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Exploring Higher Order Thinking Strategies in Georgia's Top Performing Middle Schools

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EXPLORING HIGHER ORDER THINKING STRATEGIES IN GEORGIA'S TOP PERFORMING MIDDLE SCHOOLS

Dissertation

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of the requirements for the degree of Doctor of Education
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Dedication

I dedicate this dissertation to my mother for her love, encouragement, and support; to my late father, who would have been so proud; and to my siblings and friends for their understanding and willingness to listen in my times of frustration.

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Abstract

Developmental psychologists defined adolescent cognitive development as a period of time when individuals learn to mentally separate from adults and establish a self-sufficient identity capable of the autonomous thought necessary to apply higher order thinking. In contrast, college professors of the millennial generation stated that students demonstrate increased immaturity levels inconsistent with those of prior generations. Hence, the focus of this study was to examine the higher order thinking strategies that teachers of adolescents have implemented within the five top performing middle schools in the state of Georgia. The findings offered a potential coexistence of higher order thinking abilities and autonomous behavior and suggested that a better fluency in higher order thinking could supply students with the critical thinking and autonomous problem solving skills required to succeed in future endeavors.

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Chapter I: Introduction

Developmental psychologists devised numerous theories of adolescent cognitive development (Arnett, 2000; Erikson, 1994; Kohlberg & Hersh, 1977; Marcia, 1966). Theorists defined the period of adolescence as a time when individuals learn to mentally separate from parents and establish a self-sufficient identity capable of the autonomous thought necessary to apply higher order thinking such as independent problem solving and critical thinking skills (Arnett, 2000; Erikson, 1994; Marcia, 1966). According to college professors of the millennial generation—those born between the years of 1982-2005 (Howe & Strauss, 2007)—this dynamic has changed (Hofer, Thebodo, Meredith, Kaslow, & Saunders, 2016; Price, 2010; van Ingen et al., 2015; Vinson, 2013). Professors of millennials reported that students demonstrate increased immaturity levels inconsistent with those of prior generations (Craft, 2010; Golonka, 2013).

One response to collegiate concerns was that legislators included college professionals in a collaboration to create the Common Core State Standards (CCSS)—standards that would focus on an increased amount of rigor in the curriculum as an effort to promote college and career readiness (King, 2011). Although the proposed legislation did not pass, anticipation of the initiative's implementation served as catalysts for state education agencies (SEAs) to assess the depth of curricular objectives and the extent to which local education agencies (LEAs) have prepared students for college and career success (Whitaker, 2015). Because of this focus, SEAs began to evaluate each school with tools such as the College and Career Readiness Performance Index (CCRPI) to determine the effectiveness of preparation for continued success in school and eventual readiness for college or career (Lombardi, Conley, Seburn, & Downs, 2013). In addition,

teachers received professional development training to encourage the inclusion of courses, lessons, and strategies that promoted and assessed higher order thinking skills and increased rigor (Supovitz & Spillane, 2015). Hence, the need to produce learners with the ability to apply higher order thinking skills has become a greater priority.

For many decades, prominent adolescent psychologists theorized that mature thought emerged in adolescence; therefore, middle school students have reached an ideal age for instruction that places a focus on higher order thinking skills (Arnett, 2000; Erikson, 1994; Kohlberg, 1971; Marcia, 1966). Thinking lessons and strategies directed to students between the ages 10-14 have improved the reasoning and decision-making skills needed to prepare for the increased curricular demands of high school and college (Waring & Robinson, 2010). Hence, increased practice and emphasis on the higher order thinking skills that involve critical thinking and problem solving as well as autonomous learning at the middle school level could improve future academic performance, college readiness, and self-sufficiency later in life.

Statement of the Problem

College professors have noticed changes in the millennial generation that adversely affected academic success (Price, 2010; van Ingen et al., 2015; Vinson, 2013). According to professors, millennial students displayed a lapse in the development of independent thinking (Golonka, 2013), and, according to Epstein (2010), this lapse appeared to extend adolescence into early adulthood. College professors opined that this lag in development of autonomy and ability to independently think could be a result of advances in technology that have allowed for increased and prolonged parental

interference causing a stronger dependency on adults (Bernstein & Triger, 2011; Hofer et al., 2016).

Prominent psychologists and education researchers noted the importance of forming independent thinking skills in early adolescence (Bandura & Wessels, 1994; Erikson, 1994; Waring & Robinson, 2010). Waring and Robinson (2010) stated that adolescents should have solidified a foundation in critical thinking skills by the time they leave middle school to achieve academic success in later years. Since college professors have identified that millennial college students have demonstrated a weak foundation in this area (Price, 2010; Vinson, 2013), the focus of the study was to investigate successful strategies and assessments that middle school teachers have used to promote and nurture age appropriate higher order thinking, autonomous learning, and problem-solving skills.

Higher order thinking instruction could supply learners with the ability to view problems from additional angles as well as perceive concepts more clearly and broadly (Hofer & Yu, 2003). Furthermore, students of all learning levels have demonstrated benefit from engagement in tasks that involved higher order thinking; therefore, teachers should encourage and promote these skills (Zohar & Dori, 2003). Both college professors and researchers opined that students must develop the higher order thinking skills of critical thinking, problem solving, and decision making to progress as the world has continued to evolve and change (Hofer & Yu, 2003; Miri, David, & Uri, 2007). A heightened awareness and increased attention to successful teaching strategies and the assessment of those strategies could benefit educators and middle school students by providing teachers with additional information about instructional practices that strengthen the prerequisite skills so desperately needed for future academic success.

Research Question

According to interviews with teachers in the five middle schools which ranked highest in the state of Georgia on the College and Career Readiness Performance Index (CCRPI), which strategies do these middle school teachers report using to facilitate the higher order thinking skills needed for college success?

Theoretical Framework

Edward De Bono (1970) defined lateral thinking, a theory pertinent to this study, as a process of applying information to activate creativity, humor, and insight restructuring. De Bono (1970) coined the term and claimed that lateral thinking was an alternate or supplement to vertical thinking, which De Bono defined as normal, systematic, and logical thinking. De Bono (1970) explained lateral thinking as a way to stray from vertical thought since it contained new ideas, unique viewpoints, and problem solving procedures to find new approaches to problems through awareness and practice.

De Bono (1970) believed that lateral thinking was a skill that students could learn, practice, and use just as acquired skills in mathematics. Educators could improve lateral thinking through direct instruction with strategies designed to introduce and encourage thought processes (De Bono, 1976). Hence, De Bono (1976) organized a thinking course of practice exercises and specific strategies to promote thinking (De Bono, 1976). De Bono (1976) claimed that thinking strategies would be most effective as a separate class with more focus placed on processes than content; however, he also believed teaching strategies in lateral thought had great potential to enhance subject specific content courses.

De Bono (1992) explained that the brain utilized basic operations similar to those that a carpenter must use for successful work performance: cutting, sticking, and shaping. De Bono (1992) stated the act of cutting was separating one piece from the rest, which corresponds to the thinking operations of extraction, analysis, focus, and attention. Sticking, or putting things together, included the brain's ability to make connections, synthesize, group, and design (De Bono, 1992). The step of shaping to achieve a certain result could equate to the cognitive operations of judging, comparing, checking, and matching (De Bono, 1992). De Bono (1992) opined that, like a carpenter, the brain needs tools to perform the above-mentioned operations.

De Bono (1992) further explained that the tools needed to think successfully were strategies and lessons that educators could use to initiate and nurture higher order thinking. De Bono (1970) devised many techniques and strategies for use as tools to nurture the higher level thinking that he named lateral thought. The strategy that gained the most popularity was *The Six Thinking Hats* (De Bono, 1992). *The Six Thinking Hats* strategy encouraged one to view a problem from various perspectives (Kalelioglu & Gülbahar, 2014). Each of the six colored hats represented a different perspective, thus enabling students to examine an issue from distinct points of view and then discuss each perspective in isolation (Kalelioglu & Gülbahar, 2014).

Some additional strategies that De Bono has created are plus, minus, and interesting; consider all facts; alternatives, possibilities, and choices; other people's viewpoint, and aims, goals, and objectives (De Bono, 1992). The strategy PMI has encouraged students to evaluate the positive, negative, and interesting points to an issue before jumping to a conclusion (De Bono, 1976). CAF was devised as a practical tool to

encourage students to consider all consequences of a given situation (De Bono, 1976). APC prompted students to defend opposite sides to their original assumption (De Bono, 1976). OPV could spur thought as to how various groups of people could possess a different perspective of the same issue (De Bono, 1976). AGO was a strategy particularly difficult since all three terms are synonymous for the same result, yet students would try to make a distinction (De Bono, 1976).

In addition to thinking tools or strategies, De Bono (1976) explained the mechanics that educators should incorporate into lessons that provoke lateral thought. First, De Bono (1976) felt group work was a great advantage to students since the individuals within groups offer differing opinions. Group work has served to facilitate lengthened discussions, role-play, and additional perspectives. Another mechanic of thinking lessons was grouping (De Bono, 1976). De Bono (1976) explained that educators might want to consider several ways to group students, some of which included ability and mixed ability grouping, random grouping, and grouping based on personality types. Other mechanics to consider were individual work and output (De Bono, 1976). De Bono (1976) explained that, although grouping was important, the teacher should visit the groups frequently to ask individual questions. Output in the form of individual response to questioning as well as individual response to essay questions have produced evidence that each student has applied lateral thought effectively (De Bono, 1976). De Bono (1992) added that the incorporation of real-world problems was especially important to young adults in that these types of problems have provided a thinking background for use later in life.

De Bono devoted decades of study designed to generate and nurture thought in people of all ages (De Bono, 1976). Those teaching strategies in thinking experienced that children were ready to address any topic as early as age seven (De Bono, 1970). De Bono (1976) opined that the ideal age range for teaching thinking was 10-14, not only because change in thinking is gradual and beneficial to begin at a young age but also because teaching children of that age to think could facilitate the transition to content that is more difficult in the secondary schools. De Bono (1976) conducted experiments with students aged 10-14 and found that the children who underwent training with thinking strategies, such as those mentioned above, displayed strengths in problem solving skills. The students trained with thinking strategies brainstormed more ideas, made fewer judgements, considered wider effects, and were more prone to develop points on both sides of the issue rather than concentrate on their own personal viewpoints (De Bono, 1976).

Significance of the Project

Researchers have acknowledged the importance and effectiveness of implementing thinking exercises at the middle school level (i.e., students aged 10-14) due to adolescent advances in cognitive development (De Bono, 1976; Piaget, 1964; Waring & Robinson, 2010)). The goal of these thinking exercises and strategies has been to enhance the same skills that college professors claimed they have not observed in the college students of the millennial generation (Golonka, 2013; Hofer et al., 2016; Price, 2010; van Ingen et al., 2015; Vinson, 2013). According to Ennis (1989), a teacher could implement thinking skills in three ways: the general approach, the infusion approach, and the mixed model approach.

The general approach was to teach thinking separately; the infusion approach was to incorporate thinking into existing subject matter; and the mixed model approach was a combination of the general and infusion approach (Ennis, 1989). Since most middle schools do not have time within the school day to add a course exclusively dedicated to thinking, the onus of teaching and assessing thinking strategies has become the responsibility of the content area classroom teacher (Ennis, 1989). Hence, the focus of this study was to examine the strategies that middle school teachers have chosen to best promote thinking within the content areas.

The study proved useful to middle school teachers by providing content-specific thinking strategies to diversify lesson plans. As a result, both teachers and middle school students benefitted from new ideas aimed at teaching content while promoting higher order thinking skills. A better fluency in higher order thinking at the middle school level could supply students with the much-needed critical thinking and autonomous problem solving skills required to succeed in high school and college (De Bono, 1976; Vinson, 2013; Waring & Robinson, 2010). Thus, this study directed attention to the problem of an observed decline in cognitive maturity and investigated an academic factor that could potentially lessen the downward trend.

Description of the Terms

Assessment. Bissel and Lemons (2006) defined assessment as the methodology that clearly measures the mastery of content as well as cognitive skills obtained and applied. Used formatively, assessment informed teachers of student understanding and development while summative assessment could indicate student accomplishment, effectiveness of instructional strategies, and teacher efficacy (Schraw & Robinson, 2011).

Researchers have stated there have been problems associated with the reliability and validity of existing measures used to assess higher order thinking (Lai, 2011) since performance-based assessments of creativity suggests subjectivity and an increased possibility of error (Silva, 2008).

Autonomy. According to Cutler (2014), autonomy was the development of behavioral independence. Noom, Deković, and Meeus (2001) defined autonomy as a necessary element in the transition from adolescence to adulthood. Researchers have separated the definition of autonomy into three categories: attitudinal, emotional, and functional (Noom et al., 2001). Attitudinal autonomy was the power to make decisions, define goals, and display confidence in one's own abilities (Noom et al., 2001). Emotional autonomy was a feeling of confidence in personal goals in addition to a demonstration of consideration for the goals of others (Noom et al., 2001). Functional autonomy was an ability to achieve goals by developing strategies (Noom et al., 2001). The researcher considered the definition of autonomy to be a combination of all three.

Bloom's Taxonomy. Bloom, an Associate Director of the Board of Examinations of the University of Chicago, Illinois, created the taxonomy of educational objectives in 1956 to facilitate the creation of test items and clarify levels of learning and thought (Krathwohl, 2002). Bissel and Lemons (2006) suggested Bloom's Taxonomy is a hierarchy of thinking skills that students need to be successful. Ranked from lowest to highest, the six categories included knowledge, comprehension, application, analysis, synthesis, and evaluation (Bissel and Lemons, 2006).

Critical thinking skills. Critical thinking skills have been difficult to define. In 1990, the Delphi Research Group assembled to create a formal definition:

> We understand critical thinking to be purposeful, self-regulatory judgment that results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, or contextual considerations upon which that judgment is based. CT is essential as a tool of inquiry. Thus, educating good critical thinkers means working toward this ideal. It combines developing CT skills with nurturing those dispositions which consistently yield useful insights and which are the basis of a rational and democratic society. (Facione, 1990, p. 3)

Higher order thinking skills. Ennis (1985) explained that higher order thinking skills are the top three levels of Bloom's Taxonomy: analysis, synthesis, and evaluation. Among higher order thinking skills are critical thinking and problem solving (Miri et al., 2007). Miri et al. (2007) defined higher order thinking skills as the development of critical thinking, decision making, and problem solving beyond the knowledge capacity that are necessary to achieve success in the world. See Appendix A for a chart that further details the definitions, verbs, and behaviors associated with higher order thinking skills (Huitt, 2011).

Lateral thinking. De Bono (1976) coined this term to indicate a change from one way of looking at things to another. Lateral thinking differed from vertical thought in that vertical thought was normal, systematic thought, and lateral thinking involved more insight, creativity, and humor (De Bono, 1970)

Millennials. Researchers have identified those born between the years of 1982 – 2005 as millennials (Howe & Strauss, 2007).

Problem–solving skills. An integral aspect of higher order thinking was problem-solving skills (Lewis & Smith, 1993). Steps to problem solving were similar to those of the scientific method: recognition of a problem, consideration of background, research plan of potential actions to solve the problem, a planned execution, and an examination of the results (Qin, Johnson, & Johnson, 1995).

Rigor. Academic rigor of content required the utilization of higher order thinking skills and an advanced, thorough curriculum. Wyatt, Wiley, Camara, and Proestler (2012) noted that organizations have listed academic rigor as a core component to college readiness.

Chapter II: Review of the Literature

Despite the fact that prominent philosophers and psychologists theorized independent thought, problem solving skills, and autonomy emerge in adolescence (Arnett, 2000; Bandura, 1977; Erikson, 1994; Kohlberg, 1971), college professors noticed changes resulting in a delay in this area (Frey & Tatum, 2016; Hofer et al., 2016; van Ingen et al., 2015; Vinson, 2013). According to college professors, one reason for this decline was that students have perpetuated a strong dependency on their parents and thereby exhibit a lack of the independent problem solving skills that should have emerged in the adolescent years (Erikson, 1994; Price, 2010; Vinson, 2013).

De Bono (1976), Bandura and Wessels (1994), and Hofer and Yu (2003) thought teachers had a responsibility to create student environments conducive to the establishment and development of the cognitive skills and self-efficacy needed for future success. SEAs within the state of Georgia have recognized not only the role of the classroom teacher but also the responsibilities of each school in the attainment of this important goal (Lombardi et al., 2013). As a result, SEAs have implemented assessment tools such as the CCRPI, which is used in Georgia, to evaluate the degree to which each LEA has prepared students for a successful future (Kramer, Hodges, & Watson, 2013).

Hence, the purpose of the study was to examine the strategies and assessments that middle school teachers have used to promote, nurture, and assess higher order thinking skills since these skills serve as a prerequisite to high school, college, and career success. In the following literature review, the researcher studied the definitions of higher order thinking skills as well as concerns of college professors and their opinions as to the root of the problem. In addition, the researcher included a failed initiative attempt to remedy the collegiate concerns and an assessment tool that resulted from the

legislation. The subsequent sections contained information about psychological theories that detail the emergence of problem-solving and advanced cognitive thought in adolescents as well as the importance of teaching students to think at the middle school level.

Higher Order Thinking, Critical Thinking, and Problem-Solving Skills

Researchers provided many definitions of higher order thinking, but the meaning became vague and confusing due to the inconsistent use of the term critical thinking (Ennis, 1989; Lewis & Smith, 1993). A definition by Schraw and Robinson (2011) detailed higher order thinking as "skills that enhance the construction of deeper, conceptually-driven understanding" (p. 2). Another definition by Lewis and Smith (1993) offered the following explanation, "Higher order thinking occurs when a person takes new information and information stored in memory and interrelates and/or rearranges and extends this information to achieve a purpose or find possible answers in perplexing situations" (p. 136). Miri et al. (2007) defined higher order thinking skills as the development of critical thinking, decision making, and problem solving beyond the knowledge capacity to achieve success in the world. In sum, higher order thinking incorporates both critical thinking and problem-solving skills since it requires the application of both new and previously learned information to find answers to a problem and then decide on a course of action (Lewis & Smith, 1993).

According to Ennis (1989), educators have used the term higher order thinking skills as a reference to the top three levels of Bloom's Taxonomy: analysis, synthesis, and evaluation, though Bissell and Lemmon (2006) argued that higher order thinking skills were actually the top four levels of Bloom's Taxonomy: application, analysis, synthesis, and evaluation. Bloom, an Associate Director of the Board of Examinations of the

University of Chicago, Illinois, created the taxonomy of educational objectives in 1956 to facilitate the creation of test items and clarify levels of learning and thought (Krathwohl, 2002). Since then, Bloom's taxonomy has served to classify learning and instruction and has provided educators with an educational framework and a basis for moving learning objectives toward higher level thinking skills (Krathwohl, 2002). In Appendix A, this researcher provided the definitions of the top three levels of Bloom's Taxonomy as well as the verbs and behaviors associated with each of these higher order thinking skills.

A revision of Bloom's taxonomy provided educators with a multi-dimensional classification since the changes included categories that can overlap and do not necessarily indicate a hierarchy of complexity (Amer, 2006). The original noun categories were changed to the following verbs: remember, understand, apply, analyze, evaluate, and create (Krathwohl, 2002). According to Krathwohl (2002), the team of revisers considered the inclusion of the popularly used terms *critical thinking* and *problem-solving* but found it too difficult to assign the terms to any specific category since the meanings were too diverse.

According to Hess, Jones, Carlock, and Walkup (2009), the drawback to using the revision of Bloom's Taxonomy was that there were many verbs at multiple levels of the hierarchy, which caused confusion in the levels of complexity. Hence, a switch to Webb's Depth of Knowledge (DOK) schema provided a return to a hierarchical framework and a clearer criteria to analyze the alignment of standards to curricula and assessments (Hess, 2013). Educators believed this schema would be a more effective tool to promote higher order thinking skills in preparation for the impending education reform initiative—the CCSS (Hess, 2013). Webb's DOK contained four levels: recall and reproduction, skills and concepts, strategic thinking and reasoning, and extended

thinking (Hess, 2013) Webb considered higher order thinking plus knowledge to indicate the deepest level of complexity—DOK level four, extended thinking (Webb, 2002).

The term *critical thinking* also has had many definitions and explanations. One definition of critical thinking skills was the capacity to apply purposeful self-regulatory judgement (Abrami et al., 2008). Schafersman (1991) explained that critical thinking skills involved the ability to ask pertinent questions, collect information, and use the information in a logical manner. Halpern (1998) felt that critical thinking was the use of problem solving and purposeful, reasoned, goal-directed thinking to increase the probability of a desired outcome. Ennis defined critical thinking as "reasonable reflective thinking focused on what to do or believe" (Ennis, 1989, p. 4). Lewis and Smith (1993) explained that critical thinking could have three different but closely related meanings: problem solving, evaluation or judgement, and a combination of evaluation or judgement coupled with problem solving (Lewis & Smith, 1993).

To clarify the many meanings and broad use of the term critical thinking in education, 46 educators, scholars, and theorists formed a panel known as the Delphi Research Group (Facione, 1990). The panelists of the Delphi Project provided two definitions related to critical thinking: one that involved the process and one that described an individual who practiced the skill (Facione, 1990). The Delphi Report defined the critical thinking process as purposeful, self-regulatory judgment and consideration resulting from interpretation, analysis, evaluation, and inference (Facione, 1990). The panel defined critical thinkers to be "inquisitive, well-informed, reasoning, open-minded, flexible, honest in facing personal bias, able to reconsider, clear about issues, and persistent in seeking results" (Facione, 1990, p. 3). Walker (2003) acknowledged that individuals who possessed the disposition to think critically have

developed the skills needed to do so. Hence, educators have been faced with the challenges of both developing critical thinking skills and nurturing the qualities that contribute to insightful thinking and learning (Facione, 1990; Walker, 2003).

The act of problem solving was listed as an important component in the definitions of both higher order and critical thinking (Lewis & Smith, 1993; Miri et al., 2007). Windschitl, Thompson, and Braaten (2008) explained the epistemic perspective of problem solving was simply the application of the scientific method. In fact, the cognitive processes needed for higher order thinking, critical thinking, and problem solving were similar to the steps required of the scientific method—recognition of a problem, consideration of background research, plan of potential actions to solve the problem, a planned execution, and an examination of the results (Qin et al., 1995). Although experts in the field associated the scientific approach to problem solving with mathematics and sciences (Lewis & Smith, 1993), philosophers, such as Dewey, believed the scientific method should be expanded to solve problems outside the realm of science and mathematics (Johnson, 2014; Windschitl et al., 2008).

Hence, critical thinking and problem solving skills were indeed elements of higher order thinking skills, and according to educators and researchers, these thinking skills were acquired though education, training, and practice (Balin et al., 1999; De Bono, 1976; Lewis & Smith, 1993; Snyder & Snyder, 2008). Gokhale (1995) conducted a study of 48 undergraduate students at Western Illinois University, all enrolled in the same course. All students heard a lecture but half completed a worksheet individually and the other half completed the worksheet collaboratively. Afterward, the students took a test comprised of drill and practice questions as well as critical thinking items (Gokhale, 1995). Although the instructor gave the answers to both groups, those in the

collaborative group scored higher on the test (Gokhale, 1995). Likewise, ten Dam and Volman (2004) found that courses with teachers who have encouraged a high level of student participation or interaction between peers have been related to growth in the area of critical thinking.

Schafersman (1991) explained the purpose of teaching thinking skills was to prepare students to succeed in the future. Educators could not teach these skills through mere repetition but rather through the development of relevant knowledge combined with discussion and the understanding of which strategies and standards apply to a particular issue (Balin et al., 1999). Miri et al. (2007) found that students demonstrated improvement in the area of critical thinking and related abilities after teachers had incorporated strategies that encouraged student inquiry, self-investigation of phenomena, open-ended experiments, and making inferences.

In sum, the definitions of higher order thinking, critical thinking, and problem solving can become confusing (Lewis & Smith, 1993); however, an understanding that the term higher order thinking encompasses critical thinking and problem-solving could help teachers better conceptualize the terms and move students toward higher levels of thought (Krathwohl, 2002; Miri et al., 2007). By knowingly, persistently, and purposely incorporating strategies, educators could successfully promote higher order thinking skills that move students in the direction of college and career success (Miri et al., 2007).

Assessment of Thinking Skills

A focus on the higher order thinking skills of reasoning, problem-solving, and critical thinking has necessitated alternative assessments to traditional testing. Authentic or alternative assessment, an effort to reform assessment based on student need, has involved ill-structured problems and tasks such as conducting research, writing and

revising, discussion, oral analysis, and debate (Wiggins, 1990). According to Behar-Horenstein and Nui (2011), the characteristics of formative or traditional evaluation such as assessments that have required right or wrong answers, telling the truth, and objectively scored tests did not encourage the use of critical thinking skills. Traditional assessments that placed emphasis solely on factual knowledge and were limited to paper and pencil tests requiring one correct answer did not prepare students for adult life (Linn, Baker, & Dunbar, 1991; Wiggins, 1990).

Formative or traditional assessments have been useful to determine mastery of knowledge and understanding of specific content; therefore, researchers suggested the use of both quantitative and qualitative measures to assess growth in content as well as higher order thinking (Behar-Horenstein & Nui, 2011). Rather than traditional multiple choice exams, students had a better opportunity to demonstrate growth in critical thinking via class presentations, papers that displayed critical analysis, and essay exams (ten Dam & Volman, 2004). Thus, the use of Bloom's taxonomy proved to be a useful tool not only for the formulation of questions that incorporate content and critical thinking but also as a guide in the preparation of grading rubrics that evaluate the content and thinking needed for appropriate answers (Bissell & Lemons, 2006). The process of using Bloom's Taxonomy for lesson planning and assessment has clarified course objectives, goals, and improved student learning outcomes (Bissell & Lemons, 2006).

A focus on increased academic standards that incorporate modern technology and appropriate assessments has been an academic concern since the start of the new millennium (Silva, 2008). In 2008, Silva mentioned the challenges of measuring 21st century learning skills—the ability to find and analyze information from multiple sources and apply the information to create ideas and make decisions—thought to be of renewed

importance due to a changing workforce (Silva, 2008). Silva (2008) referred to the International Baccalaureate Program as an example of a curriculum encouraging an advanced core content and skills aligned with the essential assessment components that included multiple choice, short response, structured, open-ended, essay, problem solving, and data analysis questioning in addition to case studies.

Wiggins (1990) stated that assessment matched to method of instruction clarifies student expectations and goals. Hence, the teaching and learning of higher order thinking skills necessitated the implementation of assessments that matched and measured those skills more effectively (Wiggins, 1990). While assessment of knowledge and understanding was direct and to the point, it has taken more time and resources to measure higher order thinking skills effectively (Bissell & Lemons, 2006). Lewis and Smith (1993) reasoned that educators must assess higher order thinking skills by presenting students with situations and questions they cannot solve nor answer through simple recall. In sum, the proper measurement tools could produce meaningful results that not only enhance the validity of the assessment but also serve to improve instruction (Linn et al., 1991).

Concerns at the College Level

To achieve college success, Hofer et al. (2016) believed students should have established the ability to manage time, organize work, and self-regulate. According to Hofer (2008), the most important psychosocial task of an individual entering adulthood was to become an autonomous, self-governing, and self-regulated individual. College professors identified a lapse in the development of these abilities and a growing trend toward dependency on parents who are engrossed in the daily decisions of their adult

children (van Ingen et al., 2015). College professors have noticed this trend to have adverse effects on student success (Vinson, 2013).

According to college professors, the millennial generation have struggled to make independent decisions (Bernstein & Triger, 2011; Hofer, 2011; van Ingen et al., 2015; Vinson, 2013). Professors of the millennial generation college students observed that the students think differently than previous generations, possibly due to overprotective parents and a philosophy that promoted an *everybody wins* mentality (Tallent & Barnes, 2015). Both Price (2010) and Vinson (2013) acknowledged the relationship between students and parents as a likely reason for the delay in the cognitive maturity level of college students. Price (2010), a professor at Dalton State College, Georgia, reported that colleagues who have taught undergraduates for a decade or more noticed changes in the development of these students—changes that demonstrated an extension of student adolescence and a delay in the development of independence from parental influence. Vinson (2013), a professor at Suffolk University Law School of Boston, Massachusetts, claimed that parental involvement has become an issue in graduate school as well. Vinson (2013) explained that excessive parental involvement has hampered students' ability to acquire the skills needed to become effective legal professionals.

Hofer et al. (2016) also alleged that college students who maintained daily contact with parents were not likely to achieve the autonomy needed to form positive relationships with peers and failed to maintain higher overall grade point averages. van Ingen et al. (2015) studied undergraduate students and found those with highly involved parents tended to exhibit low self-efficacy, alienation problems, and a lack of trust in peers. The researchers claimed these traits were the result of *helicopter parenting* and defined helicopter parents as over-involved parents in the lives of their children

(van Ingen et al., 2015). They characterized the effects of this dependent relationship at the college level as "a readily observable and potentially detestable dynamic" (van Ingen et al., 2015, p. 18).

Hofer and Moore (2010) believed the term helicopter parent represented only a small and extreme segment of parents who over managed their children. Hofer and Moore (2010) coined the term "iConnected Parents" (p. 2) to describe the majority of parents in the new era—those whose parenting practices were responsible for the college students stuck between adolescence and adulthood. Hofer, Thebodo, Meredith, Kaslow, and Saunders (2016) explained that this parental involvement in college has become widespread and commonplace due to the various modes of communication that have facilitated immediate and recurrent contact between parents and students (Hofer et al., 2016). Bernstein and Triger (2011) used the terms *intensive parenting* and *over parenting* to describe the above-mentioned dynamic they considered the new normal in middle class America.

Bernstein and Triger (2011) reiterated the concern that intensive parenting was a socio-technological trend reinforced by advances in technology that enabled parents to stay in constant contact with their children. Craft (2010) studied the frequency and context of texting between 10 pairs of 13-16-year-old teens and their parents. The researcher found that texting gave parents an abundance of control, access, and insight into their children's lives (Craft, 2010). Golonka (2013) also studied the frequency and effects of communication between college students and parents. The researcher investigated data from the self-reports of 180 residential college students to study the impact of communication patterns between parent and child on college adjustment (Golonka, 2013). Golonka (2013) commented that individuals who believed that the

post-adolescent period was a time of "extended adolescence" (p. 126) would find the implications of the study not only reinforcing but also quite alarming. The findings indicated an existence of immaturity, an inhibition in the development of autonomy, and a lack of independent identity among students who maintained frequent contact with parents. Hofer and Moore (2010) described this frequent contact as an "electronic tether" (p. 14) linking students to their parents via increased use of email and cell phones.

Hofer (2005) conducted studies detailing communication between college students and their parents. In the first research study at Middlebury College, Vermont, Hofer (2005) examined the frequency of contact of 1212 incoming freshmen college students with their parents. By the end of the first semester, the results showed that students maintained contact with parents at an average of 10 times per week. A year later, Hofer and Fullman (2006) conducted a bigger follow-up study of 1,000 students and parents at Middlebury College, Vermont, and the University of Michigan. Hofer and Fullman (2006) researched the contact between first- and second-year college students and their parents to determine whether the frequency of contact had waned in the sophomore year. The research revealed that students communicated with parents an average of 13 times per week, mostly via cell phone but also through email. Thus, the findings revealed no decrease in frequency of communication from freshman to sophomore year but rather a trend toward increased communication (Hofer & Moore, 2010). Existence of a trend toward increased communication as the curriculum became more difficult could validate the apprehension of graduate school professors, such as Vinson (2013), who expressed concerns that graduate students in law school relied too heavily on parents. Vinson (2013) noticed that the law students demonstrated deficiencies in the qualities needed to become successful legal professionals. More

specifically, Vinson (2013) observed that the students exhibited under-involvement in decision making, reduced ability to cope, a lack of ability to self-advocate, and an inability to manage time due to excessive contact and reliance on parents (Vinson, 2013).

Technological advances have made close contact with friends and family possible no matter the distance one travels to study. Hofer, Thebodo, Meredith, Kaslow, and Sanders (2016) conducted a study with 417 American students studying at a Danish study abroad program. Hofer et al. (2016) assessed student communication patterns with parents and friends to determine the consequences to personal and cultural learning. The researchers found the students who were unable to loosen the ties to relationships at home in the United States had a less fulfilling experience (Hofer et al., 2016). Findings confirmed the obvious assumption that students who were able to concentrate on activities and relationships within the host country achieved a sense of autonomy, a higher caliber of cultural learning, and a positive overall experience (Hofer et al., 2016).

Hofer and Moore (2010) expressed that college students used to make the transition from adolescence to adulthood without parental intervention. Continuous contact between college students and parents was not convenient nor affordable for generations prior to the millennials; therefore, students and parents checked in with a weekly phone call (Hofer et al., 2016). College students learned to do laundry, register for classes, manage studies, stay awake all night to complete term papers, date, and confide in peers without daily parental intervention (Hofer & Moore, 2010).

Daily contact with parents has changed much of the college experience (Golonka, 2013). According to Smith (2017), 92% of all Americans owned a cell phone in 2016, and the number rose to and 96% in 2019 (Pew Research Center, 2019). In addition, half of all Americans owned a small tablet computer (Pew Research Center, 2019). The

American Academy of Pediatrics published a report by Kabali et al. (2015) that stated most American children had access to a mobile device by age four. This access to technology has provided unlimited contact between parent and child, allowing for continuous parental management of the child's life from infancy into the adult years. Through daily texting and phone calls, parents have reminded their children to clean their rooms, study for tests, and write papers. Technology facilitated the parental micromanagement that began in the child's early years and has not ceased after the child entered college (Hofer & Moore, 2010). Since the teens had never experienced a different way of life, they did not conceptualize an intrusion to privacy and independence (Craft, 2010), but Hofer (2008) found that the frequent contact and regulation by parents did not facilitate the transition from high school to college.

Technology provided an avenue for immature student behavior (Hofer et al., 2016). Student immaturity due to increased parental involvement became troublesome to the student affairs professionals in colleges and universities (Reynolds, 2013). To temper the frequency of parental over involvement at the college level, Vinson (2013) proclaimed colleges must adopt a firm policy with clear boundaries and parameters for parental communication. Vinson (2013) expressed the policy should advocate either parental involvement or student autonomy, but whichever the case, the policy needed to incorporate complete faculty and staff acceptance. Payne (2010) suggested college admissions offices work with high school guidance counselors to provide parents with a better explanation of the differences in expectations for parents of high school and college students. Furthermore, van Ingen et al. (2015) proposed that college counselors attend college orientations to explain to parents the benefits of acquiescing control and permitting their adult children to make independent choices.

Conversely, Spence (2012) suggested that college administrators adapt to this growing trend and provide guidance to parents as to how they could be most helpful. Spearman (2010) also suggested that colleges accept parents as part of the higher learning process and implement a campus-wide approach to collaboration. Both Spearman (2010) and Spence (2012) recommended that student affairs professionals adopt a model to interface with parents and recognize them as valuable partners in achieving learning outcomes since this growing trend of increased dependence and decreased ability to problem solve is unlikely to reverse.

The Common Core Initiative

To better prepare for the academic challenges of college, professors suggested that students take high school classes with more rigor and focus on higher order thinking skills (Rothman, 2012). Hence, policy makers and professionals from higher education institutions formed a partnership to brainstorm solutions to facilitate the transition to college and address college and career readiness concerns (King, 2011). As a result, the National Governors Association for Best Practices and the Council of Chief State School Officers established the CCSS initiative of 2010 in an attempt to create national standards with better focus, consistency, efficiency, and quality (Porter, McMaken, Hwang, & Yang, 2011).

One goal of the CCSS was to elevate national expectations in the areas of language arts and mathematics so that children in America could better compete in a global economy (Krashen, 2014). The CCSS initiative included more rigor within content with the incorporation of higher order thinking skills. The research-based standards were an attempt to mirror the expectations of top performing countries to ensure the same level of college and career success (King, 2011). The objective was to

build on the strengths of current state standards by increasing expectations so that U.S. students were as prepared to succeed on a global level (King, 2011).

Another goal was to raise the standards of states with lower student performance scores to ensure that every state held high academic standards. As a result, the CCSS initiative placed emphasis on standards requiring that all states cover a universal set of higher order thinking standards to better prepare all students in America for college (Conley, Drummond, de Gonzalez, Rooseboom, & Stout, 2011). The standards were a guide for educators to focus instruction more deeply on fewer topics (Supovitz & Spillane, 2015) and abandon a curriculum that is "a mile wide and an inch deep" (Porter et al., 2011, p. 103). The standards contained the existing state requirements with an emphasis on national academic norms of increased difficulty, rigorous content, and higher order thinking skills (Rothman, 2012). The standards would have raised the bar so that teachers could implement lessons that engaged higher levels of cognitive development, especially in the areas of mathematics and English language arts (Supovitz & Spillane, 2015).

In 2010, 36 states had begun implementation of the CCSS (Porter et al., 2011). According to the Education Policy Improvement Center at the University of Oregon, professors of freshman college courses found that the accepted standards of Common Core were in alignment with skills needed for college success (Conley et al., 2011). Whitaker (2015) proposed the possibility that education was on the rise to peak performance with the intention to adopt the CCSS and CCRPI, both of which emphasized rigor and cognitive strategies that promoted critical thinking.

The anticipated implementation and alignment of the new standards gained momentum but lost intensity during the 2014–2015 academic year as an anti-Common

Core coalition had become more popular (McGuinn & Supovitz, 2016). Critics alleged the CCSS would place too much emphasis on international test scores, ignore poverty issues, and only benefit the already high performing elite (Krashen, 2014). Politicians opposed the initiative because they claimed it emphasized excessive government control, placed too much emphasis on standardized tests, had a one-size-fits-all plan, and hampered teacher autonomy (McGuinn & Supovitz, 2016).

In 2015, Congress adopted the Every Student Succeeds Act (ESSA) (McGuinn & Supovitz, 2016). The ESSA did not emphasize national standards nor did it address collegiate concerns to promote increased rigor and the development of higher order thinking skills (McGuinn, 2016). Instead, the ESSA gave states the power to select academic standards that aligned with college entrance requirements and choose a research-based plan to transform the lower performing schools (Klein, 2016).

Although the Common Core initiative was not accepted as initially intended, many states had already adopted the standards and began the implementation process to train teachers with strategies to promote rigor and higher order thinking skills (Troia et al., 2016). An emphasis on learner-centered techniques, such as differentiated instruction and problem-based learning, have provided teachers with options to increase academic rigor and enhance the content in daily lesson plans (Paige et al., 2015). Enhancement of content with the insertion of strategies that differentiate learning has provided teachers with additional tools to adapt lessons to the needs of learners of all ability levels (Whitaker, 2015). Hence, not all progress was lost with the abatement of the Common Core initiative, rather it served as a catalyst to recognize and implement higher standards such a gifted training and the CCRPI (Paige, Smith, & Sizemore, 2015).

The Purpose of the College and Career Readiness Performance Index

The anticipated adoption of the CCSS promoted educators in each state to consider higher standards for critical thinking and problem solving within a range of academic content areas (American Institute for Research, 2014). The goal of the higher standards was to create a set of expectations for college and career readiness that would improve student performance and future success in a global economy (American Institute for Research, 2014). Hence, the Center on Educational Policy conducted a survey of state directors of education in 46 states to clarify the meaning of college and career readiness (American Institute for Research Center, 2014)

Among the definitions, there were references to academic knowledge, critical thinking and problem solving, social and emotional learning, perseverance, and community involvement (American Institute for Research, 2014). In Georgia, the Department of Education (2015) defined college and career readiness:

> . . . the level of achievement required in order for a student to enroll in two- or four-year colleges and universities and technical colleges without remediation, fully prepared for college-level work and careers. This meant that all students should graduate from high school with both rigorous content knowledge and the ability to apply that knowledge. (American Institute for Research, 2014, p. 8)

In 2012, the Georgia Department of Education had adopted the CCRPI to measure individual school success in preparing students for the next academic level and ultimate achievement of the above-mentioned definition (Robinson, 2015). The Georgia Department of Education has implemented this 100-point scale, with 10additional bonus points, to determine achievement, achievement gap closure, and progress (Robinson,

2015). In addition, the CCRPI included a 1-5 star rating of financial efficacy and school climate (Robinson, 2015).

The CCRPI had supplemental indicators for Georgia schools to earn additional bonus points (Georgia Department of Education, 2015). At the middle school level, these indicators were the amount of students with a passing score in fine arts, career exploration, or world language by eighth grade and the percentage of students earning a high school credit by the end of the eighth grade year (Georgia Department of Education, 2015). Other indicators were a Georgia Science, Technology, Engineering and Mathematics certification, the percentage of teachers using statewide data, the implementation of innovative practices to improve student achievement, and research-based practices to promote a personalized school climate (Georgia Department of Education, 2015).

In 2015, federal legislators authorized the ESSA, which not only aligned more closely with Georgia's CCRPI but also provided the ability to revise the rating system (Georgia Department of Education, 2018). As of 2017, the redesigned version of the CCRPI has become the new accountability system in the state of Georgia (Georgia Department of Education, 2018). The revision placed emphasis on simplified, clearer goals toward student growth and school improvement (Georgia Department of Education, 2018). Hence, Georgia retained an aspect of the CCSS by maintaining the CCRPI as an accountability system to encourage schools to focus on increased rigor of curriculum and college preparation by offering incentives for student performance, attendance, discipline, and school climate (Kramer, Hodges, & Watson, 2013).

The Importance of Teaching Students to Think at the Middle School Level

The concerns and observations of college educators have included a lack of independent thought and higher order thinking skills among college students—behaviors that should have emerged in adolescence before the college years (Golonka, 2013; Hofer et al., 2016; Jones & Ratcliff, 1993; Price, 2010; Vinson, 2013). This emergence of cognitive development has been associated with teenagers and has been a prerequisite for college and occupational success (Bell, Allen, Hauser, & O'Connor, 1996). In fact, prominent psychologists have recognized these behaviors as the defining elements of early adolescence (Erikson, 1994; Kohlberg, 1971; Piaget, 1964). Psychologists such as Hall, Piaget, Kohlberg, Erikson, and Marcia have considered adolescence a period of cognitive and moral development characterized by emerging autonomy, independence, identity and self-efficacy when advanced problem solving and critical thinking skills have appeared and begun to flourish (Arnett, 2000; Bandura & Wessels, 1994; Epstein, 2010; Kohlberg, 1971; Marcia, 1966; Piaget & Inhelder, 1969). According to the theories of these psychologists, students should have developed a foundation for critical thinking skills in early adolescence—the middle school years—to handle the demands of high school and college instruction (Waring & Robinson, 2010).

Interestingly, college professors of the millennial generation have indicated a distinct absence of the very qualities that the most prominent psychologists have attached to the following theories of adolescent development (Craft, 2010; Golonka, 2013; Hofer et al., 2016; Price, 2010; Vinson, 2013). For example, the scientific study of adolescent psychology began in 1904 as Hall defined the emotional and behavioral distinctiveness of adolescence as a time of storm and stress (Arnett, 2000). Hall claimed this was evident since adolescents had learned to question and contradict their parents (Arnett, 2000).

Like Hall, Piaget believed that adolescents have reached a stage where cognitive development has enabled them with the ability to question and contradict (Arnett, 2000). Piaget (1964) believed that most teens have acquired adult thinking skills and emotional maturity by age 15. Wechsler (1944), the developer of intelligence tests, also proclaimed that individuals have reached the highest point of intelligence at 15 but then intelligence levels gradually drop throughout the adult years. Piaget (1964) introduced four stages of cognitive development and believed individuals entered the fourth and final stage between the ages of 12–19 (Feldman, 2004; Piaget & Inhelder, 1969). In the first stage of life, Piaget detailed a Sensorimotor, pre-verbal phase that he believed to last approximately 18 months (Cherry, 2016). In this stage, the infant has learned to rely on the basic senses to acquire information (Cherry, 2016). The child eventually has developed object permanence, the recognition that objects out of the child's line of sight continue to exist (Piaget, 1964).

In the second Preoperational stage, Piaget explained that the child has learned to pretend and play but has not yet discovered logic or another's point of view (Cherry, 2016). This stage typically has ended around age six when the Concrete Operational Stage has begun (Feldman, 2004). The Concrete Operational Stage emerged as children develop the fundamental basis of logic, mathematics, and physics (Piaget, 1964). At this point, the child has become a less egocentric individual and has developed a sense of empathy (Cherry, 2016).

In the final stage, the Formal Operational Stage, the young adolescent has established the formation of abstract thought, hypothetical reasoning, and logic to find solutions to problems (Cherry, 2016). At this point, adolescents have moved beyond the trial and error approach to problem solving and have reached an ability to use systematic

and logical methods to create solutions independently using a plan and an approach (Piaget & Inhelder, 1969). According to Piaget (1964), this level of cognitive development has commenced at the approximate age of 12 and continued throughout adulthood.

Along with Piaget (1964), both Kohlberg (1971) and Erikson (1994) theorized that individuals passed through stages of cognitive development and that adolescents have reached advanced levels of those stages. Kohlberg (1971) theorized that individuals also passed through stages of moral development. At the highest level, the post-conventional level, individuals have learned to live by ethical principles that require higher levels of thinking and decision making (Kohlberg & Hersh, 1977b). Kohlberg's study revealed over half of 13-14-year-olds tested were at the conventional moral reasoning stages, and over 20% already had reached the highest level of moral development (Kohlberg, 1971).

Leading psychologists such as Erikson (1994) and Marcia (1966) believed that adolescents reached a point in cognitive development when they learned to make decisions and solve personal dilemmas or they faced an identity crisis that interrupted the natural progression of adulthood. According to Erikson (1994), adolescents have reached a stage of psychosocial development titled identity versus role confusion. This stage involved the struggle to achieve self-identity and become independent and autonomous (Erikson, 1994). An attempt to avoid personal responsibilities at this adolescent stage would result in an identity crisis and a delay of entrance to adulthood. Thus, Erikson (1994) believed adolescents who were unsuccessful at this stage had a tendency to experience role confusion and upheaval.

Marcia's theory of identity was an extension of Erikson's stages and perspective of ego identity; however, Marcia's statuses focused solely on the adolescent period (Marcia, 1966). Marcia (1966) believed that trauma in adolescent identity was a result of difficulty in decision making while moving through any of the four adolescent identity statuses: identity diffusion, foreclosure, moratorium, and identity achievement (Marcia, 1966). Identity achievement is the point in which the adolescent has chosen and made a decision and commitment to a sense of identity (Marcia, 1966). Hence, both Erickson (1994) and Marcia (1996) acknowledged future problems with decision making and autonomy if adolescents do not transition smoothly between stages or statuses.

Epstein (2010) also proposed a theory; however, his theory did not detail the cognitive abilities of adolescents. In contrast, Epstein (2010) detailed a theory of the reason that the millennial generation exhibits a lack of critical thought and autonomous decision-making skills. Epstein (2010) noticed an adolescent extension into the 20s or 30s and blamed an absence of exposure to life events. The researcher claimed that modern society shelters perfectly capable adolescents by shielding them from adult responsibilities and life events resulting in an extension of adolescence (Epstein, 2010). Epstein (2010) coined the term "infantilization" (p. 161) to explain the results of these unnecessary restrictions placed on teens.

Epstein and Dumas (2007) surveyed 100 teens aged 13-17 from seven states. The two researchers administered a checklist of 42 restrictions adapted from the Epstein-Dumas Test of Adultness. Most of the 42 restrictions detailed over protective parenting practices; however, the checklist contained some legal restrictions that have increased in number since the 1960s (Epstein, 2010). Examples of parental restrictions included types of punishment, rules pertaining to daily activities such as showering or

style of dress, and requirements for school behaviors and extra-curricular activities (Epstein, 2010). Legal restrictions ranged from sexual activity, smoking, drinking alcohol, school attendance, and town curfews (Epstein, 2010).

The findings of the Epstein and Dumas study indicated that teens endured 10times as many restrictions as adults since the average adult score was 2.3 and the average teen scored 26.6 (Epstein, 2010). Teens also scored higher than incarcerated individuals who averaged a score of 14.6 (Epstein, 2010). Hence, Epstein (2010) listed unnecessary restrictions from parenting and society as the reason that adolescents display a delay in independent, autonomous, and adult-like behavior.

Between early and middle adolescence, an individual should have formed an increased ability to define one's personal goals independent from the influence of others (Noom, Deković, & Meeus, 2001). In addition, adolescents at the middle school level should have demonstrated growth toward abstract thinking—the ability to think and learn, consider additional ideas, and plan the steps involved in learning activities (National Middle School Association, 2003). Thus, the development and nurturing of independent thinking skills has been especially important to the middle school student's cognitive development (Waring & Robinson, 2010). De Bono (1976) opined that although critical thinking instruction was effective at all ages, the ideal age range for teaching thinking was 10-13 because it could facilitate the transition to content that is more difficult in the secondary schools. A focus on strategies that encourage higher order thinking skills at the middle school level could nurture the skills that help close the gap between the cognitive abilities that professors have observed and those that prominent psychologists have documented in their theories.

Higher Order Thinking Strategies

Sternberg (1999) stated that students who think to learn also learn to think. Hence, the development and enhancement of higher order thinking skills for all ages in addition to content mastery has become a major educational goal (Yen & Halili, 2015; Zohar & Dori, 2003). To achieve this goal, Yen and Halili (2015) opined that teachers should promote student engagement activities and tasks which surpass the second level of Bloom's Taxonomy and place focus on application, analysis, synthesis, and evaluation. A focus on strategies that promote these higher order thinking skills have proven to benefit students of lower and average ability levels as well as the gifted students (Zohar & Dori, 2003).

Limbach and Waugh (2010) established a five-step process for the development of higher order thinking skills that educators could use to promote an active learning environment and encourage student movement toward higher levels of thought. The first step was to determine the learning objectives that students should master upon completion of the course (Limbach & Waugh, 2010). The second step was to teach through higher level questioning to challenge the students (Limbaugh & Waugh, 2010). The third step was to implement practice by choosing activities and strategies that allow students to think creatively (Limbaugh & Waugh, 2010). The fourth step was to continually review, refine, and improve upon instruction (Limbaugh & Waugh, 2010). The final step was to provide the students with constructive feedback and relevant assessments that not only evaluate student achievement but also gauge the effectiveness of the course, curriculum, and instructional techniques and strategies (Limbaugh & Waugh, 2010).

Another process for the development of higher order thinking skills was to choose appropriate thinking strategies (Limbach & Waugh, 2010). Teacher choice of strategies that encourage students to state opinions, pose arguments, and analyze evidence has been a crucial component to the development and application of higher-level thought in the classroom (Limbach & Waugh, 2010). The following instructional techniques have been listed and explained in Appendix B as strategies that enhance higher order thinking skills: case-based scenarios, concept mapping, cooperative learning groups, debates, demonstration, discussion, journal writing, meta-cognition, problem-based learning, reflection, scaffolding, simulations, and Socratic learning (Jerome, Lee, & Ting, 2017; Savi, Collins, & Alexander; 2011).

Summary of the Literature

The numerous definitions of higher order thinking skills included both critical thinking and problem solving skills as important components (Hess et al., 2009; Lewis & Smith, 1993; Miri et al., 2007; Schraw & Robinson, 2011), yet educators have simplified the many definitions of higher order thinking skills as the skills necessary to reach the top three levels of Bloom's Taxonomy (Ennis, 1993; Halpern, 1998). To reach levels of higher thought consistently and develop a better fluency in thinking skills, researchers theorized that individuals need the proper training (Bissell & Lemons, 2006; De Bono, 1976; Kivunja, 2015; Miri et al., 2007; ten Dam & Volman, 2004). Accordingly, the incorporation of lessons and assessments that promote a higher fluency in thinking has become quite important for several reasons (Ennis, 1993; Schraw & Robinson, 2011). First, cognitive psychologists have theorized that independent critical thought naturally develops in the adolescent years (Arnett, 2000; Feldman, 2004; Kohlberg & Hersh, 1977b), yet college professors have noticed an absence of these skills (Golonka, 2013;

Hofer et al., 2016; Vinson, 2013). Second, SEAs have implemented tools such as the CCRPI to measure the rigor of academic content and higher levels of learning in preparation for future success (Lombardi et al., 2013).

Although educators and legislators have recognized the necessity to nurture higher order thinking skills, the classroom teacher has endured the sole responsibility to create lessons that make thinking and problem solving a regular part of the curriculum (Resnick, 1987). This responsibility to develop competent and independent thinkers has become especially important in middle school since these skills theoretically should have developed within this span of time (Price, 2010; Waring & Robinson, 2010). Hence, the middle school teacher has become the architect of lessons, strategies, and assessments that are not only academically rigorous but also motivate students to think.

Chapter III: Methodology

The college professors referenced in Chapter II revealed that millennial students have demonstrated an increased dependence on adults and a decreased ability to display autonomous higher order thinking skills (Golonka, 2013; Hofer, 2011; Price, 2010; Vinson, 2013). According to cognitive psychologists, autonomous decision making and the ability to apply the critical thinking and problem solving skills involved in higher order thinking skills should have developed in early adolescence (Arnett, 2000; Feldman, 2004; Kohlberg, 1971; Marcia, 1966). Hence, the purpose of the study was to examine the strategies that teachers of early adolescents in Georgia's top CCRPI scoring middle schools have implemented to nurture age appropriate cognitive behavior.

Research Design

Creswell (2014) explained that qualitative research involves the exploration and understanding of the meaning that individuals assign to a problem. In an attempt to reveal a better understanding of effective strategies that middle school teachers have used to encourage the skills involved in higher order thinking, this researcher conducted a qualitative study. As Creswell (2014) suggested, this researcher conducted the study using emerging questions, collected all data in the participants' school setting, and developed general themes from gathered particulars before making an interpretation of the data.

Population of the Study

The study included a sample of teachers from a population of top-rated middle schools in Georgia according to the CCRPI scores of 2017. The top schools in the state had similar enrollment numbers but hailed from two very different counties. This researcher selected middle schools based on the common factors: CCRPI letter grades

and size of student enrollment. Each of the schools earned an A rating with numeric scores that ranged from 90–103 on a scale of 1-100 with the possibility to earn three bonus points. Student enrollment of the middle schools ranged from 1,100–1,310.

This researcher selected the five schools based on the Governor's Office of Student Achievement website that revealed the CCRPI scores and enrollment data for each school. The researcher first contacted each of the five principals with an introductory email containing a description of the study, interview questions, a copy of the district consent letter, and a copy of the participant request letter. Then, the researcher contacted the principals by phone to answer questions and request a list of candidates that the principal felt would be suitable for the study. Each principal granted verbal permission by phone to conduct the interviews at their school and then emailed a list of five teachers who have proven to be effective educators. All in all, 21 of the 25 recommended teachers that the researcher contacted decided to participate. On the day of each interview, the researcher collected the written permissions form the principals and teachers.

In an attempt to expand the utility of the data, this researcher originally planned to conduct 25 interviews: one teacher from each of the four academic disciplines within each school due to high test scores in those areas. The researcher's also chose to interview a foreign language teacher from each school since foreign language courses offered at the middle school level were considered to be advanced content. The CCRPI granted extra points to advanced content courses; therefore, the researcher placed importance on this subject area. Among the recommended teachers, each school's principal had provided the name of a Spanish teacher, although the researcher did not specify a preferred foreign language.

As stated above, 21 of the 25 teachers the researcher contacted decided to participate in the study. The experience levels of these teachers ranged from 6-28 years of classroom teaching. The researcher informally spoke with each teacher before the interview to ask about questions or concerns. Then, the researcher gained written permission and conducted each interview in the teacher's classrooms. In the transcriptions and in Chapter IV, the researcher referred to each teacher with an abbreviation of the content area followed by a number representing the order in which the interview occurred. For example, SCI3 represented the third science teacher that had been interviewed.

Data Collection

To acquire data, the researcher completed and submitted the standard application forms for permission to conduct research within both county school districts (see Appendix C). Upon receipt of approvals, this researcher called the secretaries of each principal and then spoke with each principal to discuss research goals. After verbal receipt of principal permission, the principals facilitated the selection process by providing a list of highly qualified teachers of each of the five academic disciplines. The assistance of each principal was the key to finding one educator of English-language arts (LA), mathematics (MA), science (SCI), social studies (SS), and social studies/Spanish (SP) within each of the five schools.

After speaking with the principals, this researcher emailed the teachers on each list to request participation and provide a general explanation of the study (see Appendix D). This researcher requested that the teachers identify a lesson within their curriculum that had served as a catalyst for student application of higher order thinking

skills. To prepare for the interview, this researcher requested that each teacher gather the plan and instructional materials needed to teach the lesson.

Several weeks after the initial email, this researcher began visiting each of the five schools to conduct the interviews. The teachers had chosen convenient times for the interviews based on their daily schedules. Each interview took place in the teacher's classroom and commenced with an explanation of the expected length of time, the purpose of the interview, and a request to record the responses. The goal of each interview was to uncover age-appropriate strategies for early adolescents that aim to promote rigor with higher order thinking skills by asking the four interview questions noted in Appendix E. Each question made no mention of research-based strategies nor alluded to popular assessments to avoid any influence on the direction of the interview. This researcher used a digital tape recorder to document each interview.

In total, this researcher asked four open-ended questions. The four questions were prompts for teachers to describe one lesson that encouraged middle school students to demonstrate higher order thinking skills, to explain the teaching techniques or strategies incorporated within the lesson, and to describe the student actions and behaviors that exemplified the use of higher order thinking skills. This researcher chose the questions based on the literature and guidance from the university committee members and asked these questions in hopes of discovering the strategies that middle school teachers report using to facilitate the higher order thinking skills needed for college success. Upon conclusion of all interviews, this researcher transcribed each interview, used two checklists: Checklist of Instructional Strategies that Promote Higher Order Thinking Skills (see Appendix F) and Checklist of Verbs Associated with Higher Levels of

Bloom's Taxonomy (see Appendix G), and coded the acquired information to analyze the data.

This researcher conducted 21 interviews and asked the four qualitative open-ended questions to gather information based on the experiences and perspectives of the participants (Agee, 2009; Bogdan & Biklen, 2006). This researcher's open-ended questions encouraged the participants to answer in such a way that they could add personal thoughts and feelings (Smith, 1995). The use of open-ended questions eliminated the possibility of short responses or yes or no answers.

The format was semi–structured in that the procedure enabled the participants to preview the questions ahead of time and for interviews to take place within each teacher's classroom (Stukey, 2013). This type of interview allowed participants the comfort to express beliefs and perspectives freely (Bogdan & Biklen, 2006). It also allowed this researcher to prompt participants to extend answers and probe additional areas that appeared to uncover reoccurring themes (Smith, 1995). This researcher spent several minutes socializing with each teacher beforehand to establish a rapport where the participants felt more at ease to elaborate on each answer as well as insert personal thoughts and opinions. As a result, several responses were long enough to cover the questions that followed but this researcher continued to ask the question as an additional means of member checking (Harper & Cole, 2012). Hence, the interview format was more semi-structured in nature in that each interview not only enabled participants to reveal the strategies that have induced higher order thinking skills but also welcomed the frame of reference of each teacher regarding the reasons for the effectiveness of each strategy (Agee, 2009; Bogdan & Biklen, 2006).

This researcher employed aspects of both the structured interview and the semi-structured interview design (Smith, 1995). While this researcher did not use closed questions nor a questionnaire format, this researcher did use a consistent format and order of questioning for each interview (Smith, 1995). In addition, this researcher employed pre-coded response categories in the initial coding process (Smith, 1995).

Analytical Methods

This researcher took an inductive approach to the data analysis of this qualitative study since the research design did not provide a predetermined framework. The decision to ask open-ended questions enabled the participants to present new strategies and steer the direction of the interview. To analyze the data, this researcher transcribed all recorded interviews and then organized the information according to interview questions and research objectives.

This researcher coded the interview data based on reoccurring patterns. Pattern coding provided this researcher with a means to encounter common concepts and themes within all interview data in addition to finding themes within content area and school (Merriam & Tisdell, 2016). This researcher established codes based on common lessons, strategies, student behavioral objectives, and verbs aligning with the last three levels of Bloom's Taxonomy, according to the charts included in Appendix F and Appendix G. This process enabled this researcher to pinpoint higher order thinking skills, triangulate data more effectively, and establish a link between the analyzed data and the research questions.

Assumptions of the Study

The assumptions were the beliefs that the researcher postulated to be true but could not verify (Mertler & Charles, 2008; Simon & Goes, 2013; Wargo, 2015).

Although the researcher could not prove truth to these assumptions, this researcher had no choice but to assume authenticity to carry out the research (Simon & Goes, 2013). In this study, the researcher made the following assumptions and held these beliefs to carry out the following research.

First, the researcher speculated an increased need for higher order thinking skills based on the accounts of college professors, goals of former legislation, teacher implementation, and evaluation criteria of the CCRPI in the Chapter II literature. In addition, the researcher inferred the instructional techniques mentioned in the interviews did encourage and strengthen higher order thinking skills. The researcher also presumed the assessment techniques matched the higher order thinking skills that the teacher taught and practiced in the classroom environment in such a way that was reliable and valid. Last, the researcher assumed that the teachers did not exaggerate the efficacy of each strategy and frequency of use in the classroom environment.

Validity and Reliability

Validity reflects the trustworthiness, authenticity, and accuracy of findings in a research study based on the beliefs of the researcher, participants, and the readers (Creswell, 2014). Bogdan and Biklen (2006) suggested open-ended questions as one way to provide participants with a means to produce honest and accurate responses based on expertise and experience. Rolfe (2006) stated that trustworthiness could determine the validity of a study provided the reader judges that the participants responded with honesty and accuracy.

In this study, the researcher believed that all educators answered questions honestly and that motives such as impressing the principal were not a factor. The researcher did not review documents nor observe classes. The researcher had no reason

to doubt participant responses and felt a follow up review or observation would appear to be a display of distrust.

Each interview was an example of interpretive validity in that the questioning technique brought forth accurate and appropriate information that the researcher could easily interpret (Johnson, 1997; Maxwell, 1992). The open-ended questions followed by member checking enabled teachers with the ability to produce reliable and somewhat consistent responses upon which they could clarify and expand. The teachers were able to provide answers that relayed an accurate reflection of real strategies used to motivate middle school students to utilize higher order thinking skills. Thus, the researcher judged the responses of the participants to be trustworthy and believed the readers would come to the same conclusion.

This researcher applied member checking to demonstrate accuracy, trustworthiness, and validity of each interview (Harper & Cole, 2012). The researcher periodically restated and summarized interview responses to verify a correct interpretation of all statements. In addition, the researcher later sent the transcribed interviews to each participant so they could verify the accuracy of all content. This procedure gave the participants time to agree or disagree with the researcher's perception in addition to the opportunity to expand on views and experiences (Harper & Cole, 2012).

Reliability indicated the degree to which other researchers could transfer or duplicate the study (Merriam & Tisdell, 2016). Rolfe (2006) suggested that transferability is a manner of not only establishing reliability but also determining the dependability of the research study. Other researchers could replicate findings due to the reliability of the methodology. Although there was no guarantee of identical findings, a researcher of a replicated study would encounter similar strategies and techniques that

foster higher order thinking skills among middle school students. In addition, the act of category construction and coding revealed a pattern of consistency in response and popularity of various strategies within the 25 lessons (Merriam & Tisdell, 2016). Educators and researchers could transfer the actual strategies and techniques to other academic environments at the middle school level, proving advantageous to teachers of additional subject areas.

Limitations and Delimitations

The limitations of the study were the factors or natural conditions that narrowed the scope or influenced findings and were beyond the control of the researcher (Mertler & Charles, 2008). One limitation of the study was that each principal provided a list of teachers who fit the criteria of the study. This procedure may have limited potential participants to the personal preference of the principal rather than expanding the study to reach the teachers best suited for the study. Other limitations were the teachers' perceptions of student engagement level and efficacy of chosen assessment of each lesson. There was no way to verify that all students indeed reached a level of thought that utilized higher order thinking skills; therefore, the researcher relied on the experience and expertise of the teacher participants. In addition, there was no way to determine whether the teachers utilized the most efficient assessments to measure the effectiveness of each lesson.

Delimitations were the factors that restricted the scope of research but were a result of the researcher's choice of methodology (Mertler & Charles, 2008). One delimitation of the study was the choice to interview only teachers of the five core academic courses and not broaden the sample to include teachers of additional content areas such as music, art, and physical education. Since the study served as a benefit to

teachers of the core content areas, the findings could have been an asset to teachers of elective courses as well.

Chapter IV: Analyses and Results

The researcher utilized a qualitative study designed to identify strategies that have encouraged middle school students to employ higher order thinking skills. After conferencing with the principals of the five top scoring middle schools based on the 2017 CCRPI scores, the researcher interviewed educators of the five core content courses within each school: mathematics, science, social studies, language arts, and social studies. The researcher conducted 21 interviews and identified common strategies that boost advanced thought, promote college readiness, and maintain overall academic success within each top rated middle school. In this chapter, the researcher presented the qualitative data that emerged from coding and analyzing the content generated throughout the interview process.

Data Analysis

The researcher interviewed 21 middle school teachers from five different middle schools within two counties: five teachers from one school and four from each of the remaining four schools. The participants consisted of five science teachers, five mathematics teachers, four language arts teachers, four Spanish teachers, and three social studies teachers. The researcher traveled to each of the schools and conducted the interviews that varied in length from 11–17 minutes. The researcher recorded and took notes during each interview. Immediately after each interview, the researcher further discussed answers with each participant as a means of member checking to clarify information and ensure understanding of each response. Afterward, the researcher transcribed all interviews and examined each transcription several times before initiating the coding procedure.

The researcher referenced each interview with the following abbreviations; SCI for science, MA for math, SS for social studies, LA as language arts, and SP which represented Spanish. The numbers 1–5 indicated the order in which each content area interview took place. For example, the third social studies teacher interviewed was listed as SS3. The researcher also indicated a code for the school on each transcription but did not divulge that information within the dissertation.

Then, the researcher coded each interview twice: once to determine the existence of each higher order thinking skill and again to identify the instructional strategy. Lastly, the researcher noted an additional theme that looped the research back to concerns presented within the review of literature. Eight teachers revealed this theme as the reason for use of various higher order thinking strategies.

Research Question

According to interviews with teachers in the five middle schools which ranked highest in the state of Georgia on the College and Career Readiness Performance Index (CCRPI), which strategies do these middle school teachers report using to facilitate the higher order thinking skills needed for college success?

The researcher conducted 21 interviews to answer the research question. Analysis of each interview involved a two-part process: one to code and record the existence and frequency of higher order thinking skills reached throughout the execution of each lesson and another to determine the higher order thinking strategies used. Lastly, the researcher compared, recorded, and created charts from the data of the overall findings.

First, the researcher applied a coding technique to interpret, compare, and contrast the data. The researcher initially implemented a priori coding since the first examination of the data involved the identification of verbs from a list already associated with the

levels of Bloom's Taxonomy (Stemler, 2001). The verbs served as a master list that the researcher used to identify the subtheme or axial code (Smith, 1995). Second, the researcher determined the axial codes, or the categories, directly related to the initial codes (Corbin & Strauss, 1990). In this case, the axial codes were the higher order thinking levels as defined by Bloom's Taxonomy. Then, the researcher was able to identify the existence and frequency of higher order thinking skills that students reached within each lesson according to the data present in each interview.

Next, the researcher examined the raw data in each interview to identify quotes, explanations, definitions, or actual mention of strategies (Smith, 1995). The predetermined definitions and explanations of each teaching strategy were the a priori codes that led to the axial code or category used to identify the existence of each higher order thinking strategy (Stemler, 2001). The researcher made charts of data containing the existence and frequency of higher order thinking skills reached as well as the strategies employed to reach these higher levels of thought.

To create Figure 1, the researcher first referenced Appendix G, a checklist of verbs associated with the higher levels of Bloom's Taxonomy. The researcher searched each line of each transcript to identify verbs associated with each Bloom level as a means of initial a priori coding (Stemler, 2001). The resulting axial codes revealed the presence of all four higher order thinking skills and the frequency of occurrence within the 21 interviews (Smith, 1995).

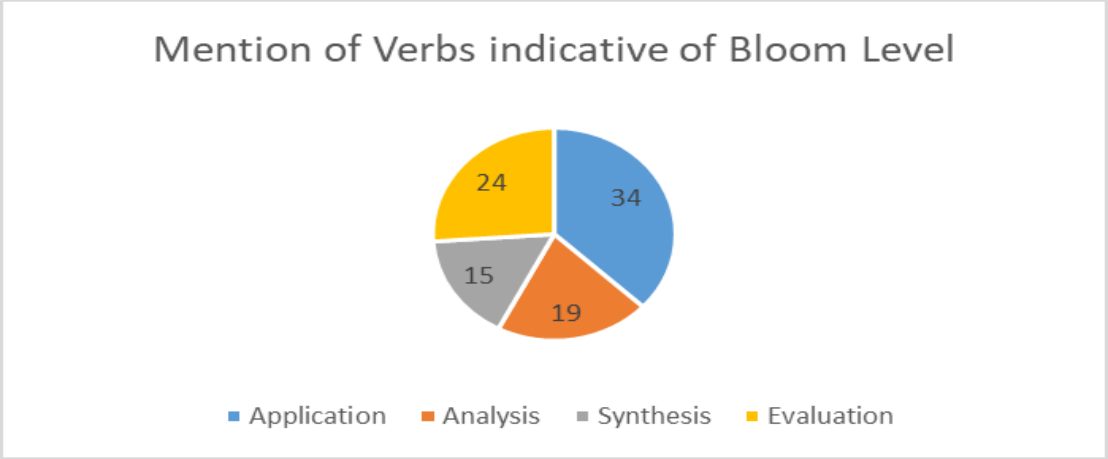

Figure 1. Frequency of mention of verbs indicative of Bloom's level

As shown in Figure 1, application was the higher order thinking skill most often found within the lessons discussed in the interviews. Following application was evaluation, analysis, and synthesis. Throughout the 21 interviews, the teachers referred to verbs associated with application 34 times. Most often articulated was the word *use* at a rate of 15 times, *show* occurred eight times, followed by *apply* five times, *illustrate* three times, *solve* twice, and one application of the word *examine*.

Evaluation was the second most popular higher order thinking skill present among the lessons discussed in the teacher interviews. There were 24 occurrences of verbs associated with evaluation within the 21 transcriptions. The most commonly occurring word was *discuss*, which the teachers referenced 12 times. The other verbs indicative of evaluation were *debate* that was used four times; *judge, choose, rate,* and *evaluate* all appeared two times within the transcriptions. The teachers said both words *decide* and *select* only once.

Verbs associated with analysis appeared in the interviews 19 times. Teachers most often said the word *explain*. A mention of verbs *analyze* and *compare* occurred four times, followed by one use of each of the following verbs: *distinguish, separate,* and *dissect*. Lastly, teachers revealed the use of the higher order thinking skill synthesis 15

times. The educators said *create* eight times, *predict* twice, and the verbs *invent, plan, construct, propose,* and *synthesize* only once.

In Figure 2, the researcher presented data that shows that all of the teachers did indeed describe lessons utilizing strategies that encouraged student use of two or more higher order thinking skills. Seven educators relayed lessons containing strategies that initiated all four levels of higher order thinking within their lessons. Twelve educators discussed lessons that included strategies initiating three of the four levels. Two of the teachers relayed lessons containing two higher order thinking strategies, while none of the teachers explained a lesson with students utilizing less than two higher order thinking strategies throughout the time frame of the class period.

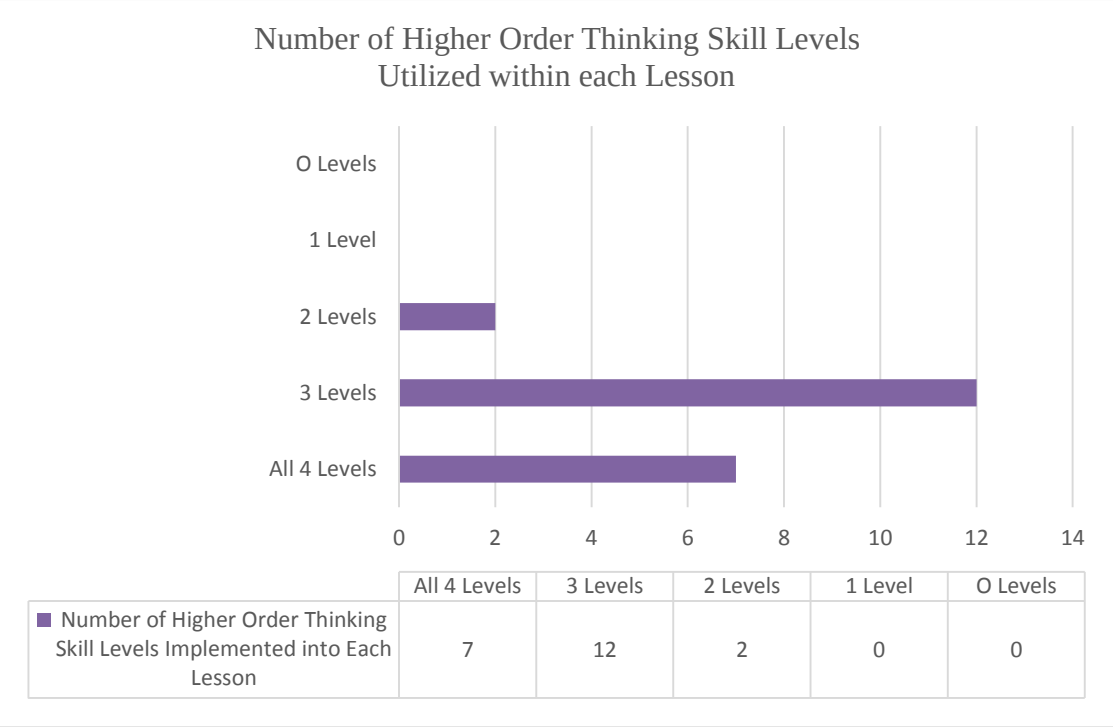

Figure 2. Number of higher order thinking skill levels utilized within each lesson.

The researcher used the list of instructional strategies defined in Appendix B to identify higher order thinking skill strategies within the 21 lessons discussed during the interview process. The researcher continued to interview teachers beyond the point of saturation (i.e., the point when the researcher could not encounter new data nor establish new codes) (Fusch & Ness, 2015). The most commonly used higher order thinking strategies proved to be Socratic and open-ended questioning, the use of real-world problems, the integration of additional content areas, the use of differentiation, student debates, problem-based learning, concept mapping and graphic organizers, discussions, collaboration or cooperative learning, and student led lessons (see Figure 3).

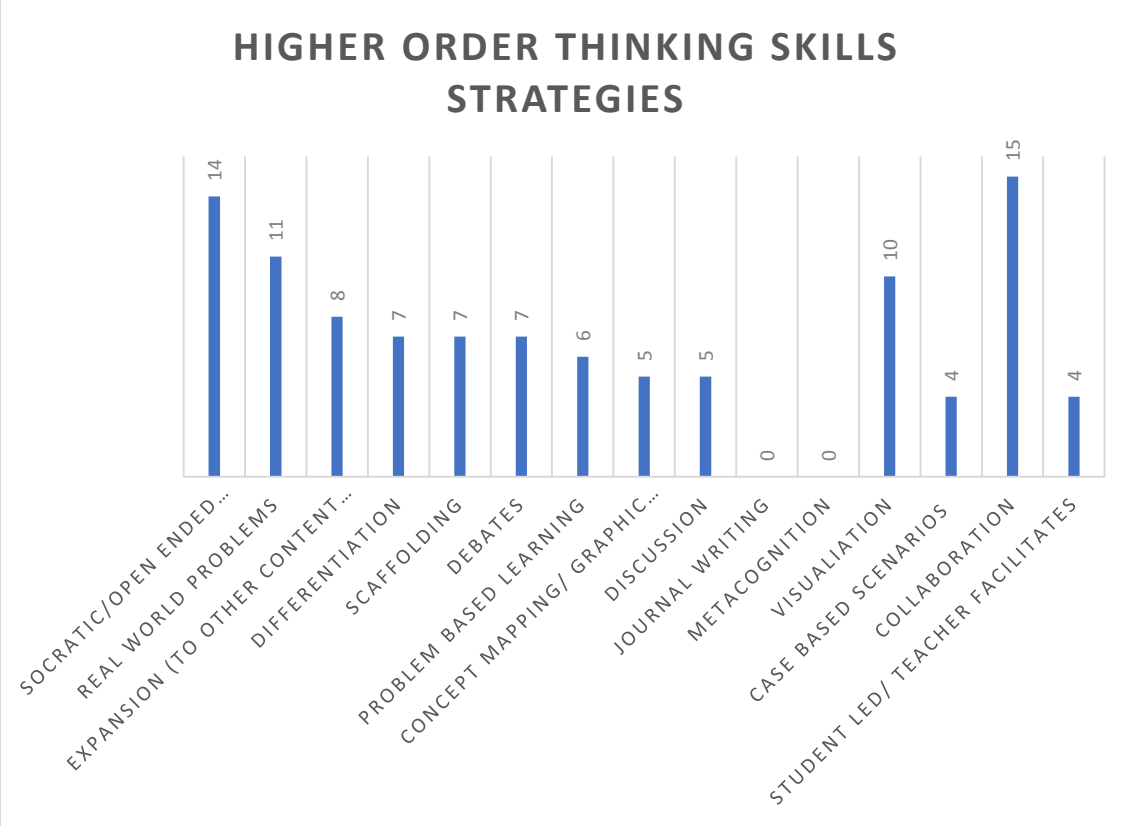

Figure 3. Higher order thinking skills strategies.

Fourteen of the participants detailed the importance of open-ended questioning as a strategy that encouraged their students to reach higher levels of thought. Two of the 14

specifically described the Socratic seminar, a strategy that has allowed teachers to supply students with the necessary information and then place students in a circle to ask and answer open-ended questions (Griswold, Shaw, & Munn, 2017). These two teachers also mentioned the fishbowl technique, which was Socratic questioning with two circles, that has been used with bigger classes (Griswold et al., 2017). SP2 assigned a job interview scenario and had small groups prepare beforehand and then interview in the center of the fishbowl. SP2 stated:

> They had to brainstorm what qualities we were going to need for this position, *What do we need to do for this position?* and also what questions would we ask in an interview. So, when it was time to perform we did a classroom fishbowl interview scenario. All four of them would come interview with me as a group, interview for the position in the center of the fishbowl. Everybody else in the surrounding fishbowl had to listen, and they helped vote on who was going to get hired based on the quality of the interview.

LA1 also used Socratic seminar as a means to discuss the novel *Fahrenheit 451* by Ray Bradbury. LA1 opined:

> I think the biggest thing with Socratic seminar is that it allows students to speak who might not necessarily feel like they have something to say on a particular topic. And with the topics and questions, everyone has something to say and some point to make, or some text evidence to bring in, or a quote to share.

In addition to the two teachers who implemented Socratic seminar into their lesson plan, 12 others stressed the importance of questioning. Open-ended questioning was a reoccurring topic. Open-ended questioning called for longer answers and not only has allowed for opinions and spontaneous responses but also eliminated possible bias

from the suggested responses associated with closed-ended questions (Reja, Manfreda, Hlebec, & Vehovar, 2003). SCI1 explained, "I'll go over and see what they're doing and ask them, *Why do you think it's this?* or *Why did you pick this?* It frees me up to create more of an individualized learning and review for each student." SCI2 claimed to ask the students, "What is the reason? We would go back and forth with the why. Why it's correct or why it's not?" SS2 stated, "We'll do open-ended questions. Why is it this? Then I see if they can make a link." In addition, SS1 relayed, "One lesson we do is on how a bill becomes a law. They are given a series of open-ended questions that they have to answer to see the process through."

Eleven educators referenced the use of real-world problems. According to Sarathy (2018), real-world problems have required students to solve realistic problems in real time with situational and environmental constraints. MA2 gave three examples of the types of real-world problems she has applied to her math classes. She explained:

> I lot of the things I do is to incorporate real-world computations. Here's a simple word problem we use when we do Pythagorean Theorem. They have a newly planted tree that needs to be staked with three wires, there's one in my front yard that needs to be staked three ways to make it through the storms. I give them the dimensions and they need to find how much wire they need for six trees. So, they go to Pythagorean Theorem to find one, and then take that into account and they do it for six trees. There's one where I took a picture of an airport and they had to decide which plane was going to land first and who should the tower tell to land first. They have to use Pythagorean Theorem and figure out which plane is closest to the airport. They have to think if you were the air traffic controller, what you would do. It's making them think in a different direction. There's

another one, one that most people who own a home have had to deal with. Jill has a front door that measures 42 by 84 inches tall, she purchases a circular table; will it fit through the door. So now we have to think about Pythagorean Theorem which cuts it at an angle and, therefore, they have to see before she goes and purchases it, will it make it through the door.

SCI5 described a lesson that contained a real-world scenario involving plants. She stated:

> [The students] were given a set of three different pictures, and the first level of pictures showed a tall plant and a short plant and they had to write their observations and predict what the offspring of those plants would look like in the next generation.

SCI1 explained her rationale for use of real-world problems in the following quote:

> When we are doing conversions, I try to give them examples like skiing or ones that apply to them as individuals. I feel like giving them real-world connections helps them understand how my content relates to the real-world.

Eight teachers mentioned the integration of other content areas into their lesson. SCI2 described a lesson that stressed math and language arts in addition to the science content. In that particular lesson, the students had to defend the pros and cons of nuclear power versus fossil fuels. SCI2 stated:

> We go through radioactivity and discuss the pros and cons of both, nuclear power versus coal burning fossil fuels type of deal. And at the end as their culminating activity, they have to write a letter and they are assigned a role . . . They have to

persuade that either yes they want a nuclear power plant built or no. They have to manipulate formulas and bring in math.

Coincidentally, MA5, from a different county, also explained a lesson on radioactivity that too incorporated additional disciplines: science and language arts. MA5 explained:

> They (the students) have to do exponential functions, exponential growth, and decay. I rearranged it to teach the same time science taught radioactive decay so the concepts overlap. Their summative for that unit was there is a radioactive element in a vaccine to stop the Ebola virus in Africa. We had to figure out how much of the vaccine we have to ship from China to get here to have enough to vaccinate the million people we want to vaccinate. The rubric was, were your mathematical calculations correct but also did you also use professional language. I graded for spelling and grammar errors.

Differentiation was a strategy that seven educators referenced during their interviews. According to Beecher and Sweeney (2008), the concept of differentiation was to stray from whole class generic lessons and to create lessons that considered the learning needs of individuals or smaller groups. LA1 described differentiation within her Socratic Seminar lesson. LA1 stated, "They (the students) had many open-ended questions. Many of the questions were open-ended ones, but what I do, is I incorporate one word answer questions so the students feel successful for the ones that they know." LA1 explained that the students needed to reference the book to defend their statements and answers. The manner in which they did so was another example of differentiation as demonstrated by the following quote. "So, you have layers of understanding and some

kids are surface understanders and some kids can go as far as a grown up would if they read the book."

Three of the teachers discussed student choice or choice boards as a means of differentiation in the interviews. LA4 detailed a review of a novel study in which she implemented student choice. LA4 explained:

> As a review and culminating activity, we had six different pieces of chart paper that I put out in the hall. I put something different on each one. On a few of them, I put some major subjects from the novel. One was complicity; another was innocence. Ignorance was another, just some things we tracked throughout the novel. On a couple of them, I put a theme statement from the novel, and on the last one I put a question about characterization. It was which character from the novel has changed the most. What I asked students to do was go out into the hall, and pick two of those six pieces of chart paper to respond to.

Two of the educators referenced choice boards. The choice boards were predetermined options from which students could choose to demonstrate mastery of the lesson or unit. Students chose options that represented their unique strengths and learning preferences. SP1 claimed:

> As a culminating activity, students used their knowledge to expand and create different tasks based on the reading. They picked three tasks from a choice board. Some items were higher level where they could create new and original sentences in Spanish to show meaning and understanding. Or they could also create a Pinterest board that shows they can synthesize the material. Students could also choose to write a Dear Diary entry about the reading answering the question *How do you feel?* as the main character.

SS1 also included a choice board in her lesson. SS1 said, "I also give them a choice board to go with the bill/law lesson. They can choose different ways to present the lesson such as PowerPoint and Sway."

Seven teachers included debates in the interviews. LA2 described:

> This is a lesson on using an article from the New York Times about trying to ban Judy B. Jones books. We read the New York Times article and the students annotated the article with a point of view as either a Harvard English professor, a book store owner, a first grade teacher, a first grade student, or a parent. And they have to come up with a claim of whether the books should be banned or not, based on the point of view given to them. From there, they take the facts or take the evidence from the article to support their particular claim that their group comes up with, and then we do a little debate based using their point of view and then using the evidence they find in the article.

LA3 relayed that students tended to debate to make the best collaborative decision based on the information they learned from reading the *Odyssey*. LA3 stated:

> The students collaborate and make presentations based on a comparison of the *Odyssey* and a movie of choice. One of the 8th grade language arts standards is seeing how architypes are used nowadays. So, they get into arguments and discussions about which movie to pick and which would be a better fit for the project.

SCI1 expressed that she has listened to student conversations to hear the manner in which they debate one another. SCI1 said, "I'm always listening for words, vocabulary, and discussions. I love it when they debate a question 'No I think it's this;' well I think it's this.' 'But why do you think it's this?'"

Problem-based learning has involved real-world problems and collaboration. In problem-based learning lessons, students have attempted to solve ill-structured problems before they have received the formalized instruction. Student groups have taken various roles and attempted to find solutions, and in the process of problem solving, they often incorporated a variety of disciplines. While six of the teachers whom the researcher interviewed mentioned problem-based learning, SP2 relayed a problem-based learning lesson that the 8th grade teachers of several disciplines created together as a capstone project. The capstone project was a lesson that has become more popular at the college level and has required a combination of academic disciplines to prepare for future success in the workplace (Farrell, Ravalli, Farrell, Kindler & Hall, 2012). Capstone projects required teamwork, communication, role-playing, and an understanding of how the project has affected a bigger community (Farrell et al., 2012).

According to the SP2:

> The Capstone project is interdisciplinary. English language arts helped with proposals; social studies was the history of the industrial revolution and roller coasters in Georgia; science and math did the physics. Spanish was communication. This year the 8th grade word is innovation so our capstone project reflects that.

SP2 explained that her lesson was a problem-based learning lesson in which students had to interview for various positions at the amusement park in the Spanish language. SP2 further explained:

> I created this PBL scenario that the amusement park was hiring people for different positions. They needed a cook, they needed a janitorial position, they needed a dog walker because they were going to let people bring their dogs and

> supply people to take care of them. The students were grouped together in fours, and different groups would be assigned a position they were going to try out for. There was a level of prep beforehand and discussion in small groups. They had to brainstorm what qualities they were going to need for the position, what they need to do for the position, and what questions would I ask in an interview. So when it was time to perform we did a classroom fishbowl interview scenario.

Five teachers implemented concept mapping, graphic organizers, and visualizations into the lessons. Trochim (1989) explained that concept maps are ideas represented in the form of a picture; first, one brainstorms ideas and then decides how the ideas relate or connect. MA1 explained:

> [The students] were given graph paper, they had to make an X and Y axis. They had to come up with their 10 or 12 equations. They were encouraged to use horizontal and vertical lines, as well as parallel and perpendicular lines, but they had not been taught yet the rules of parallel and perpendicular lines. The higher-level students were asked to create their own equations and then create a stained glass window with their own equations.

Although this particular lesson was not an example of concept mapping, it was a creative example of how visualization has promoted a deeper learning of mathematical concepts.

Five teachers described student discussion as a means to encourage higher order thinking. Discussion in class not only nurtured communication and collaboration but also promoted the development, exploration, synthesis, and evaluation of ideas (Sutton-Grier, Rauschert & Momsen, 2016). SCI5 explained her introduction to a lesson about Mendel's experiment with plants.

SCI5 stated:

> [The students] were given a set of three different pictures. The first level of the picture showed a tall plant and a short plant, and they had to write their observations and predict what the offspring of those plants would look like in the next generation. For this, they were partnered up; often they are in partners for the exploration part because two brains are better than one. They can bounce off their ideas, and everybody brings something different to the table, their prior knowledge of real-world things.

As a response to the question of which teaching techniques or strategies were incorporated into the lesson, the SCI5 once again explained the importance of discussion.

> I am constantly walking around and just listening to their conversations. And then, based on their conversation, I'm pulling information out, guiding them with some other questioning to help them get to the answer. I help them make that connection and help them connect it to their personal life.

MA4 relayed the importance of discussion in an introductory lesson to *pi,* the formula for measuring circles. MA4 explained, "The students] have to measure different circles and come up with a ratio that consistently works." MA4 added, "It's just really interesting to watch them hash out little arguments and prove each other wrong. It's a good way for them to come up with evidence to support their conclusion."

One strategy that was not mentioned was journal writing. While several teachers mentioned writing as a component of the lesson or strategy, teachers did not refer to individual writing in a journal. Another strategy that was not mentioned was metacognition. The educators made no reference to student awareness of the learning process itself.

Visualization was a commonly used technique within other strategies. Ten of the teachers indicated some form of pictorial or illustration. SP3 described the need for students to produce visuals to demonstrate understanding and application of the second language:

> They have to process the vocabulary but then also draw how the relationships work. They just get this empty clue thing, family tree chart, and I read the clues out loud in Spanish. As I read them, they have to fill it out based on the relationship.

The teachers mentioned case-based scenarios on four occasions. Williams (2005) explained that case-based scenarios are similar to problem-based learning lessons; however, problem-based techniques drive learning while case-based scenarios require the application of prior learning to solve each case. SCI3 described part of her case-based scenario lesson as follows:

> They had all fossil pieces out and they had to figure out what organism it was depending on the layers and how old it was compared to other fossils that were found, and they had to discuss the difference between fossils and fossil records.

The most popularly implemented strategy was collaboration or cooperative learning. This technique was employed in 15 of the 21 the lessons. According to Gokhale (1995), collaborative learning was the grouping of students with the aim of achieving a common academic goal. As a result, individual learning occurred with the successes of the group (Gokhale, 1995).

To implement the strategies of Socratic Seminar, discussion, debates, and problem-based learning, collaborative groups were necessary; however, eight of the 15 teachers stressed an additional reason for the student led collaborative groups. The

teachers felt the need to become less involved in learning and assume the role of a facilitator to encourage student autonomy and independence. SCI1 explained her rationale for collaborative groups as follows, "One of the strategies that I use when we review is called inquiry stations or open-ended discussion stations. When I teach content, I expect the students to take a leadership role and take ownership of what they are learning."

SS1 relayed a collaborative activity:

> Students imagine and invent a law that they would want to be created. It can be realistic or far-fetched. The students not only have to bring the bill through each step, they have to brainstorm opposition they could encounter as well as detail the proponents.

SS1 added, "My students demonstrate higher order thinking skills with creative onus of the standards." While explaining a lesson using Socratic Seminar, LA1 said, "Students can expand on thoughts and with the Socratic seminar, I become the facilitator and I am not the driver of the bus." In addition, LA1 claimed, "They make connections with the book and for me it's about taking the back seat and listening."

SCI4 described her teaching techniques as follows:

> There's mostly problem-based learning, learning as needed. Lots of collaboration, independent work, and I facilitate as needed. Lots of questioning from kids, but lots of times I send them back and say, go back and figure that out with your group.

SCI4 claimed, "I'm like the supervisor; I'll only intervene if needed." SCI4 added, "Our philosophy here is that it all happens in the room in front of our face. You don't go home and get expert help from your parents, your dad who is an engineer at

Georgia Tech." SCI4 said, "They realize it's okay to screw up. There's no crying in science. You screw up, you sit back, you evaluate, and try again."

MA5 also indicated a strong emphasis on autonomy and independence as the reason for group collaboration. MA5 described a problem-based learning lesson as "a few days of gnashing teeth and a few tears." MA5 explained, "The students kept coming back and going, is this right?" MA5 then said, "My favorite answer is 'I don't know, is it?'" The teacher relayed that she will not tell them the answers. MA5 told the students:

> I'll grade it when you turn it in. I'm not going to grade it while you're doing it. If you have to ask me if it is the right answer, then you're not sure. So, go back to your group and maybe you need to do more than one method and see if you get the same answer.

Summary of Results

Through careful analysis of the interviews with 21 middle school teachers of core content from the five top-rated schools in the state of Georgia, the researcher assessed three areas to answer the research question. First, the researcher used a predetermined list to identify verbs associated with the higher order thinking skills according to Bloom's Taxonomy. According to the verbs noted, the researcher then determined that each educator's instruction did indeed encourage the students to employ a minimum of two and a maximum of four higher order thinking skills. Next, the researcher began to identify the specific strategies within each lesson and recorded the frequency of use among these teachers whose schools received a high rating on the 2017 CCRPI. Among the top three strategies were collaboration, open-ended or Socratic questioning, and real-world problems. In many of the lessons, these three strategies occurred simultaneously.

The researcher also indicated the presence of two additional strategies. The first, differentiation, emerged in seven of the interviews. The seven teachers explained the manner in which they increased the rigor for students that were able to delve deeper into the content. The second additional strategy was for the teacher to assume the role of facilitator. As a result of this practice, there was increased student onus on learning as well as decreased dependency on the teacher. Eight of the teachers explained the importance of this strategy due to concerns about their students' maturity level and need to rely on the teacher. This rationale linked the research to the theoretical framework and review of the literature.

Chapter V: Conclusions and Recommendations

Theorists have defined adolescence as the period of time when individuals establish a self-sufficient identity capable of the autonomous thought necessary to apply higher order thinking (Arnett, 2000; Erikson, 1994; Marcia, 1966); however, professors of students of the millennial generation have reported that students display decreased maturity levels (Craft, 2010; Golonka, 2013). According to college educators, the dependent behavior was inconsistent with those of prior generations (Craft, 2010; Golonka, 2013). As a response to collegiate concerns, both policy makers as well as college professionals collaborated to create the CCSS—standards that would focus on an increased amount of rigor in the curriculum as an effort to promote college and career readiness (King, 2011). The proposed legislation did not pass but served as a catalyst for SEAs to assess the depth of curricular objectives and the extent to which LEAs have prepared students for college and career success using tools such as the CCRPI (Whitaker, 2015). As a result, teachers received professional development training to encourage the inclusion of courses, lessons, and strategies that promoted and assessed higher order thinking skills and increased rigor (Supovitz & Spillane, 2015). Hence, the need to ensure learners could apply higher order thinking skills by the time of adolescence has become a greater priority for middle school educators.

In this study, the researcher placed focus on the higher order thinking skill strategies used within the top five performing middle schools in the state of Georgia based on the 2017 CCRPI scores. The researcher identified that teachers of differing schools and content areas implemented similar strategies and techniques. The researcher found it beneficial to share the data to stress the strong relationship between higher order thinking skills and autonomous student behavior.

Discussion and Conclusions of the Study

The researcher found that teachers in top performing middle schools have made conscious efforts to include strategies that encourage higher order thinking skills within their lessons. High CCRPI scores were one reflection that execution of these strategies led to successful teaching and learning. These strategies have promoted thought beyond knowledge and comprehension. The strategies enabled students with an ability to delve deeper into the content, thus promoting an increased ability to apply, analyze, synthesize, and evaluate the content.

Although autonomy was not a specific topic of the interview questions, it was a reoccurring theme that the researcher could not ignore. As the middle school teachers relayed their lessons, several educators felt the need to address the rationale for their choice of strategies. They explained concerns about student dependency issues and the importance of fostering independent problem-solving skills. Hence, the middle school teachers did relay similar concerns to those of the college professors mentioned in the literature review.

As a result, the researcher surmised that one should consider a relationship between not only higher order thinking skills and increased rigor of content but also the coexistence of higher order thinking skills and autonomous thought. Although group work and collaboration necessitated discussion, debate, and articulation of thought, one could argue that the students had to utilize independent thought to apply, analyze, synthesize, and evaluate the content of each lesson. Consequently, one could surmise that dependency on another for answers and information stagnates intellectual growth and obstructs the ability to probe deeper into content.

This conclusion could apply to learning at every stage of life. De Bono (1970) coined the term *Lateral Thinking*, the ability to find new ideas, viewpoints, and problem-solving procedures to encounter different approaches to problems. Interestingly, De Bono theorized that group work was an advantage to students since the individuals within groups offer differing opinions and gave students an opportunity to discuss, role-play, and provide additional perspectives (De Bono, 1976). De Bono also stated that individual work was important (De Bono, 1976). De Bono (1976) claimed the teacher should visit the groups frequently to ask individual questions so that students could demonstrate evidence that they have applied lateral thought effectively. Hence, educators need to take some time to step back and facilitate, thereby allowing students the freedom to collaborate, then independently demonstrate application, analysis, synthesis, and evaluation of content.

Based on this study, it is my understanding that strategies that have encouraged students to apply higher level thinking skills led to overall higher test scores. In addition, findings lead one to consider the strong possibility that individuals who have developed the capacity to apply higher order thinking skills effectively also have established autonomous thinking at a higher level than those who have not. Thus, the researcher agreed with De Bono (1970) that educators should begin to implement higher order thinking skills at an early age and place priority on age appropriate continued use at each grade level.

De Bono (1970) believed one could learn thinking strategies at any age but he thought the ideal range was 10–14 and that one could begin to learn thinking skills and strategies as early as age seven. Hence, the learning and reinforced use of higher order thinking and autonomous thought could nurture intellectual advances and minimize the

concern that adolescents are not reaching cognitive milestones. In addition, the reinforcement of higher order thinking strategies throughout the academic years could not only raise overall test scores but also could ameliorate the concerns of college professors about student dependency issues after high school.

Implications of the Study

In the future, teachers and administrators should promote and emphasize strategies that have encouraged higher order thinking skills and independent learning. This is not an implication that students should work individually but rather that teachers should encourage their students to separate from the teacher and reflect as often as possible. The researcher acknowledged that teacher lecture is necessary at some point in each unit plan; however, teachers must utilize strategies that encourage students to work with peers as well as think individually in lieu of depending on adults (Bernstein & Triger, 2011; Hofer et al., 2016).

The researcher noticed that teachers implemented many of the same strategies—strategies presented in staff development meetings, workshops, and mandatory gifted education training after the introduction of the CCSS initiative (Paige, Smith & Sizemore, 2015). Although these strategies have proven to be successful, additional strategies from which to choose would only benefit both teachers and students. As done upon the introduction of the CCSS, the researcher suggested that administrators replace much of the information presented in each faculty and staff meeting with the introduction of a new and successful age appropriate higher order thinking strategy (Paige, Smith & Sizemore, 2015).

Individuals, such as De Bono (1992), have studied and presented a plethora of strategies to schools, organizations, and government agencies. The presentation of

additional strategies such as those created by De Bono (1976) several years ago could provide educators with new and fresh ideas. As indicated above, the researcher felt that many of these ideas and techniques could benefit educators if they were more readily available. The researcher surmises that consistent application of higher order thinking skills could result in autonomous thought and future successes. The researcher could not prove that autonomous thought evidenced at the middle school level would generate independent thinking at the college level. Hence, there is a high likelihood that society must address additional factors to alleviate the current stresses of college professors of the millennial generation. Nonetheless, it was the researcher's belief that an increased ability to use higher order thinking skills has served and will continue to serve as a benefit, especially at the middle school level.

Recommendations for Future Research

Based on the results of this study, the researcher considered the following recommendations: limitations, sample size, region of study, and future research possibilities. These implications focused on the potential benefits of expanding the use of higher order thinking strategies. Researchers could follow this study with a similarly constructed design or utilize other methodologies in an attempt to uncover additional strategies as well as advantages of implementing higher order thinking skills at all levels of learning.

1. A delimitation of the study was that the researcher placed focus on students at the middle school level. Another area of potential research would be to compare this study with a replication done at the elementary school level, high school, or college level. If additional research continues to indicate that higher order thinking skills are synonymous with autonomous thought and independent behavior, the findings would be

just as beneficial to educators of other levels of learning. Hence, reinforcement of independent behaviors with a strong focus on effective higher order thinking skill strategies would begin at an early age then strengthened and solidified in later years.

2. One could expand this study beyond the five core subjects at the middle school level to include additional content areas such as art, physical education, technology, and music. It could be interesting to note similarities or differences in strategies and frequency of use. Furthermore, the researcher thought it would be interesting to increase the number of participants that teach the same content, thereby placing focus on one content area. In this case, teachers might consider the findings of the study more directly applicable to their own lesson plans.

3. This study included interviews of teachers from the five top performing middle schools to identify effective strategies; however, it would be interesting to execute an identical study within the five lowest performing middle schools in the state. In the case of a discrepancy, the research could serve as rationale for collaboration between educators from high- and low-performing middle schools. In the case that the teachers of both high- and low-performing schools implemented similar strategies, one must consider the impact of additional factors.

4. Future research in the area of higher order thinking skills could solidify the link between the ability to apply, analyze, synthesize, and evaluate information with autonomous behavior. A better fluency in higher order thinking at any age could supply students with the much-needed critical thinking and autonomous problem solving skills required to succeed in all future endeavors (De Bono, 1976; Vinson, 2013; Waring & Robinson, 2010). Additional study in this area could direct increased attention to the

problem of an observed decline in cognitive maturity and further reveal an academic solution designed to lessen the downward trend.

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Appendix A

Last Three Levels of Bloom's Taxonomy (Higher Order Thinking Skills)

Level	Definition	Verbs	Behaviors
Analysis	Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence, or structure of a statement or question.	analyze, categorize, compare, contrast, separate, apply, change, discover, choose, compute, demonstrate, employ, illustrate, interpret, manipulate, modify, operate, predict, prepare, produce, relate, schedule, show, sketch, solve, use	The student will compare and contrast the cognitive and affective domains.
Synthesis	Student originates, integrates, and combines ideas into a product, plan, or proposal that is new to him or her.	create, design, hypothesize, invent, develop, arrange, assemble, categorize, collect, combine, comply, compose, construct, create, design, develop, devise, explain, formulate, generate, plan, prepare, rearrange, reconstruct, relate, reorganize, revise, rewrite, set up, summarize, synthesize, tell	The student will design a classification scheme for writing educational objectives that combines the cognitive, affective, and psychomotor domains.
Evaluation	Student appraises, assesses, or critiques on a basis of specific standards and criteria.	judge, recommend, critique, justify, appraise, argue, assess, attach, choose, compare, conclude, contrast, defend, describe, discriminate, estimate, evaluate, explain, judge, justify, interpret, relate, predict, rate, select, summarize, support, value	The student will judge the effectiveness of writing objectives using Bloom's Taxonomy.

Appendix B

Explanation of Instructional Strategies that Promote Higher Order Thinking Skills

Instructional Strategy	Definition
Case-based Scenarios, Analogies, Similes, Metaphors	Instructional design model where students consider realistic scenarios from a perspective which requires analysis
Concept Mapping, Graphic Organizers	Graphical tools for organizing and representing knowledge typically illustrated using diagrams to show the relationships among concepts
Cooperative Learning Groups	Groups of students working together in groups with their peers to accomplish a common goal
Debates	A formal discussion about the pros and cons of an issue
Demonstration, Visualization, Show and Tell	Visual displays/presentations of something
Discussion, Elaboration, Explanation	Consideration of a subject by a group through conversation
Journal Writing	The process of using structured exercises for students to write educational experiences
Meta-cognition	Teaching students how to plan, monitor, and repair their own comprehension
Problem-based Learning	An instructional strategy in which students collaboratively solve problems and reflect on their experiences
Reflection, Expansion	Teaching students to reflect critically on one's experience, integrate knowledge gained from experience with knowledge possessed, and take action on insights
Scaffolding, Steps for Learning Concepts	Teaching students by defining parameters, rules, or suggestions for given learning situations
Simulations, Real-world Inferences	Artificial replication of components of a real-world situation to achieve specific goals
Socratic Learning (questioning)	Teaching through student inquiry and questioning

Savi, C., Collins, V., & Alexander, J. (2011). Higher order thinking (HOT) faculty survey (V1). *University of North Texas Health Science Center Scholarly Repository, 12*(1). Retrieved from http://digitalcommons.hsc.unt.edu/surveys/1/

Appendix C

Study Permission Request

RECIPENT
ADDRESS

Dear NAME:

I would like to conduct a research study with the purpose of identifying higher order thinking strategies and assessments in use within the five highest performing middle schools in the state of Georgia according to 2017 CCRPI scores. The study could assist middle school teachers by spreading the use of higher order thinking strategies and assessment techniques in an attempt to diversify their current repertoire of strategies and assessments within their content area. Hence, both teachers and students of middle school could benefit from new lessons and assessments aimed at teaching and assessing content while promoting age appropriate higher order thinking skills.

I would like permission from the principal of XXX to interview five teachers in each school. I understand I will need consent from the district, the two principals, and the teachers/participants. Students and parents will not be included in this study. I plan to interview one highly qualified veteran teacher of Math, Science, Social Studies, English/Language Arts and World Language from each school. I hope to conduct 10 thirty-minute interviews that contain the following interview questions:

1. Describe one lesson that encourages your middle school students to demonstrate higher order thinking skills.
2. Explain the teaching techniques or strategies that you incorporate within the lesson.
3. Describe the student actions and behaviors that exemplify the use of higher order thinking skills.
4. Provide detail as to how you assess higher order thinking skills.

The underlying goal is to highlight the successes of teachers and share those accomplishments with others in the field of education. I understand I cannot identify staff members, schools, nor the district participation in any draft or final report of my study. In addition, I agree to provide the district a copy of my completed dissertation.

Thank you for your time and consideration.

Karen A. Kister
Doctoral Student at Lincoln Memorial University
Karen.kister@gmail.com
XXXX

Faculty Sponsor: Dr. Cherie Gaines
Professor and Chairperson at Lincoln Memorial University
Cherie.Gaines@lmunet.edu
XXXX

_____

Principal Signature Date

Appendix D

Participant Request Letter

Researcher: Karen A. Kister
Doctoral Student at Lincoln Memorial University
Karen.kister@gmail.com
XXXX

Faculty Sponsor: Dr. Cherie Gaines
Professor and Chairperson at Lincoln Memorial University
Cherie.Gaines@lmunet.edu
XXXX

Dear Educator,

I am requesting your participation in a research study entitled *Evaluating Teacher Implementation of Lessons that Promote Thinking at the Middle School Level*. Participation in this study is voluntary. Please read the information below and contact me via email or cell phone number listed above with any questions you may have before deciding to participate.

The purpose of my research study is to reveal higher order thinking strategies and assessments used within the highest performing middle schools in the state of Georgia. A better fluency in higher order thinking at the middle school level is important since higher-level thought provides students with the much-needed critical thinking and autonomous problem solving skills required to succeed in high school and college. This study may prove useful to middle school teachers by providing content specific thinking strategies and assessment techniques to diversify lesson plans. As a result, both teachers and middle school students can benefit from new ideas aimed at teaching and assessing content while promoting higher order thinking skills.

You are eligible to participate in this study if you are highly qualified to teach your content area and have taught middle school for at least five years. This study will include approximately 25 subjects and will require about 30 minutes of your time to record your answers to five interview questions. The audio recordings will be stored in a secure location for three years, and then destroyed. Participation in this study is voluntary. You may refuse to answer any question or discontinue your involvement at any time without penalty. Your decision will not affect your future relationship with this university.

There are no known harms or discomforts associated with this study, as it involves minimal risk and is an effort to highlight your current success as an educator within a top performing school. For the study, I am requesting that you browse through your curriculum and identify a lesson that has served as a catalyst for student application of higher order thinking skills. To prepare for the interview, I am asking that you gather the instructional materials needed to teach and assess the lesson.

Upon completion of my research, I will give you a packet of the lessons and instructional materials that I acquired from other teachers of similar content. I hope that the lessons and assessments discussed in the interviews will further enrich your already successful curriculum. It is my hope that these lessons will be helpful to you since your participation will be extremely valuable to me

If you are unable to contact the researcher listed at the top of this form or the faculty sponsor and have general questions, concerns, complaints, or inquiries about your rights as a research subject, please contact the Chair of the LMU IRB, Dr. Kay Paris at (423) 869-6323, or by email at kay.paris@lmunet.edu.

Please sign this form after you have read the letter completely and I have answered your questions. The signature below indicates that you agree to participate in this study and that the researcher was able to answer your questions to your satisfaction.

I agree to participate in the study.

_____

Participant's Signature Date

_____

Printed Name of Participant

Appendix E

Interview Protocol

Introduction: "The purpose of this research is to uncover the most effective higher order thinking strategies and assessments used within the highest performing middle schools in the state of Georgia. The study may prove useful to middle school teachers by providing effective content specific thinking strategies and assessment techniques to diversify lesson plans.

I will ask you a series of questions about the lesson you have chosen to discuss. Your identity and answers will remain confidential. It will take approximately thirty minutes to answer all of the questions but you may terminate this interview at any time. I thank you in advance for your time and participation in my project. Do I have your permission to record your answers? Do you have any questions for me before I begin?"

Introductory Questions

1. What grade and content area do you currently teach?
2. Which content areas are you highly qualified to teach in the state of Georgia?
3. How many years have you been teaching? How many years have you been teaching this subject at this middle school?

Interview questions

1. Describe one lesson that encourages your middle school students to demonstrate higher order thinking skills.
2. Explain the teaching techniques or strategies that you incorporate within the lesson.
3. Describe the student actions and behaviors that exemplify the use of higher order thinking skills.
4. Provide details as to how you assess higher order thinking skills.

Appendix F

Checklist of Instructional Strategies that Promote Higher Order Thinking Skills

Instructional Strategy	Usage
Case-based Scenarios, Analogies, Similes, Metaphors	
Concept Mapping, Graphic Organizers	
Cooperative Learning Groups	
Debates	
Demonstration, Visualization, Show and Tell	
Discussion, Elaboration, Explanation	
Journal Writing	
Meta-cognition	
Problem-based Learning	
Reflection, Expansion	
Scaffolding, Steps for Learning Concepts	
Simulations, Real-world Inferences	
Socratic Learning (questioning)	

Savi, C., Collins, V., & Alexander, J. (2011). Higher order thinking (HOT) faculty survey (V1). *University of North Texas Health Science Center Scholarly Repository, 12*(1). Retrieved from http://digitalcommons.hsc.unt.edu/surveys/1/

Appendix G

Checklist of Verbs Associated with Higher Levels of Bloom's Taxonomy

Level	Verbs	Verb Mentioned	Frequency
Application	. Solve · Show · Use · Illustrate · Construct · Complete · Examine · Classify		
Analysis	· Analyse · Distinguish · Examine · Compare · Contrast · Investigate · Categorise · Identify · Explain · Separate · Advertise		
Synthesis	· Create · Invent · Compose · Predict · Plan · Construct · Design · Imagine · Propose · Devise · Formulate		
Evaluation	· Judge · Select · Choose · Decide · Justify · Debate · Verify · Argue · Recommend · Assess · Discuss · Rate · Prioritise · Determine		

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