. I learned a great deal about how methods/theories translate into actual practice. It was interesting for me to compare my role during the teacher-guided learning classes with my role during the problem-based learning classes. I think the PBL students learned more content about their objective, specifically, but I tend to think that TGL group learned more content overall--at a more shallow level. I would also assume, based on everything I've said above [referring to her comments on the higher-ordered thinking skills employed by the students], that the PBL students would retain the knowledge they learned about their particular objective better than anyone else in any section. From my perspective, the students in the problem-based learning classes benefited in ways that cannot be accomplished with traditional teaching methods.

#### *Objective Four*

Guided by the literature (Ryan & Deci, 2002; Reeve & Jang, 2006), prior knowledge and reading aptitude (competence), self-selection and family decision to attend CHSAS (autonomy support) were correlated with the knowledge acquisition unit test. Self-selection was not significantly correlated to performance on the knowledge

acquisition test and therefore removed from the multiple regression model. All other factors had a strong positive correlation and were placed in the regression model.

The three identified variables (prior knowledge, academic aptitude, and perceived autonomy support) accounted for approximately 24% of the variance in performance on the knowledge acquisition unit test. Prior knowledge, family decision to attend CHSAS, and academic aptitude were all significant predictors of achievement and uniquely accounted for 8%, 7%, and 6% of the variance in performance on the knowledge acquisition unit test respectively. Therefore, the null hypothesis that the selected variables will not account for statistically significant variance in performance on the knowledge acquisition unit test was rejected in favor of the research hypothesis.

#### *Objective Five*

ANCOVA was used to test the null hypotheses of research objective five. The null hypothesis for content knowledge was tested controlling for prior knowledge and academic aptitude (competence), and family decision to attend CHSAS (perceived autonomy support). The mean test score between the two instructional strategies was significant, indicating there was a statistically significant difference in knowledge acquisition when accounting for competence and perceived autonomy support. Analyzing the mean averages for the posttest indicated that the TGL group scored statistically higher than the PBL group. The null hypothesis stating that no difference existed between groups on content knowledge scores was rejected in favor of the research hypothesis.

The null hypothesis for critical thinking ability was tested controlling for critical thinking ability prior to treatment. The mean critical thinking score between the two instructional strategies was not significant, indicating there was not a statistically

significant difference in critical thinking ability when accounting for critical thinking ability prior to treatment. The null hypothesis stating that no difference existed between groups on critical thinking ability scores was accepted.

#### *Objective Six*

ANCOVA was used to test the null hypothesis of research objective six. The difference in score between posttest and follow-up posttest (3 months) was used to obtain the knowledge retention score for each student. The null hypothesis for retention was tested controlling for competence and perceived autonomy support. The mean difference in retention scores between the two instructional strategies was significant, indicating there was a statistically significant difference in the amount of information retained when accounting for competence and perceived autonomy support. Analyzing the differences in mean retention scores, the PBL group mean score dropped by approximately 2 points and the TGL group mean score dropped by approximately 5 points. This indicates that the TGL group had a significantly higher drop in mean score in comparison to the PBL group. The null hypothesis stating that no statistically significant difference existed between the two groups change in knowledge scores after treatment was rejected in favor of the research hypothesis.

### **Conclusions, Implications, and Recommendations**

#### *Objective One*

Participants in this study were majority female and were categorized as meeting or above reading standards based on state-wide standardized assessment scores. According to the National Center for Educational Statistics (NCES), 54% of the student population at CHSAS is female. Similarly, 55% of the freshmen student population at

CHSAS is female. Also, both groups' prior knowledge of leadership theory and critical thinking ability mean scores were determined to be similar, validating the assumption of homogeneity of variance between groups. Therefore, it is concluded that this sample is representative of the gender distribution at CHSAS. In addition, according to the aforementioned competency measurements the participants were evenly distributed by ability as a result of random assignment to groups.

In terms of motivation to attend school, the sample was high in extrinsic motivation, averaging 6 on a 7-point scale for each of the three subscales. This was followed by a moderate range for intrinsic motivation, averaging 5 on a 7-point scale. Finally, the sample was low in amotivation, averaging 2 on a 7-point scale. The sample low rating in amotivation, stressed their desire to want to attend school and intent to learn. Although students did report a moderate level of intrinsic motivation, they were the strongest in extrinsic motivation, particularly in external and identified regulation. This can be interpreted as the students are most likely motivated to go to school because of outside inducements. This includes the potential for receiving scholarships, praise from teachers, making parents happy, and so forth.

When asked about influences in the decision to attend CHSAS, students reported self-selection as the strongest influence in their decision to attend CHSAS. This was followed by family decision, mother's decision, and father's decision respectively. This is promising because it indicates a level of perceived autonomy with choosing which high school to attend. Students who perceive autonomy support in educational decisions tend to be more engaged and persistent with difficult tasks related to those educational decisions (Reeve & Jang, 2006). The fact that the students perceive they had full

autonomy in the decision or was very influential in the family's decision indicates they more likely want to be there. This was validated by the findings that the students were satisfied with their decision to attend CHSAS.

There is a finding that should be highlighted in terms of the satisfaction with the decision to attend CHSAS. Both groups indicated moderately high satisfaction with the decision before school began, however, the PBL groups' satisfaction with the decision to attend CHSAS increased after the study was complete and the TGL groups' satisfaction decreased after the study. This confirms findings from the aforementioned studies that indicated students who participated in PBL were more satisfied with their educational experience than students who were taught using traditional methods.

In summary, CHSAS is a magnet school that emphasizes the agricultural and food sciences. The requirement to be considered for the school lottery is that the student must score a composite stanine of 5 or better on the 7<sup>th</sup> Grade Illinois Standardized Achievement Test. This entrance requirement narrows the pool of applicants to those who are at least meeting the state standards in two or more of the core areas. Although this sample does not accurately represent low-achieving students, it does represent the average to above average urban student who is college-bound. The sample also represents those who enroll in comprehensive urban agriculture programs, which are typically magnet programs as well. Based on this demographic information, the results of this study and following recommendations should be generalized, with caution, to urban students who are in a high minority educational environment and are meeting state academic standards.

*Recommendation One:*

The findings, implications, and recommendations for this study should be placed in a user-friendly format (e.g. trade magazine article, professional development workshop, listserv topic) and disseminated to agriculture teachers, particularly with urban populations for use in the classroom.

*Objective Two*

The relationships identified between factors influencing autonomous support and outcomes of self-determination supported the literature on self-determination. Students who self selected to attend CHSAS also indicated that intrinsic motivation as well as introjected regulation was the major motivation for attending school. This may be interpreted as some of these students self-selected to attend CHSAS because they had an intrinsic interest in learning about agriculture. The most common response for those students who had an intrinsic interest in agriculture was because they wanted to become a veterinarian. However, those who were identified with introjected regulation self-selected because they perceived it was the right thing to do.

There are many possible reasons why this occurred. Nonetheless, there are two common phenomena that may best explain this occurrence. First, according to Lucille Shaw, head of the agriculture department at CHSAS, there are a considerable number of students who have family members that attend or have attended the school and attending CHSAS may be a logical and sometimes convenient choice for the family. Secondly, CHSAS is located in a community where most local students attend parochial schools. Some of these students may have selected to attend CHSAS instead of one of the three

private high schools in the area because they perceived this as the best choice for alleviating some of the financial strain on the family.

In both instances the student made the choice, however, the choice was made not because of internal inducements but because it was perceived as the right thing to do. This relationship with introjected regulation may also explain why self-selection was not a significant predictor of performance on the knowledge acquisition unit test. Although the individual who is motivated by introjected regulation perceives this as an autonomous decision, it is very much driven by outside forces and thus does not lend itself to the outcomes of true self-determination.

In addition, students who reported that the decision to attend CHSAS was a family decision were also more intrinsically motivated as well as externally regulated. This may be because some students had an intrinsic interest in the school while others were motivated by outside inducements. These inducements could be a safe school environment, better educational resources, potential to receive scholarships for college, or incentives from the family.

Conversely, students who reported their mother or father made the decision to go to CHSAS were more likely unmotivated to attend school. These students were not satisfied with that decision and reported exerting less effort during the study. Many students do not have a choice in what high school they attend. Typically it is selected based on district zoning. Reflecting on the current issues in education and the outcomes associated with student motivation and perceived choice, the lack of student involvement in the selection of the selection of high schools may answer why some students are disengaged a lack ownership of their education.

In summary, most students reported that the influence in their decision to attend CHSAS was self-selection or a family decision. The result was that most of these students were satisfied with the decision to attend CHSAS and more likely demonstrated outcomes of self-determination towards school and learning (e.g. the desire to attend school, more engagement in classroom activities, and academic achievement). This was validated by the high daily attendance rate of 92.3% for the school (Chicago Public Schools, 2007) as well as the students' indication that they put effort into participating in this study. However it must be noted that the extrinsic motivation subscales, particularly identified regulation, were identified more than intrinsic motivation. This means, for many of these students, there were outside influences in the motivation to go to school. Some students may have selected CHSAS as a means to an end. When students were asked why they attend CHSAS, a common response was because it was a safer school, they heard they could get a lot of scholarship money for college when they graduate, or because their parents made them attend. All of these reasons would measure as extrinsic and in some cases amotivation. Very few students selected the school because of an intrinsic interest in agriculture. The implications for this is that in order to keep these students satisfied and engaged, the agriculture teachers at CHSAS must provide further extrinsic motivation or motivate students to begin to internalize their education.

*Recommendation Two:*

The findings of the motivational profile should be provided to the administration, counselors and agriculture instructors at CHSAS. This information should be used by the school to facilitate discussion on how to better serve the students. Mainly,

what strategies can be incorporated to turn the students' extrinsic motivation toward school and studying agriculture into an intrinsic interest?

*Recommendation Three:*

Further research should be conducted to explore the following topics:

- Are students in other urban agriculture programs intrinsically motivated to learn about agriculture or do they see it as a means to an end (extrinsically motivated)?
- What are the outcomes of students who perceive support (parents, teachers, counselors, and friends) in this decision to enroll in an agriculture program versus students who do not perceive support? Mainly, do these students stay in agriculture throughout their high school career and do they major in agriculture in college?

*Objective Three*

Student and teacher reflections were used to document occurrences associated with knowledge acquisition and retention, critical thinking, and engagement during and after the treatment not measured by the unit test or WGCTA<sup>®</sup>. Students in the PBL group reported this method of instruction as more rigorous and thought provoking. Many students liked working in groups but were frustrated when members in their group did not provide equal contributions. Students also reported that the problem-solving process was long and confusing but would like to use this method in the future to provide variety in instruction.

The instructor observations supported students' reflections. She reported that students in the PBL group learned content at a deeper level. She also stated that students

were excited to learn using this method, learned to work in teams, and improved their problem-solving skills. Although the instructor believed students gain a lot from the experience, she reported that the concepts that the PBL students were most knowledgeable about and had the propensity to retain longer were the learning objectives they were responsible for investigating and teaching. In addition, she believed that TGL students had better knowledge and comprehension of all the concepts but at a more shallow level.

Several studies (Amos & White, 1998; Cooke & Moyle, 2002; Williams, Sewell, & Humphrey, 2002) involving nurses in a variety of settings all had outcomes that supported the PBL instructional strategy's ability to improve critical thinking, creativity, teamwork, research skills, motivation for learning, self-esteem, and professionalism. The reflections submitted by the students and instructor supported these earlier outcomes. PBL may not give students an advantage when acquiring knowledge of new material. However, based on the reflections from this study and past literature, PBL is a good instructional strategy for motivating students to learn, encouraging students to think and problem solve, and helping student to make a connection between what they learn in the classroom and how it can be applied in the real world, which may lead to better retention of the concepts.

The information in the reflections provided insights that could not be gathered from the quantitative instruments. Students found PBL difficult to use when learning the leadership theories because they had very little prior knowledge of the concepts. The key assumption to learning with PBL is that students have some prior knowledge of the subject so that they can use what they know to gain a better understanding of the new

concepts. For younger learners, such as the ones used in this study, more guidance, especially with the comprehension of difficult concepts will make PBL a more effective learning strategy. Instructors have to understand the fine line between facilitating and instructing. It may be necessary for the instructor to guide them toward helpful resources or clear up misunderstandings without giving students all the answers.

An example would be for the instructor to have classroom discussions throughout the learning process to allow students to pose questions to each other or explain information they have gathered. The primary focus of this is to allow students to share with each other information that will help groups that are off track or having difficulties to refocus their attention. The instructor should also have probing questions prepared to interject if the students are not generating appropriate discussions.

Another example would be to employ the use of mini-lessons. This involves the instructor taking key concepts that are difficult and explaining the basic theory behind them in very short 10 minute lessons. This alternative method removes some of the anxiety students have with the difficult concepts so that they can focus more on the problem-solving process, however, it does make the learning process more teacher-centered during the mini-lessons. This method is only encouraged when students are struggling with very difficult material and the mini-lessons are deemed not to take away from the information discovery process.

In summary, both the students and the teacher reported how pleased they were to participate in an activity using PBL. They recognized the advantages and challenges to using this instructional strategy. However, the advantages far outweighed the challenges, particularly when it came to defining *relatedness* among the student, the teacher, and

one's peers. Overall, PBL is an effective strategy for engaging students cognitively, behaviorally, and emotionally.

*Recommendation Four:*

Problem-based learning should be incorporated into the curriculum to encourage engagement and relatedness. However, instructors should use classroom discussions or mini-lessons through the process to mitigate some of the frustrations of using PBL.

*Recommendation Five:*

Instruction in the facilitation of PBL should be incorporated into teacher education programs and professional development seminars. These training activities should include ample opportunity for the attendees to practice the instructional strategy as a participant and a facilitator. Teachers will not use PBL in the classroom unless they understand and are comfortable with the process.

Furthermore, successful outcomes are dependent on the ability of the instructor to facilitate the PBL activity.

*Objective Four*

Three personal factors from the motivational profile (prior knowledge, family decision to attend CHSAS, and academic aptitude) accounted for approximately 24% of the variance in performance on the knowledge acquisition unit test. Motivation literature suggests that factors related to competency and autonomy support (autonomy & relatedness) are predictors of achievement (Ryan & Deci, 2002; Reeves & Jang, 2006). However, self-selection to attend CHSAS was not a significant predictor of performance on the knowledge acquisition unit test. This may be due to the introjected regulation

motivation observation discussed in objective two. Self-selection by students who were identified with introjected regulation did not make an autonomy supported decision and therefore may not demonstrate self-determined behaviors.

In summary, the regression model used supports the literature that self-determined factors are stronger predictors of achievement. Those students with a higher perceived competence (validated by prior performance) and who were able to make decisions about their education that were supported by family were more intrinsically motivated to attend school and thus more self-determined. A finding that should be highlighted is that family decision to attend CHSAS was a slightly stronger predictor of performance on the knowledge acquisition test than reading aptitude. Although the amount of variance uniquely accounted for by this autonomy-supportive factor was 8%, it supports the literature that autonomy-support is important to a student's psychological well-being, resulting in increases engagement and academic performance in school.

*Recommendation Six:*

Agriculture instructors should create an autonomy-supportive learning environment in order to develop stronger relationships with their students and foster higher levels of engagement. Autonomy-supportive behavior would include open dialogue between instructor and student, more student-centered methods of instruction, informative feedback, and encouragement.

*Recommendation Seven:*

Teacher educators should incorporate techniques in autonomy-supportive behaviors into methodology courses and encourage full adoption of these techniques into the secondary classroom. Ways of effectively encouraging this is

by presenting research on the benefits of autonomy-supportive behaviors in the classroom and allowing ample opportunities for pre-service teachers to practice these behaviors in a variety of instructional environments.

#### *Objective Five*

A statistical analysis of knowledge acquisition and improvement in critical thinking ability yielded mixed results. An analysis of covariance in content acquisition when accounting for competence and autonomy support yielded a statistically significant difference between the two groups. The TGL group scored on average three points higher than the PBL group. This supports the findings by Burris (2005) that students in the PBL group scored lower on the content knowledge unit test than students taught with an alternative method. This may be explained because the activities employed by the instructor with the TGL group focused on acquiring knowledge and comprehension. The unit test used for data collection was most appropriate for measuring learning at those lower levels of cognition. However, it can be argued that the PBL group used higher levels of cognition, such as analysis, synthesis, and evaluation. The test did not adequately measure learning at those levels and consequently did not accurately measure the knowledge acquired by the PBL students. The implication of this is that the type of instructional strategy used must take into account the learning objectives. Furthermore, the type of assessment used to evaluate academic performance must take into account the instructional strategy used.

Conversely, the analysis of covariance in critical thinking ability when accounting for ability prior to treatment yielded no statistically significant difference between the two groups after treatment. Although Burris (2005) reported a statistical difference in

critical thinking ability, these results support his findings that no practical difference existed between the groups when measured using the WGCTA<sup>®</sup>. In addition, previous descriptive studies (Alexander, Baldwin, & McDaniel, 1998; DeMarco, Hayward, & Lynch, 2002; McGrath, 2002) indicated an increased satisfaction in the educational experience of students in that it promoted teamwork, creativity, motivation, and critical thinking. Although the instrument was not able to measure these outcomes, both the students' and teacher's written reflections as well as the increase in the PBL students' satisfaction in the decision to attend CHSAS supported these findings.

There are advantages and disadvantages to both instructional strategies when teaching leadership to youth. The teacher-guided learning instructional strategy was better for teaching the foundation (knowledge and comprehension) of leadership theory to students. It is important that a strong foundation of knowledge and comprehension is provided in order to prepare students to engage in activities that call for higher levels of cognition. van Linden and Fertman (1998) discussed commonalities that should be taken into account when creating leadership interventions. They were a desire for autonomy, the need for time for self-discovery and definition, the need for time to learn and develop skills, the need for exploration, and allowance for their unpredictable natures. PBL is an appealing instructional strategy for teaching leadership education for several reasons. It accounts for the aforementioned needs, it develops students' ability to apply the leadership theories to real-life situations, and it develops students' ability to manage resources, work productively with others, acquire and use information, understand complex systems, and work comfortably with a variety of technologies.

In summary, although frustrated occasionally, the students involved in the PBL group reported enjoying the experience. Their reflection statements were supported by change in satisfaction with the decision to attend CHSAS after the study concluded. Students in the PBL group reported an increase in satisfaction whereas students in the TGL group reported a decrease in satisfaction. Although the teacher-guided learning strategy was better for knowledge acquisition, the problem-based learning strategy was reported to be more interesting and engaging. Therefore, it is important that agriculture teachers continue to evaluate the instructional strategies they use and their effectiveness as a teacher. Students' needs and interests change over time and the effectiveness of the teacher will be determined by one's ability to adapt to these changes, relate to the students, and develop lessons that will prepare these students to be competitive in a global market. Since teacher-guided learning is very important to the acquisition of basic knowledge, instructors must be vigilant of societal shifts and adapt instruction to these changes so that students find instruction by teachers interesting and engaging. This is particularly important in the highly populated urban areas where the variability in interests and academic needs is larger. Just as technology becomes obsolete and must be changed, so does the strategies used in teaching.

*Recommendation Eight:*

Teachers should continue to develop the “art” of teaching so that students are motivated to learn. Teachers should focus on creative interest approaches, dynamic presentations, application activities to which students can relate, and unique assessments (e.g. portfolios, presentations, case studies, service projects).

*Recommendation Nine:*

Instructors should continue to evaluate the learning objectives and incorporate a variety of appropriate instructional strategies and assessments into the curriculum in order to achieve the learning objectives. Simply stated, when the learning outcome is knowledge and comprehension, directed learning instructional strategies should be employed using standard-based assessments for evaluation. However, when analysis, synthesis, or evaluation is the end sought, exploratory instructional strategies should be employed, such as PBL, using performance-based assessments (e.g. portfolios checks, demonstrations or presentations, and teacher observations) for evaluation.

*Objective Six*

Limited literature exists as to the effects of PBL on knowledge retention. However, based upon the limited literature, it can be hypothesized that students learning using higher levels of cognition will retain targeted information learned at those levels. Nevertheless, although some studies (Bechtel, Davidhizar, & Bradshaw, 1999; Willis, Jones, Bundy, Burdett, Whitehouse, & O'Neill, 2002) have claimed that PBL facilitated problem solving in a self-directed learning environment, so learning is relevant, dynamic, and challenging, none of the studies support its effectiveness related to students' knowledge retention. A study was conducted with nursing students to determine the effects of PBL on long-term knowledge retention (Beers & Bowden, 2005). The researchers concluded that a significant difference existed in retention between the two groups with the PBL group scoring higher after one year. However, a study conducted in Sweden yielded a conflicting finding by having found no differences in knowledge

retention between students taught using PBL and those taught using conventional lecture (Sundblad, Sigrell, Knotsson, Lindkvist, & Lindkvist, 2002).

The results from this study yielded a significant difference in knowledge retention between the two groups. When the difference between the posttest scores and follow-up posttest scores were analyzed, there was a significant difference found for both groups. The TGL group retained a less of the leadership content information when compared to the PBL group. This outcome may be partially explained by the observations of the instructor who believed the PBL students would retain more, particularly the items related to their assigned learning objective. Although a very strong claim and a hypothesis that could be drawn from the literature on higher-order thinking, it was not validated in this study.

However, the data confirmed that the prior knowledge mean scores were similar at the start of this study. Although both groups' mean scores increased after treatment, the TGL group's mean score measured significantly higher than the PBL group's mean score. In the final administration of the test (knowledge retention), the two groups' mean scores dropped substantially yielding no statistical difference. This means that the TGL group acquired more knowledge and loss that knowledge within three months. The instructor indicated that a thorough study guide was created for the students prior to the administration of the test. The TGL students had specific items to focus on in order to perform well on the test. This phenomenon can be described as a form of "teaching to the test."

Teaching to the test is a strategy that is standard-driven instead of mastery driven. Standard driven methods occur when a goal is defined of what "every student ought to

know and be able to do” and teachers are mandated to make sure all students, regardless of ability or circumstance, meet that standard. This indirectly encourages the teacher and the students to focus on getting the highest score to meet the standard instead of focusing on the learning process, participating to understand, and acquiring the knowledge for later recall and application. Although the students are learning and the initial outcome is positive (high performance), the potential for recall over an extended amount of time diminishes. In addition, the satisfaction with the learning process may be lower because of the added pressure to focus on the end result instead of the process.

The TGL students memorized the information they were prompted to learn and did much better on the knowledge acquisition unit test. Their focus was learning the material for the test and consequently, over time, the students began to forget the concepts they learned. However, the PBL students’, who may not have learned as much information as the TGL students, major focus was the process of learning and understanding the material. As a result they retained more of what they learned because of the higher-order thinking skills employed.

*Recommendation Ten:*

Urban agriculture teachers should continue to incorporate activities that employ higher-order thinking skills into the curriculum (e.g. PBL, case studies, and comprehensive projects). This not only helps students to retain the information they are learning, but provides stimulation during the learning process and also helps to further develop higher-order thinking skills for use in other classes and real-life situations.

*Recommendation Eleven:*

This study should be replicated to confirm the findings as well as test the hypothesis that the retention of knowledge on a particular learning objective is significantly higher for students who researched and taught that learning objective than for any of the other students.

**APPENDIX A**  
**Consent Forms**

## Consent to Recruit Form

Dear CHSAS Administrator,

I hope this letter finds you in great spirits. As we begin a new school year, I am interested in doing a two-week analysis of effective methods for teaching leadership development to freshmen ag students. The reason why I would like to analyze the curriculum with freshmen is because they have limited leadership knowledge and exposure to leadership organizations like the FFA. This would allow me to see what information students actually retain from the curriculum based on teaching methods and not because of past exposure to the FFA and other leadership activities. More specifically, I would like to look at the difference between the traditional teaching method with the teacher being the primary source of learning versus allowing students to work in groups and discover, using critical thinking skills, the information themselves with systematic guidance from the teacher. What it would require of Ms. Settle is to teach a couple of sections using lecture based instruction, and a couple of sections using problem based learning (a group case study) with the instructor guiding the students toward the correct learning objectives. Students would be asked to take a unit test on the leadership information being presented as well as an assessment of their critical thinking skills before they are instructed on the content as well as after. This would allow me to measure the growth of knowledge in the students. This study is completely anonymous and voluntary and participants can decline participation at any time. If you are willing to grant permission for me to conduct this study at CHSAS, please sign this consent to recruit form and return it to Ms. Settle. Due to the unique characteristic of the school and size of the freshman class, I am only asking your school to participate in this study. Therefore, your school's participation is highly valued and greatly appreciated. Thank you in advance for your time.

I grant permission to conduct the Leadership Development Study described above at CHSAS.

---

Print Name

Title

---

Administrator's Signature

Date

**James C. Anderson II**  
Primary Investigator

### NOTE

If you have any questions regarding participants' rights, you may contact the University of Missouri-Columbia Campus Institutional Review Board (IRB) at:

**483 McReynolds Hall**  
**Columbia, Mo. 65211**  
**573-882-9585**  
[umcresearchcirb@missouri.edu](mailto:umcresearchcirb@missouri.edu)

## Consent to Participate Form

Dear Parent/Guardian:

I am writing to inform you that your child has been asked to participate in a two-week assessment of the effectiveness of instructional methods in teaching leadership development curriculum. A set of lessons have been designed to test two teaching methods. Your child will be asked to learn the lessons using one of the teaching methods and then given an assessment to determine the amount of material he/she has retained. Your child's participation is valued and will be used to help determine how future leadership development curriculum is written. This is voluntary and confidential and we hope that you and the student understand how invaluable this is to creating a quality education. If there is a question or activity that he/she is uncomfortable with, they are encouraged to decline participation in that component of the assessment. By signing the line below, both of you are agreeing to allow him/her to participate in this confidential study. Please keep in mind that this is completely voluntary and you or your child can stop participation at anytime without consequences. This study does not affect his or her grade or school performance. Thank you for your time and cooperation.

\_\_\_\_\_ has permission to complete the Leadership  
Student's Name  
Development Curriculum Assessment.

\_\_\_\_\_  
Parent/Guardian Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Date

James C. Anderson II  
Student Investigator  
573-882-2200  
[JCAnderson@mizzou.edu](mailto:JCAnderson@mizzou.edu)

Robert M. Torres  
Advising Investigator  
573-884-7376  
[TorresR@missouri.edu](mailto:TorresR@missouri.edu)

### NOTE

If you have any questions regarding you or your child's rights as a research participant, you may contact the University of Missouri-Columbia Campus Institutional Review Board (IRB) at:

**483 McReynolds Hall**  
**Columbia, Mo. 65211**  
**573-882-9585**  
[umcresearchcirb@missouri.edu](mailto:umcresearchcirb@missouri.edu)

## **Youth Assent Statement**

**Note to Instructor:** Please read the following statement to students after you have handed out the consent form.

**You have been selected to assist the Agricultural Education Department at the University of Missouri-Columbia by participating in a study of the effectiveness of teaching methods on student learning. Your participation is valued and will be used to help determine the future of leadership development in urban agricultural education. We are asking you to take an assessment on leadership knowledge and critical thinking ability before and after you are taught the lessons on leadership. Your participation is completely voluntary and confidential. If there is any activity or question that you do not feel comfortable with, please feel free to remove yourself from that portion of this study. Keep in mind that this is completely voluntary and you can stop at anytime without consequences. Taking the assessments or deciding not to take them will not affect your grade or school performance in any way. By signing the consent form and taking it home for your parent/guardian to sign, you are agreeing to voluntarily participate in this confidential study. If you agree to participate in this study, please sign now where it says student signature and take the form home to be signed by a parent/guardian. I ask that you bring the signed form back to class tomorrow. Are there any questions?**

**APPENDIX B**

**Leadership Theory Unit Test**

## Leadership Unit Exam

---

### *True-False*

1. Environmental influences are factors in a situation that lie outside the leader's competencies, characteristics, and experiences.
2. Technical skills grow in importance as one moves up the managerial hierarchy.
3. Situational leadership requires the clear recognition of subordinate needs.
4. The skills approach suggests that many individuals have the potential for leadership.
5. One of the strengths of the situational approach is its clear conceptualization of subordinates' developmental levels.
6. The emergence of a vision should originate only from the leader, not the followers within the organization.
7. A strength of the transformational model is the emphasis it places on followers' needs, values, and morals.
8. Career experience is a strong influence on a leader's competencies.
9. Some studies have suggested that masculinity is a leadership trait.
10. Followers usually are responsible for maintaining the relationship with leaders.
11. According to Situational Leadership, D3 subordinates may be highly skilled but also lack commitment.
12. Transactional leadership refers to the bulk of leadership models.
13. Human skills are important at all levels of management.
14. Laissez-faire leadership represents the absence of leadership.
15. The trait approach has failed to identify a definitive set of specific leadership traits.
16. The situational approach contends that leadership involves both directive and supportive behaviors.
17. Leaders who use coercion are generally mostly interested in their own goals, rather than those of subordinates.

18. A major strength of the trait approach is that it is quite useful for training.
19. A factor common to the leadership classification systems is the view of leadership as a process of influence.
20. The trait approach determines the most important traits in a highly objective way.
21. The trait approach focuses primarily on the leader, not on the followers or the situation.
22. A criticism of transformational leadership is that it treats leadership as a personality trait.
23. Leadership occurs in both large and small groups.
24. The SLII model emphasizes flexibility in leadership style.
25. An individual perceived by other group members as influential can only be an assigned leader, not an emergent one.

### Multiple-Choice

1. Leaders' use of physical force to get their way is which kind of power?
  - a. Reward
  - b. Coercive
  - c. Legitimate
  - d. Referent
  - e. Expert
2. House notes that charismatic effects are more likely to occur in:
  - a. Contexts in which followers experience few difficulties.
  - b. Supportive environments.
  - c. Stressful situations.
  - d. a and c only.
  - e. None of the above.
3. Which of the following work experiences contribute to leaders' knowledge and skills?
  - a. Challenging assignments
  - b. Mentoring
  - c. Hands-on experience
  - d. All of the above
  - e. None of the above

4. You are the leader of a small jazz band comprised of four of your peers who have never been in a jazz group before. As the leader of the band, you have been very straightforward about how the band will function. You have clearly described each of the members' roles, and they are starting to catch on to how the group works. What style do you exhibit next?
  - a. Style 1
  - b. Style 2
  - c. Style 3
  - d. Style 4
  
5. According to House, the following is NOT one of the specific types of behaviors commonly exhibited by charismatic leaders:
  - a. Serving as a strong role model
  - b. Giving structure to complex tasks
  - c. Articulating ideological goals with moral overtones
  - d. Arousing emotions
  - e. Articulating vision
  
6. Performance outcome is measured by
  - a. Standard external criteria
  - b. Original solutions to problems
  - c. Solutions that go beyond given information
  - d. a and b only
  - e. a, b, and c
  
7. It is accurate to say that SLII is primarily
  - a. Descriptive
  - b. Prescriptive
  - c. Well supported by research
  - d. All of the above
  - e. b and c only
  
8. Which answer best describes the elements of a model of transformational leadership?
  - a. Idealized influence, inspirational motivation, intellectual stimulation, individualized consideration
  - b. Laissez-faire, contingent reward, management-by-exception, corrective transactions
  - c. Supporting, controlling, delegating, directing
  - d. Forming, storming, norming, performing
  - e. Motivating, planning, controlling, organizing

9. The trait approach
  - a. Emphasizes behavior of leaders.
  - b. Lays out a set of hypotheses about leadership.
  - c. Emphasizes leader personality.
  - d. All of the above.
  - e. a and c only.
  
10. You are leader of a group project for a class. The other group members seem insecure about whether they can complete the project, but it is apparent that they are competent enough to do a good job. In prior meetings you have been coaching them on the project. Based on SLII, which leadership style should you exhibit at the next meeting?
  - a. Style 1
  - b. Style 2
  - c. Style 3
  - d. Style 4
  
11. Which of the following traits is associated with effective leadership?
  - a. Intelligence
  - b. Self-confidence
  - c. Sociability
  - d. All of the above
  - e. None of the above
  
12. Power that any elected official has is
  - a. Reward
  - b. Coercive
  - c. Legitimate
  - d. Referent
  - e. Expert
  
13. Trait research
  - a. Links traits to outcomes.
  - b. Shows that successful leaders tend to have certain identified traits.
  - c. Provides useful data for training and development.
  - d. All of the above.
  - e. None of the above.
  
14. The power Bill Gates had when he and Paul Allen started the Microsoft company:
  - a. Reward
  - b. Coercive
  - c. Legitimate
  - d. Referent
  - e. Expert

15. Researchers agree that leadership
  - a. Is an inborn trait.
  - b. Cannot be learned.
  - c. Is influenced by the situation.
  - d. a and b only.
  - e. b and c only.
  
16. For leaders operating at lower levels of management, which skills are most important?
  - a. Technical and human
  - b. Technical and conceptual
  - c. Human and conceptual
  - d. Human, technical, and conceptual
  - e. None of the above
  
17. Transformational leadership
  - a. Helps followers to transcend their own self-interests for the good of the group.
  - b. Results in performance that goes well beyond what is expected.
  - c. Is a process in which leaders and followers exchange efforts for specified rewards.
  - d. a and b only.
  - e. b and c only.
  
18. Which of the following is *not* a competency?
  - a. Problem-solving skills
  - b. Cognitive ability
  - c. Social judgment skills
  - d. Knowledge
  - e. All of the above
  
19. Transformational leadership
  - a. Creates a connection between leaders and followers.
  - b. Increases the motivation and morality of followers.
  - c. Helps followers reach their full potential.
  - d. All of the above.
  - e. None of the above.

20. You have recently been made a department head of the new regional office. In getting to know your departmental staff, you have noticed that one of your inexperienced employees is not following through on assigned tasks. She is enthused about her new job and wants to get ahead in the organization. Which alternative represents the most effective leadership style?
- Discuss the lack of follow-through with her and explore possible ways to solve this problem (S3).
  - Specify what she must do to complete the tasks but incorporate any suggestions she may have (S2).
  - Define the steps necessary to complete the assigned tasks and monitor her performance frequently (S1).
  - Let her know about the lack of follow-through and give her more time to improve her performance (S4).
21. Which of the following is (are) an Individual Attribute(s)?
- General cognitive ability
  - Motivation
  - Personality
  - a and c only
  - a, b, and c
22. You are president of a large corporation. At a typical monthly meeting each of your vice presidents gives standard area reports. In the past these reports have been good, and the VPs seem satisfied about their work. Based on SLII, which leadership style should you exhibit at the next meeting?
- Style 1
  - Style 2
  - Style 3
  - Style 4
23. Leaders' power to provide pay raises and promotions is
- Reward
  - Coercive
  - Legitimate
  - Referent
  - Expert
24. According to the trait approach, leaders should
- Have determination.
  - Have integrity.
  - Be much smarter than their followers.
  - All of the above.
  - a and b only.

25. Defining leadership as a process means
- a. It is an inborn trait or characteristic.
  - b. It is a transactional event.
  - c. The leader affects and is affected by followers.
  - d. a and b only.
  - e. b and c only.

## **APPENDIX C**

### **Example of the Instructor's Manuals w/Test Key**

## Example of the Teacher-Guided Learning Instructor's Manual

Written by  
Mary Ann Bowman

Revised by  
James C Anderson II

To Accompany

Leadership Theory and Practice  
*Third Edition*

Peter G. Northouse  
Western Michigan University

Sage Publications  
Thousand Oaks, CA

### USING THE INSTRUCTOR'S MANUAL

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#### Manual Contents

This manual provides the following for each chapter of the third edition of *Leadership Communication: Theory and Practice*.

- A brief overview of the chapter's contents
- Teaching points outlining the chapter's contents
- Activities for use in class
- Writing assignments

#### Using the Teaching Points

These teaching points provide an outline of the chapter's main points. You can use these to structure your lectures, using overhead transparencies or presentation software.

#### Using the Activities

Using small-group activities provides students an opportunity to interact with and learn from one another, as well as to actually apply the information presented.

#### Using the Writing Assignments

If you have too many students to assign longer writing projects, these assignments could be adapted for use as essay questions. As in the activities, these assignments require that students apply the information they have learned about leadership communication.

#### Test Questions

Answers to the Unit Test are provided in this *Manual*.

## CONTENTS

Using the Instructor's manual

Chapter 1 – Introduction

Chapter 2 – Trait Approach

Chapter 3 – Skills Approach

Chapter 5 – Situational Approach

Chapter 9 – Transformational Leadership

## KEY TO TEST QUESTIONS

### *True-False*

1. T
2. F
3. T
4. F
5. F
6. F
7. T
8. T
9. T
10. F
11. T
12. T
13. T
14. T
15. T
16. T
17. T
18. F
19. T
20. F
21. T
22. T
23. T
24. T
25. F

### *Multiple-Choice*

1. b
2. c
3. d
4. b
5. b
6. e
7. b
8. a
9. c
10. c
11. d
12. c
13. b
14. e
15. c
16. a
17. d
18. b
19. d
20. c
21. e
22. d
23. a
24. e
25. e

## Chapter 1

### Introduction

---

Overview: This chapter defines leadership and describes its various characteristics. The entire book treats leadership as a complex process with multiple dimensions.

### Teaching Points

---

#### *Leadership Defined*

- Ways of conceptualizing leadership
- Leadership as a process
- Components of the definition
- Followers and leadership

#### *Leadership Described*

- Trait vs. process leadership
- Assigned vs. emergent leadership
- Leadership and power
- Leadership and coercion
- Leadership and management
  - Functions of management
  - Kotter's distinction
  - Rost's distinction
  - Zaleznik's position

### Activity

---

#### *Social Power*

Divide students into small groups and provide each group with one or more copies of a news magazine. Have the groups identify examples of the five bases of social power from news stories they find. Each small group should then report back to the entire class about the results of their work. Note commonalities by summarizing their conclusions in a master list.

### Writing Assignments

---

#### *Contemporary Leadership*

Have students write a 1 page reaction paper about a contemporary leader (someone they know personally or a public figure) and the way this person uses power. Students should use specific examples to support their argument that the power used fits the French and Raven category. They should also explain how the concept of social power provides a useful way to understand this person's leadership.

#### Leadership vs. Management

Have students write a 1 page reaction paper that defends or attacks the view that leadership and management are different constructs. They should provide specific examples to support their position and discuss the implications of their views for leadership in general.

## Example of the Problem-Based Learning Instructor's Manual

Written by  
Mary Ann Bowman

Revised by  
James C Anderson II

To Accompany

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### USING THE INSTRUCTOR'S MANUAL

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#### Manual Contents

This manual provides the following for each chapter of the third edition of *Leadership Communication: Theory and Practice*.

- A brief overview of the chapter's contents
- A list of concepts and terms discussed in the chapter
- Teaching points outlining the chapter's contents
- Questions for study and discussion

#### *Using Concepts and Terms*

These lists of concepts and terms give students a basic vocabulary with which to discuss and think about the ideas presented in each chapter.

#### *Using the Teaching Points*

These teaching points provide an outline of the chapter's main points. You can use these to as a quick reference if questions arise by the students as they work through the material.

#### *Using the Study and Discussion Questions*

These questions allow students to systematically work their way through the information in each chapter. If they can answer each question, they have learned the chapter contents. You can use these questions to guide the students through solving the case study.

#### *Test Questions*

Answers to the Unit Test are provided in this *Manual*.

## Chapter 2

### TRAIT APPROACH

---

Overview: Chapter 2 examines the many studies conducted through the years on individuals' personal leadership characteristics. It also identifies and discusses some of the important traits consistently associated with people who are considered leaders.

### Concepts and Terms

---

“Great Person” theory  
Leader personality  
Leader traits  
Situational factors  
Intelligence  
Self-confidence  
Determination  
Integrity  
Sociability  
Leadership profile  
Personality assessment instruments  
Minnesota Multiphasic Personality Inventory (MMPI)  
Myers-Briggs Type Indicator (MBTI)  
Leadership Trait Questionnaire (LTQ)

### Teaching Points

---

#### *Description*

- One of the oldest approaches
- Great person theories
- What traits differentiate leaders?
- Stogdill's 1948 survey
- Stogdill's 1974 survey
- Research in the 1990s
- Comparison of various studies

#### *Major Leadership Traits*

- Intelligence
- Self-confidence
- Determination
- Integrity
- Sociability

#### *How This Approach Works*

- Focuses exclusively on the leader.
- Finds people with the “right” leadership profile.
- Personality type assessments.
- May be used for personal development.

### *Strengths*

- Intuitively appealing.
- Backed by century of research.
- Focuses exclusively on leader.
- Provides benchmarks.

### *Criticisms*

- Fails to delimit a definitive list of traits.
- Fails to take situations into account.
- Highly subjective determinations of “most important” traits.
- Trait research fails to examine relationship to outcomes.
- Not useful for training and development.
- 

### **Questions for Study**

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1. What noted researchers are associated with leadership traits?
2. What methods have researchers used to investigate leadership traits?
3. Which traits are cited most often in research results?
4. What does the trait approach suggest about effective organizational leadership?
5. How might the trait approach be used for personal awareness and development?
6. What are strengths of the trait approach?
7. What are criticisms of the trait approach?

**APPENDIX D**  
**Student Identification Form**

FOR TEACHER USE ONLY

DO NOT RETURN THIS FORM

### Student Identification Form

List students alphabetically. Use this ID # for all correspondence.

<b>Student Name</b> <i>(List Alphabetically)</i>	<b>ID #</b>	<b>Team #</b>	<b>Learning Objective #</b>
	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		
	12		
	13		
	14		
	15		
	16		
	17		
	18		
	19		
	20		
	21		

**APPENDIX E**  
**Score Report Form**

RETURN THIS FORM TO  
MU DEPT. OF AG ED

DO NOT INCLUDE STUDENT  
NAMES ON THIS FORM

### Score Report Form

<b>Student ID #</b>	<b>Aptitude Score (English)</b>	<b>Pre-Test Leadership Score (number correct)</b>	<b>Post-Test Leadership Score (number correct)</b>	<b>Gender (Circle)</b>
1				<b>M F</b>
2				<b>M F</b>
3				<b>M F</b>
4				<b>M F</b>
5				<b>M F</b>
6				<b>M F</b>
7				<b>M F</b>
8				<b>M F</b>
9				<b>M F</b>
10				<b>M F</b>
11				<b>M F</b>
12				<b>M F</b>
13				<b>M F</b>
14				<b>M F</b>
15				<b>M F</b>
16				<b>M F</b>
17				<b>M F</b>
18				<b>M F</b>
19				<b>M F</b>
20				<b>M F</b>
21				<b>M F</b>

**APPENDIX F**  
**Study Schedules**

## **Problem-Based Learning Schedule**

### **50 minute Periods**

<b>Day</b>	<b>Task to accomplish</b>
1	Introduce the importance of their participation in the study Pretest administration of Leadership Theory Test
2	Pretest administration of Watson-Glaser (WGCTA) Discuss problem-solving vs. problem-resolving
3	Discuss Leadership Development
4	Explain purpose of PBL Establish teams and identify member roles Orient groups to the problem case and facilitate group processing of case information
5	Present handout of formal learning objectives Provide resources for learning objectives Facilitate individual investigation of information
6	Facilitate individual investigation of information
7	Prepare learning objective reports
8	Learning objectives presentation to group
9	Relate learning objectives to case resolution
10	Relate learning objectives to case resolution Develop resolution to problem case
11	Develop resolution to problem case Present case resolutions
12	Present case resolutions Debrief the process of resolving the case
13	Post-test administration of Leadership Theory Test
14	Post-test administration of WGCTA

## **Teacher-Guided Learning Schedule 50 minute Periods**

<b>Day</b>	<b>Task to accomplish</b>
1	Introduce the importance of their participation in the study Pretest administration of Leadership Theory Test
2	Pretest administration of Watson-Glaser (WGCTA) Discuss the importance of Leadership Development
3-4	Chapter 1 – Introduction Lesson Application activity
5-6	Chapter 2 – Trait Approach Lesson Application Activity
7-8	Chapter 3 – Skills Approach Lesson Application Activity
9-10	Chapter 5 – Situational Approach Lesson Application Activity
11-12	Chapter 9 – Transformational Leadership Lesson Application Activity
13	Post-test administration of Leadership Theory Test
14	Post-test administration of WGCTA

## **APPENDIX G**

### **Case Study**

## CASE STUDY

### Andy's Recipe

Andy Garafallo owns an Italian restaurant that sits out in the middle of a cornfield near a large midwestern city. On the restaurant's far wall is an elaborate mural of the canals of Venice. A gondola hangs on the opposite wall, up by the ceiling. Along another wall is a row of real potted lemon trees. "My ancestors are from Sicily," says Andy. "In fact, I can remember seeing my grandfather take a bite out of a lemon, just like the ones hanging on those trees.

Andy is very confident about his approach to this restaurant, and he should be, because while other restaurants have folded, Andy's restaurant is celebrating its 25th anniversary. "I'm darned sure of what I want to do. I'm not trying different fads to get people to come here. People come here because they know they will get great food. They also want to support someone with whom they can connect. This is my approach. Nothing more, nothing less."

Since opening his restaurant, Andy has had a number of managers. Currently, he has four: **Kelly, Danielle, Jimmy** and **Patrick**.

**Kelly** is a kitchen (food prep) manager who is known as very honest and dependable. She loves her work and she is efficient, good with ordering, and good with preparation. Andy really likes Kelly but is frustrated with her because she has such difficulty getting along with the sales people, delivery people, and the wait staff.

**Danielle**, who works out front in the restaurant, has been with Andy for 6 years. Danielle likes working at Garafallo's — she lives and breathes the place. She fully buys into Andy's approach of putting customers first. In fact, Andy says she has a knack for knowing what customers need before they even ask. Although she is very hospitable, Andy says she is lousy with numbers. She just doesn't seem to catch on to that side of the business.

**Jimmy**, who is the hiring manager, has worked with Andy the longest, 10 years. He loves hiring and training new employees but is not very social so he does better at training than actually working out front. Andy has noticed that 25% of the people Jimmy has hired in recent years leave within six months. The problem with this is that the restaurant loses time and money training new employees who leave quickly. Jimmy always looks for individuals who have strong interpersonal skills, are confident, have good work ethic, show commitment and a willingness to do their job, as well as show poise and initiative. Andy agrees that these are the right characteristics but with the high turnover rate, he is beginning to question what is going on.

**Patrick**, who has been with Andy for 4 years, usually works out front but can work in the kitchen as well. While Patrick has a strong work ethic and is great with numbers, he is weak on the people side. For some reason, Patrick treats customers as if they are faceless, coming across as very unemotional. In addition, Patrick tends to be very "cut and dried" about things, and approaches problems with a "black and white" perspective. This has gotten him into trouble on more than one occasion. Andy wishes that Patrick

would learn to lighten up. “He’s a good manager, but he needs to recognize that some things just aren’t that important,” says Andy.

Andy’s approach to his managers is that of a teacher and coach. He is always trying to help them improve. He sees part of his responsibility as teaching them every aspect of the restaurant business. Andy’s stated goal is that he wants his managers to be “A” players when they leave his business to take on new jobs elsewhere. Helping people to become the best they can be is Andy’s goal for his restaurant employees.

Although Andy works 12 hours a day, he spends little time analyzing the numbers. He does not think about ways to improve his profit margin by “cutting corners” — raising an item price here, or cutting the quality there. Andy says, “Its like this: The other night I got a call from someone who said they wanted to come in with a group and wondered if they could bring along a cake. I said ‘yes’ with one stipulation . . . I get a piece! Well the people came and spent a lot of money. Then they told me that they had actually wanted to go to another restaurant but the other place would not allow them to bring in their own cake.” Andy believes very strongly in his approach. “You get business by being what you should be.”

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***Your team has been sent to analyze the leadership practices use to run Andy’s restaurant. Your team will submit to Andy a 2 page write-up of what you think are the good and bad leadership practices being demonstrated by him and his management team. Your write up should include: 1) leadership analysis of each person using the leadership approaches; 2) recommendations for improving each person’s leadership ability; 3) recommendations on how to improve the employee turnover rate; 4) whether or not your team thinks Andy is running the business correctly; 4b) an explanation for the answer to question #4 using evidence from the case study; and 4c) recommendations, if any, for improving the overall business.***

**APPENDIX H**  
**Formal Learning Objectives**

## **Formal Learning Objectives**

### **Learning Objective #1**

What are the major leadership traits? How do these traits affect a person's ability to lead a group? What are the strengths and criticisms to the approach that is leader centered?

### **Learning Objective #2**

How is leadership performance (skills) described? What are outcomes based on these skills? What are the strengths and criticisms to the approach that is performance based?

### **Learning Objective #3**

How does the developmental level of employees affect how the leader leads? What leadership styles work best with what developmental levels? What are the strengths and criticisms to the approach that is situational based?

### **Learning Objective #4**

How can leaders initiate, develop, and carry out significant changes in organizations? What are the general steps a leader can take transform an organization? What are the strengths and criticisms to the approach that empowers followers to do extraordinary things?

APPENDIX I

**Organizers for Investigation**

## **Organizer for Investigation**

### **Learning Objective #1**

What are the major leadership traits? How do these traits affect a person's ability to lead a group? What are the strengths and criticisms to the approach that is leader centered?

1. What noted researchers are associated with leadership traits?
2. What methods have researchers used to investigate leadership traits?
3. Which traits are cited most often in research results?
4. What does the trait approach suggest about effective organizational leadership?
5. How might the trait approach be used for personal awareness and development?
6. What are strengths of the trait approach?
7. What are criticisms of the trait approach?

## **Organizer for Investigation**

### **Learning Objective #2**

How is leadership performance (skills) described? What are outcomes based on these skills? What are the strengths and criticisms to the approach that is performance based?

1. Who began the discussion that led to the skills approach?
2. What methods have Mumford and his colleagues used to investigate leadership skills and effectiveness?
3. Explain the difference between a skill and a trait.
4. Explain each element of the Three-Skill Approach.
5. Explain each of the elements and components of the Mumford Skills Model.
6. How might the skills approach be used for personal awareness and development?
7. What are strengths of the skills approach?
8. What are criticisms of the skills approach?

## **Organizer for Investigation**

### **Learning Objective #3**

How does the developmental level of employees affect how the leader leads? What leadership styles work best with what developmental levels? What are the strengths and criticisms to the approach that is situational based?

1. What researchers are associated with the most important situational leadership studies?
2. What are the characteristics of the four categories of directive and supportive behaviors?
3. What are the characteristics of the four levels by which employee development can be classified?
4. How does the developmental continuum work?
5. In the SLII Model, why does commitment go down for D3 subordinates?
6. Explain why it might be difficult for some leaders to exhibit Style 4 leadership.
7. What are strengths of the situational approach?
8. What are criticisms of the situational approach?

## **Organizer for Investigation**

### **Learning Objective #4**

How can leaders initiate, develop, and carry out significant changes in organizations? What are the general steps a leader can take transform an organization? What are the strengths and criticisms to the approach that empowers followers to do extraordinary things?

1. Describe what is implied by the name “transformational leadership.”
2. Explain the differences between transactional and transformational leadership.
3. Discuss what other real-world leaders, past or present, could be considered transformational leaders.
4. Explain the personality characteristics and types of behaviors often associated with charismatic leaders.
5. Describe the view that leadership is on a continuum ranging from transformational to laissez-faire.
6. Explain the seven factors incorporated in the Bass Model of Transformational and Transactional Leadership.
7. Describe the work of Bennis and Nanus and the work of Tichy and DeVanna. What are the similarities in their research methods?
8. Explain the four leadership strategies identified by Bennis and Nanus.
9. Explain the three leadership acts identified by Tichy and DeVanna in the three-act process.
10. What are strengths of transformational leadership theory?
11. What are criticisms of transformational leadership theory?

**APPENDIX J**  
**Student Reflection Questions**

## **Problem-Based Learning Reflection Questions**

1. As far as day-to-day classroom activity is concerned, do you prefer traditional learning or problem-based learning? Why?
2. Which is better in preparing you for a test (such as the leadership pre/post-test you just took)?
3. Which causes you to think deeper – traditional or pbl?
4. What was positive about PBL?
5. What was frustrating about PBL?
6. Would you like to study more topics using PBL?

**APPENDIX K**

**Teacher Observation Notes**

## PBL – Teacher Observation Notes

- Spent most of today going over the purposes of PBL. The students understand the difference between PBL and traditional learning. They've also explained to me how PBL is different than simply working in groups. Seem to understand their role vs. my role. Seem excited, with a little uncertainty.
- Positive reaction to the case study in general. They agree that it's a real-life problem.
- Trouble deciding on "what we need to know" to resolve the problem. They are focusing more on the characteristics/feelings of the employees. Ex: "Does Andy like Jimmy?" "How nice is Kelly?" I tried to impress upon them that "what we need to know" relates to Leadership. After asking several leading questions, they came up with some things that made sense. But I felt really uneasy-that maybe I was feeding them the answer.
- They completely understand that they will be working alone on their objective, but within the context of a team
- Problems focusing on reading/investigating for a whole class period. I don't think they've been asked in the past to be so individually disciplined and focused.
- Problems understanding language, diagrams, models, etc. I try to explain without saying too much, but some of them seem to be completely lost. I have a hard time figuring out when I'm crossing the "facilitator" line.
- This is a good way for me to see who's a hard-worker/motivated. Some students are putting forth an enormous amount of effort into this. I can see several students who are struggling with the difficulty of the information, but they keep plowing through and working to grasp it. Some students are barely doing anything. I have explained to them numerous times that their group members are depending on them, but it doesn't seem to register.
- Some students (particularly those with learning disabilities) are legitimately having a lot of trouble with their objective. As far as I can tell, group members are understanding of this and trying to help them.
- Approximately 4-5 people in each period showed up without their learning objective report.
- Given the difficulty of the information, most students did a good job of teaching it to their groups.
- There seems to be a disconnect between the theories and resolving the case. I found that many students were writing a resolution based on their opinions. Had to stop the class and explain AGAIN that resolutions must be based on the leadership theories.
- Most students seem to feel a sense of accomplishment with their resolution; many said they would like to use PBL again. Some are more relieved that it's over.
- Several students are worried about the post-test. They don't feel like their team members "taught" them well enough to prepare for the test.

## TGL – Teacher Observation Notes

- Easily grasped difference between leadership and coercion. Types of power were easy for them to understand and they were able to generate a lot of examples for each type.
- Understand basic premise of trait approach and skills approach.
- Students are confused by vocabulary and terminology used. Maybe lack the foundational knowledge to understand some terms.
- Students took the Leadership Trait Questionnaire, but seemed to rate themselves high for all areas. ???
- I attempted to change the PowerPoint slides by using words/terms that would be easier for them to understand. Worked fairly well for trait/skills approach.
- Took another look at the Leadership Unit test. Realized that I need to stop deleting difficult language from the PowerPoint because it's the language used for the test.
- Spent a long time explaining "general cognitive ability" vs. crystallized cognitive ability." I don't know if I got anywhere because it seems to be over their heads.
- Students have a lot of difficulty with the skills model diagram. I spent a lot of time explaining how the arrows work, why they are pointing to a particular aspect, etc.
- Seemed to grasp the 4 phases of situational leadership better than I thought they would. Diagram was initially hard for them to understand, but explaining the types of leaders/followers using high-school examples seemed to help.
- Situational has been the easiest for us to get through. I made an assignment based on the "Situational Leadership Scenarios" given in the book and most students did very well.
- I assumed that all freshmen would understand the meaning of the word "transformed." Wrong. Spent some time explaining what it means for someone/something to be transformed and how that can relate to leadership
- Students easily understood why Martin Luther King Jr. is a transformational leader. They are not familiar with Nelson Mandela and Gandhi.
- Made a review sheet for the test. They are having more trouble with it than I expected.

**APPENDIX L**

**Academic Motivation Scale – High School Version**

## WHY DO YOU GO TO SCHOOL?

Using the scale below, indicate to what extent each of the following items presently corresponds to one of the reasons why you go to school

	Does not correspond at all	Corresponds a little	Corresponds moderately	Corresponds a lot	Corresponds exactly								
	1	2	3	4	5	6	7						
1.	Because I need at least a high-school degree in order to find a high paying job later on.						1	2	3	4	5	6	7
2.	Because I experience pleasure and satisfaction while learning new things.						1	2	3	4	5	6	7
3.	Because I think that a high-school education will help me better prepare for the career I have chosen.						1	2	3	4	5	6	7
4.	Because I really like going to school.						1	2	3	4	5	6	7
5.	Honestly, I don't know; I feel that I am wasting my time in school.						1	2	3	4	5	6	7
6.	For the pleasure I experience while surpassing myself in my studies.						1	2	3	4	5	6	7
7.	To prove to myself that I am capable of completing my high-school degree.						1	2	3	4	5	6	7
8.	In order to obtain a more prestigious job later on.						1	2	3	4	5	6	7
9.	For the pleasure I experience when I discover new things never seen before.						1	2	3	4	5	6	7
10.	Because eventually it will enable me to enter the job market in a field that I like.						1	2	3	4	5	6	7
11.	Because for me, school is fun.						1	2	3	4	5	6	7
12.	I once had good reasons for going to school; however, now I wonder whether I should continue.						1	2	3	4	5	6	7
13.	For the pleasure that I experience while I am surpassing myself in one of my personal accomplishments.						1	2	3	4	5	6	7
14.	Because of the fact that when I succeed in school I feel important.						1	2	3	4	5	6	7
15.	Because I want "the good life" later on.						1	2	3	4	5	6	7
16.	For the pleasure that I experience in broadening my knowledge about subjects which appeal to me.						1	2	3	4	5	6	7
17.	Because this will help me make a better choice regarding my career orientation.						1	2	3	4	5	6	7

### WHY DO YOU GO TO SCHOOL? (continued)

Does not correspond at all	Corresponds a little	Corresponds moderately	Corresponds a lot	Corresponds exactly
1	2	3	4	5

	Does not correspond at all	1	2	3	4	5	6	7	Corresponds exactly
18. For the pleasure that I experience when I am taken by discussions with interesting teachers.	1	2	3	4	5	6	7		
19. I can't see why I go to school and frankly, I couldn't care less.	1	2	3	4	5	6	7		
20. For the satisfaction I feel when I am in the process of accomplishing a difficult academic task.	1	2	3	4	5	6	7		
21. To show myself that I am an intelligent person.	1	2	3	4	5	6	7		
22. In order to have a better salary later on.	1	2	3	4	5	6	7		
23. Because my studies allow me to continue to learn about many things that interest me.	1	2	3	4	5	6	7		
24. Because I believe that my high school education will improve my competence as a worker.	1	2	3	4	5	6	7		
25. For the "high" feeling that I experience while reading about various interesting subjects.	1	2	3	4	5	6	7		
26. I don't know; I can't understand what I'm doing in school.	1	2	3	4	5	6	7		
27. Because high school allows me to experience a personal satisfaction in my quest for excellence in my studies.	1	2	3	4	5	6	7		
28. Because I want to show myself that I can succeed in my studies.	1	2	3	4	5	6	7		

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Robert J. Vallerand, Luc G. Pelletier, Marc R. Blais, Nathalie M. Brière, Caroline B. Senécal, Èvelyne F. Vallières, 1992

**Note:** To use this scale only requires mention of the complete reference data.

## WHY DO YOU GO TO CHSAS?

Does not correspond at all	Corresponds a little	Corresponds moderately	Corresponds a lot	Corresponds exactly		
1	2	3	4	5	6	7

	Does not correspond at all	1	2	3	4	5	6	Corresponds exactly	7
29. Because my mother made me.		1	2	3	4	5	6	7	
30. Because my father made me.		1	2	3	4	5	6	7	
31. Because I wanted to go.		1	2	3	4	5	6	7	
32. It was a mutual decision by me and my family.		1	2	3	4	5	6	7	
33. Before I started attending CHSAS I was excited to go.		1	2	3	4	5	6	7	
34. Now that I have been here, I do not want to attend CHSAS.		1	2	3	4	5	6	7	
35. I put a lot of effort into learning the leadership content for this study.		1	2	3	4	5	6	7	
36. This study was a joke. I did not put any effort into any of the activities.		1	2	3	4	5	6	7	

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## VITA

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