A PHENOMENOLOGICAL STUDY OF SECONDARY TEACHERS’ EXPERIENCES
WITH ASSESSING HIGHER ORDER THINKING SKILLS

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ABSTRACT

A PHENOMENOLOGICAL STUDY OF SECONDARY TEACHERS’ EXPERIENCES WITH ASSESSING HIGHER ORDER THINKING SKILLS

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The study explored the experiences of effective secondary (high school, grades 9-12) teachers in assessing higher order thinking skills. For students to graduate an Ohio public school, they are to have the resources and skills to be college and career ready and according to Ohio’s Learning Standards (“Ohio Department...Ohio’s learning,” 2017b) developing higher order thinking is part of this mandate. Because of these demands, increased focus and attention is being directed to the development of knowledge beyond basic recall and rote memorization and towards deeper understanding, critical thinking, and problem solving.

The methods used for this study were based on a design that was a qualitative phenomenology that used a social constructivist framework and an ontological philosophical basis. Seven teachers from an Ohio secondary public-school district were the participants. Empirical data were collected through in-depth interviews and
analysis of the data was through horizontalizing and finding themes, developing textural descriptions, and deriving meanings and essences.

Twelve themes were constructed—internal classroom themes of defining higher order thinking, questioning, collaborative groups, problem/project based learning, demonstration of skills, instilling confidence, time; and external themes of administrators, professional development, teacher training, Common Core (Ohio Learning Standards), and collaboration with other teachers.
I dedicate this work to the most important people in my life—Jeff, Aly, and Ben.

I love you.
ACKNOWLEDGEMENTS

I would like to express sincere gratitude and appreciation to my committee members who provided encouragement and direction in assisting me with the successful completion of this study. My sincere thanks to the chair of my committee, Dr. Carolyn Ridenour, for her wisdom and patience throughout this process. Her kindness, care, and attention to detail have made a profound impact on me both academically and personally. My appreciation extends to committee members Dr. Theodore Kowalski, Dr. Pamela Young, and Dr. Laura Leming, whose thoughtful comments and insights made this project far better than I could have on my own. I am grateful to you all.
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<td>CCSS</td>
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<tr>
<td>CIPD</td>
<td>Curriculum, Instruction, and Professional Development</td>
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<tr>
<td>DOK</td>
<td>Depth of Knowledge</td>
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<td>FAQ</td>
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<td>HA</td>
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CHAPTER I

THE RESEARCH PROBLEM

The purpose of this study was to explore the experiences of effective secondary (high school; grades 9-12) teachers in assessing higher order thinking skills. The education enterprise (educational bureaucracy—from federal, to state, to local) is structured to separate curriculum, instruction, and assessment. It is not unusual to have different structures (at different levels: national, state, local) and different roles (board of education, administration, teachers) to monitor these three (what are defined to be) different functions. In the education research world, often researchers select one of these arenas for their study--either curriculum, instruction, or assessment.

But, these three functions in teachers’ lived experiences are not separated. Teachers’ experiences are complicated and are holistic composites of all three all mixed up together. That’s why understanding the complexity is the first step in understanding that tackling assessment of higher order thinking is not easy, but must be done by appreciating the intertwined nature of the phenomena.

The 21st century poses new challenges for American educators. Globalization, technological advances, and the achievement gap between the U.S.A and other industrialized countries are major areas of concern. Wagner (2008) states, “In today’s highly competitive global ‘knowledge economy,’ all students need new skills for college,
careers, and citizenship. The failure to give all students these new skills leaves today’s youth—and our country—at an alarming competitive disadvantage” (p. xxi). Throughout the country, curriculum standards and accountability reform measures have been adopted by school systems to provide students with the skills necessary to succeed. The Common Core State Standards (CCSS) have been adopted by 35 states and partially adopted by one state (“Academic Benchmarks,” 2017) to “define the knowledge and skills students should gain throughout their K-12 education to graduate high school prepared to succeed in entry-level careers, introductory academic college courses, and workforce training programs” (“Common Core,” 2015, para. 5). In 2010, the state of Ohio adopted the CCSS with the implementation of Ohio’s Learning Standards. Accordingly, these standards will “explain the knowledge and skills Ohio students in pre-kindergarten through grade 12 need to have” (“Ohio Department...Ohio’s learning,” 2017b, para. 1). To accomplish this challenge, Ohio standards emphasize students develop and utilize higher order thinking skills (HOTS\(^1\)) such as problem solving and critical thinking, which are identified as qualities today’s employers are seeking (“Ohio Department...Ohio’s learning,” 2017b, para. 1). For example, Ohio’s Learning Standards for English Language Arts (“Ohio Department...Ohio’s learning,” 2017c) state,

To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, and report on information and ideas, to conduct original research in order to answer questions or solve problems, and to analyze and create… (p. 4)

\(^{1}\) HOTS is an acronym for “higher order thinking skills.” Both the full term and the acronym are used intermittently throughout this document.
Ohio’s Learning Standards, and subsequently higher order thinking skills, are necessary elements for a quality life in the 21st century. “By teaching our students to apply these skills to what they are learning in school, we can make sure they are on track to graduate from high school and enjoy success in college, careers and life” (“Ohio Department...Ohio’s learning,” 2017b, para. 1).

Therefore, achieving this goal requires change, and instructional change requires leadership. To meet this challenge, school administrators and teachers must exhibit educational leadership in their areas of responsibility. Renihan (2012) stated, “Leadership is critical to school and system effectiveness and, more specifically, student success” (p. 138). Sergiovanni (1984) described aspects of leadership as forces available to administrators, supervisors, and teachers as they influence the events of schooling. The Ohio Leadership Advisory Council (OLAC, 2017) views leadership as a shared responsibility of essential practices to improve instruction and increase student learning. “Leadership is a process distributed across an entire school system-its central office and all of its buildings-involving shared responsibility for and concerted action on behalf of improved instructional practice and school performance” (“Ohio Leadership,” 2017, para. 2).

In Ohio public schools, educational leaders include school administrators—individuals who possess an administrative license from the Ohio Department of Education. Superintendents, principals, and administrative specialists are considered administrators. Educational leaders and administrators operate throughout all levels of public education governance. Superintendents serve as chief executive officers at the federal, state, intermediate district, and local district levels (Kowalski, 2006), and their
administrative roles generally incorporate two characteristic and essential organizational areas: leadership and management. As leaders, superintendents exhibit five role characterizations: teacher-scholar, democratic leader; applied social scientist; communicator; and manager (Kowalski, 2006). The superintendent’s role as teacher-scholar requires a solid foundation in the knowledge of teaching and experience in applying that knowledge in the classroom (Kowalski, 2006). As managers, superintendents work the operational environment of the school district and handle responsibilities such as balancing budgets, maintaining and operating safe school facilities, and attending to personnel requirements (Kowalski, 2006).

Similarly, school principals are school administrators and educational leaders who perform different roles in their positions. Gorton and Schneider (1991) identified six important roles of school principals: manager, educational leader, disciplinary controller, facilitator in human relations, mediator in conflicts, and evaluator. As educational leaders, the Standards for Ohio Educators (2005b) state that “principals support the implementation of high-quality standards based instruction that results in higher levels of achievement for all students” (p. 40) and “ensure the instructional content that is taught is aligned with the Ohio academic content standards and curriculum priorities in the school and district” (p. 40). Increasingly, the role of the principal has become that of instructional leader who is responsible for developing effective teaching practices to result in positive student outcomes (“Ohio Department… Working conditions,” 2016b).

Administrative specialists are educational leaders who have special training in their areas of licensure. For example, an administrative specialist who holds a Curriculum, Instruction, and Professional Development (CIPD) license has completed a
training program geared towards improving their own teaching skills and practices, and helping other teachers improve their classroom instruction. Regarding the professional development component of the CIPD administrative specialist license, these leaders use standards to design, implement, and evaluate a system’s professional learning program (“Ohio Department…Quick reference,” 2015b, p. 4).

Teachers are educational leaders who are charged with the responsibility of applying curriculum standards, instructional practices, and assessment strategies within the classroom to improve student learning. Curtis (2013) defined teacher leadership “as specific roles and responsibilities that recognize the talents of the most effective teachers and deploy them in service of student learning, adult learning and collaboration, and school and system improvement” (p. 4). Regarding teacher leadership, York-Barr and Duke (2004) suggested, “that teachers rightly and importantly hold a central position in the ways schools operate and in the core functions of teaching and learning” (p.255). Arne Duncan (2014), former U. S. Department of Education Secretary, spoke about teacher leadership. He said, “Teacher leadership means having a voice in the policies and decisions that affect your students, your daily work, and the shape of your profession. It means guiding the growth of your colleagues” (Section 4, para. 10).

Educational leaders at all levels--superintendents, assistant superintendents, principals, vice principals, administrative specialists, and teachers--are identified as those responsible for implementing the Ohio Learning Standards in Ohio public schools. Higher order thinking skills such as problem solving, critical thinking, and deeper understanding are some of the skills recognized in the state standards that are essential elements of a quality 21st century education. Examining and exploring assessment
practices of higher order thinking skills is critical to understanding the utilization and applicability of these skills specific to the Ohio Learning Standards.

According to Anderson (2002), students receive the best chance at a quality education when three components are closely aligned: curriculum, instruction, and assessment. These components should receive equal emphasis in educational practices but assessment is often overlooked or viewed as an afterthought rather than an important learning tool. Assessments are means of evaluating and verifying learning that has happened (Anderson, 1998; Bintz, 1991) and provides information about what students know and what they are able to do (Dikli, 2003).

A closer look at teachers’ experiences in assessing higher order skills could uncover successful classroom practices in the execution of assessment strategies. However, critical skills such as these, and more specifically, the assessment of such skills, may be disregarded when considering the complexity of changes that might be taking place in the classroom.

To investigate one aspect of the phenomenon of assessing higher order thinking skills, and to enlighten educational leaders who may be responsible, directly or indirectly, for student achievement, I listened to teachers discuss their own classroom experiences and the meaning they make in their work. Teachers’ experiences are often ignored when we talk about educational leadership. I posed the following question to drive my study: what lived experiences do effective teachers have with assessing higher order thinking skills in the secondary school classroom?
Statement of the Problem

Simply stating this study is a phenomenological approach to understanding secondary teachers’ experiences with assessing higher order thinking does not reveal the multiple layers involved when exploring this phenomenon. Many aspects of this study reveal the complex nature of examining teachers’ experiences with assessing higher order thinking. To begin, a basic understanding of higher order thinking was necessary to underscore the conversation about this study. Using Bloom’s taxonomy and/or Webb’s Depth of Knowledge schemas provided teachers the opportunity to use common terminology to relate their personal definitions and understandings of higher order thinking in relation to the phenomenon of assessing them. Other layers of this problem involved exploring assessments of higher order thinking skills in context with accountability measures required by the Ohio Learning Standards; considering curricular alignment where curriculum, instruction, and assessment are cohesively aligned; and understanding teachers’ dispositions in how they approach this phenomenon.

Educators often use a classification system such as Bloom’s taxonomy to provide a common language for distinguishing cognitive behaviors found in educational learning objectives. These hierarchical, knowledge-based behaviors are sometimes referred to as “skills” and include remembering, understanding, applying, analyzing, synthesizing, and evaluating (Bloom, 1956). Higher order thinking skills refer to an individual’s ability to apply, analyze, synthesize (create), and evaluate new knowledge (Bloom, 1956; Krathwohl, 2002). While higher and lower thinking skills are interwoven, there is general agreement that higher order skills can be distinguished from lower order skills such as rote memorization and basic recall (Krathwohl, 2002; Lewis & Smith, 1993). Gough
(1991) commented that thinking skills are crucial for educated people to deal with the rapidly changing world. The *Partnership for 21st Century Skills* (2009) described the skills, knowledge, and expertise students must master for success in work and life as a blend of content knowledge, specific skills, expertise and literacies. Students must master core academic subject knowledge and understanding, critical thinking, effective communication and collaboration, and problem solving for success in the 21st century (“Partnership for 21st Century Skills,” 2009).

It is not enough to consider only the instructional aspect of higher order thinking and it is often difficult to separate the curricular alignment components of instruction and assessment. Frequently, instructional practices have assessment measures embedded within them. For example, teachers using instructional strategies that involve collaborative groups often use observation and listening as a means for assessing student learning. However, the assessment of higher order thinking must also be examined to ensure students receive a quality education that is grounded in a well-aligned curriculum. “Teaching is in vain” if what is being taught is not aligned with standards or objectives; if there is no demonstrated learning, there is no recognized teaching” (Anderson, 2002, p. 259). The CCSS state, “…student attainment of the standards should be observable and verifiable and the standards can be used to develop broader assessment frameworks” (“Common Core,” 2015, para. 11). Standard 4 of the *Professional Standards for Education Leaders* (“Standards for Ohio,” 2005a) show, “Effective educational leaders develop and support intellectually rigorous and coherent systems of curriculum, instruction, and assessment to promote each student’s academic success and well-being.” Further, “effective leaders align and focus systems of curriculum, instruction, and
assessment within and across grade levels to promote student academic success, love of learning, the identities and habits of learners, and healthy sense of self” (“National Policy,” 2015, p. 12). Assessment, rather than an afterthought, should be given equal consideration when developing best practices in the secondary classroom.

Most educators agree with the premise that higher order thinking skills are essential to providing a quality education, but little is known about the experience teachers have when using and assessing such skills in the classroom. Assessments are critical components of a quality education (Gilligan, 2007) but the question often raised is how student learning should be assessed. This age-old question, which elicits a broad range of emotional reactions from teachers, is important because experience and research shows assessments influence classroom instruction and learning (Anderson, 1998). “Assessment, rather than being something added, is an integral, ongoing aspect of teaching and learning. It is the process of gathering, describing, or quantifying information about learner performance” (Rovai, 2000, p. 141). Dissecting the assessment aspect from the holistic view of curriculum alignment (that includes curriculum, instruction, and assessment) may provide a better understanding of how teachers assess higher order thinking as a separate condition from curriculum and instruction.

Accountability for student learning and success on statewide assessments is now the responsibility of teachers, administrators, and school systems (Anderson, 2002). With the implementation of the Ohio Learning Standards, assessment data are used by school districts in ways that help determine institutional effectiveness, evaluate teacher performance, align formative instruction, provide students a means to evaluate their own abilities, and help parents understand the educational standing of their children (Gilligan,
Ross (2012) stated any assessment practices which support increased student learning are necessarily aligned with instructional programs. The interaction between the assessment tool, the resulting data, and the subsequent instructional practices selected by educators contribute to the effectiveness of any assessment programs (Sacks, 2009). The accountability measures educators are now expected to meet through mandated tests place more demands and restrictions on teachers and school administrators in the way they assess in the secondary classroom. Teachers are keenly aware the results of statewide assessments may reflect on their ability to be viewed as an effective teacher and in some cases, may be a factor in their job performance ratings.

Successful accountability programs rely on cohesive curricular alignment where assessment is considered a significant component, along with that of curriculum and instruction (Anderson, 2002). Curricular alignment is important so educational leaders know what students know because of their schooling, that they understand the differences in the effects of schooling on student achievement, and they do not underestimate the effect of instruction on learning (Anderson, 2002) due to different approaches in curriculum, instruction, and assessment practices.

Educational leaders’ (i.e. teachers, principals, superintendents, curriculum and instruction directors) dispositions are important when exploring this phenomenon. “Dispositions guide behaviors” (Melton, Mallory, & Green, 2010, p. 58). With the present climate of accountability and performance based standards in Ohio public schools, educational leaders must not only be aware of their dispositions to lead, they must have the positive dispositions that will lead to school and student improvement (Melton et al., 2010). The Council of Chief State School Officers (2008) state,
“Dispositions have been influential in emphasizing the underlying assumptions, values, and beliefs appropriate to an education system that is dedicated to high expectations for each and every student” (p. 6) and indicate “the habits of professional action and moral commitments that underlie an educator’s performance” (“Council for the Accreditation,” 2016, p. 180). Educational leaders’ dispositions play a role in determining best practices for student success because an educator’s attitudes, values, and beliefs about students and themselves influence the impact made on student learning and development (Collinson, Killeavy, & Stephenson, 1998).

One way to understand an individual’s dispositions is through exploring lived experiences. Phenomenological research is a method for understanding how individuals make meaning from their lived experiences and the phenomenological design is one in which the personal perspective is valued, regardless of any constraints. To gain a deeper understanding of the phenomenon of assessing higher order thinking skills in the classroom setting, this qualitative empirical phenomenological study is designed to examine the meaning of experiences of secondary teachers identified by school district administrators as “effective.” The study attempted to explore these experiences to identify themes of commonality and similarity among participants (Ross, 2012) and to identify the contexts or situations that have influenced or affected their experiences (Moustakas, 1994).

Most educators agree that HOTS are essential in reaching the goal of students being college and career ready, but little is known about the experience teachers have when using such skills in the classroom. For Ohio’s mandate to be successful, the voices of those most affected need to be heard and their day-to-day experiences closely
examined. A lack of understanding of teachers’ experiences assessing higher order thinking, due to little or no research that specifically targets this phenomenon, was the impetus for conducting this study. Using a heuristic approach, this phenomenological study was designed to explore seven effective teachers’ experiences in developing practices, as well as gaining a deeper understanding about assessing higher order thinking in secondary classrooms of one Ohio school district.

Additionally, much of a teacher’s daily routine is based on personal experiences that influence instructional decision making and practices (Ross, 2012). As teachers develop meaning from their experiences, they either accommodate or assimilate new knowledge to create new meaning or confirm existing meaning (Ross, 2012). Such experiences may shape attitudes and perceptions (Vygotsky, 1962) in how teachers use higher order thinking in the classroom and the way in which assessing these skills are accomplished.

**Purpose Statement**

Gaining a holistic view of teachers’ experiences may provide an understanding of those most directly involved with higher order thinking skills and their assessments. Top down reform measures and state assessment practices seem to overlook the need to consider the experiences that classroom teachers have in relation to higher order thinking skills and their assessment. Findings from this study may reveal new understandings of teachers’ experiences and provide insight for organizational learning and targeted professional development.

Many academic debates and discussions have focused on standards, assessment, and curricular alignment; however, little is known about the classroom experiences
teachers have as they address the implementation of these reform measures. In examining past research, many qualitative and quantitative studies were found that dealt specifically with assessments and/or higher order thinking. While these studies provided relevant knowledge relating to how higher order thinking skills were taught and assessed, there was comparatively much less research available on educators’ own lived experiences with classroom practices, and specifically assessing higher order thinking skills. The purpose of this study was to contribute to filling that gap by adding to the literature an understanding of what experiences effective secondary public school teachers have with assessing higher order thinking skills in one Ohio public school district.

With the implementation of the CCSS, more emphasis is being given to teaching and assessing students beyond basic recall and rote memorization. The CCSS promote a broad strategy to prepare students to be college and career ready by developing critical thinking and analytic skills (Wash, Pae, & Freeman, 2014). For Ohio public school students, increasing the level of rigor is a main principle of becoming college and career ready and implementing the Common Core State Standards move educational practices in the right direction (Hess, 2013). But the implementation of the standards alone is not enough. Practical tools are needed to develop local curricula and assessments, and “to promote classroom discourse aligned to higher levels of cognitive demand” (Hess, 2013, p. 4). Ohio’s Learning Standards (Ohio Department...Ohio’s learning,” 2017c) promote such skills as evaluation, analysis, and creation over simple memorization. However, as with teaching, there is much debate over the assessment of higher order thinking skills (Gough, 1991). Research is limited in providing actual insight from the field as to what practitioners consider and experience when assessing such skills.
As stated above, students need higher order thinking skills to become college and career ready in a global economy and technological society (“Common Core,” 2015). Ohio’s Learning Standards outline the skills and knowledge that will help students become ready for success in college and careers (“Ohio Department...Ohio’s learning,” 2017b). Critical to the success of these newly developed educational programs are the experiences of teachers in applying these programs in secondary schools. These experiences may validate the results of the application of theory and the implementation of new programs intended to prepare students to be competitive in the future global economy. Understanding the meaning of teachers’ experiences may be an invaluable resource to educational leaders trying to determine the success and failures of applied theories, educational reforms, and the development of future educational programs. This study was intended to add to that understanding.

**Theoretical Framework**

The theoretical framework for this study was based on the foundation of qualitative phenomenological research using a social constructivist approach and an ontological philosophical basis. The philosophy guiding qualitative research “emphasizes the ‘meaning’ of phenomena from the perspectives of the people or culture under examination...” (Ridenour & Newman, 2008, p. 7) and a qualitative research methodology is shaped by the researcher’s experience with collecting and analyzing the emerging data (Creswell, 2013). This qualitative study attempted to provide a thoughtful glimpse into the nature of being a secondary teacher in today’s ever-changing educational environment and to provide educational leaders applicable real-life experiences to enhance their own environments in assessing higher order thinking skills.
In reviewing literature related to the framework of social constructivism, it became apparent there is discussion over the use of two similar sounding terms—constructivism and constructionism. Andrews (2012) suggested the generic term “constructivism” is used interchangeably between the terms constructivism and social constructionism. Young and Colin (2004) distinguished between constructivism and social constructionism where “the former focuses on meaning making and the constructing of the social and psychological worlds through individual cognitive processes while the latter emphasizes that the social and psychological worlds are made real (constructed) through social processes and interaction” (p. 375).

A social constructivist methodology is one where individuals seek to understand the world in which they live and work through the development of varied and multiple subjective meanings (Creswell, 2013). The researcher relies on the participants’ views as much as possible and looks for the complexity of views rather than narrowing into a few categories or ideas to inductively develop a “pattern of meaning” (Creswell, 2013, p. 25). This interpretation of social constructivism guided this study. Secondary public school teachers’ worlds are specific to the phenomenon of assessing higher order thinking skills. Examining the experiences teachers have in the context of the classroom, school, and district setting provided a means for understanding how teachers make sense of assessing higher order thinking.

The purpose of addressing philosophical assumptions in phenomenological research is to state and define them, and show how they are used (Creswell, 2013). Using ontological assumptions, this study explored the nature of reality and its characteristics through the lens of participants, researcher, and readers to understand the multiple
realities of this phenomenon (Creswell, 2013). Through their experiences, teachers’ subjective realities provided a critical understanding of how higher order skills are assessed in the classroom.

Van Manen (1997) describes phenomenology as the study of lived meaning which involves descriptions and interpretations of these meanings to provide deep and rich understanding. Phenomenology “is always the structures of meaning of the lived human world” and is considered a human science rather than a natural science (Van Manen, 1997, p. 563). A phenomenological study focuses on what all participants have in common of their lived experiences of a phenomenon (Creswell, 2013) and intends to provide a deeper understanding of the meaning of our everyday experiences (Van Manen, 1997).

Lived experience is the starting point and end point of phenomenological research. The aim of phenomenology is to transform lived experience into a textual expression of its essence—in such a way that the effect of the text is at once a reflexive re-living and a reflective appropriation of something meaningful: a notion by which a reader is powerfully animated in his or her own lived experience. (p. 1009)

Van Manen (1997) explained lived experience can only by grasped by past reflection and reconstruction of that experience.

Another aspect of the theoretical framework is the phenomenon of higher order thinking skills which have been identified as essential elements for students to become college and career ready. Ohio teachers are the intermediaries in the educational bureaucracy of accountability and professionalism in Ohio’s secondary public schools.
As such, an attempt was made to view their professional experiences as educators with higher order thinking skills and then an attempt was made to narrow the lens to peer into their experiences in assessing higher order thinking of students to understand the essence of this phenomenon. The insight and understanding revealed from teachers’ experiences were important considerations when navigating through the complicated changes required by recent reform measures. Their experiences are particularly relevant for educational leaders trying to create an educational environment that ensures the alignment of curriculum, instruction, and assessment. Bloom’s Taxonomy and Webb’s Depth of Knowledge, discussed in detail in Chapter 2, provided a common language for discussing higher order thinking skills.

Incorporating a social constructivist approach with an ontological philosophical basis for this qualitative phenomenological study provided an opportunity to explore secondary classroom teachers’ experiences of how they understand or make meaning of assessing students’ higher order thinking skills. It allowed me to examine how they construct reality from their lived experiences when assessing such skills.

**Assumptions Underlying the Study**

Several assumptions grounded this study. One was that curriculum, instruction, and assessments are critical components of a quality education. Another was higher order thinking skills are necessary for students to meet the requirements of Ohio’s Learning Standards and the CCSS. Examining the reflective experiences that teachers have with higher order thinking may increase understanding and reveal meaning that might enhance the use of higher order thinking skills’ instruction and assessment. Subsequently, understanding these experiences may shape the way instructional and assessment
strategies are used in the classroom and may illuminate practices that can be transferrable to other secondary classrooms in the state of Ohio. Another assumption was made that secondary teachers (with the guarantee of anonymity) answered interview questions thoughtfully and honestly when they spoke about personal experiences they had with assessing higher order thinking.

**Importance of the Study**

This study adds to the body of knowledge concerning the experiences of teachers relating to the phenomenon of higher order thinking skills instructional and assessment practices in the secondary classroom. Given the growing importance and value placed on higher order thinking skills at the classroom, school, district, and state level, educational leaders may benefit in increased understanding of how teachers make sense of higher order thinking skills and their assessments. Educators and administrators may gain insight into how HOTS and their assessment influence instructional programs and practices in support of student learning (Perie, Marion, & Gong, 2009). This insight and understanding might reveal challenges and successes that teachers encounter, thereby providing a framework for others in similar circumstances who may experience the same challenges. Findings could allow educational leaders to tailor professional development and preservice training in areas where curriculum, instruction, and assessments are not in alignment.

**The Researcher’s Position Relative to the Purpose and Topic**

Understanding my own position and bias as a researcher is an important aspect of phenomenological research. Van Manen (2014) wrote about suspending one’s own beliefs and attitudes that are taken for granted, and Patton (2002) felt it critical to bracket
one’s own experience from participant experiences to better understand the collected data. Bracketing my personal beliefs and attitudes allowed me to approach this study with an awareness of my own position and potential biases which is critical when conducting phenomenological research. It is also important for the reader to understand my personal position in the context of interpreting and presenting the data.

As an educational leader and doctoral student, with career aspirations that involve curriculum, instruction, and professional development, I find the perceived lack of understanding of teachers’ experiences with higher order thinking skills disconcerting. While there are many studies of classroom instruction and assessment, I found relatively few researchers who explored the experiences of teachers in the classroom (Marlow & Inman, 1992; Marso & Pigge, 1993; Tan, 2013). This apparent lack of understanding prompted me to conduct this study to provide teachers an opportunity to relate their experiences with assessing higher order thinking.

Throughout my undergraduate schooling as a music education major, higher order thinking skills were rarely mentioned or utilized in any conscious manner. I do not recall teacher training including higher order thinking skills as essential elements in teaching, much less in assessing them in a music classroom. Bloom’s taxonomy was a lecture topic discussed in a theoretical manner and never applied in creating teaching objectives or developing curricula. In my personal educational experiences as a college student, higher order thinking skills were incorporated throughout many musical productions and performances but traditional classroom instruction involved mainly Bloom’s lower levels of knowledge and comprehension. The majority of time spent in the classroom involved instruction through lectures and traditional assessments.
As a music teacher, rarely did I consciously incorporate higher order thinking skills when developing classroom instructional objectives. I conducted classroom instruction in the same way I was taught. Fortunately, the way I was taught did incorporate higher order thinking skills; I just did not realize it at the time. In almost every aspect of my classroom instruction students applied, analyzed, evaluated, and created musical experiences through participation and performance opportunities. Students used the highest levels of higher order thinking skills when they created or wrote their own music. They used metacognitive awareness through the evaluation of their musical performances and demonstrated critical analysis on a variety of musical selections. While working in my third school system, I was given the opportunity to become the chairperson of the Fine Arts Learning Community. This involved setting course objectives and learning standards for our department. It was during this period that I consciously used Bloom’s taxonomy in developing instructional practices but not when I was using assessments. Later, upon reflection, I realized I was using higher order thinking skills in assessing as well; I just did not realize I was. Students were frequently assessed by demonstrating, creating, evaluating and/or judging musical activities or performances.

Shortly after receiving my master’s degree, I obtained a job as a classroom assistant in a Montessori school. Although I held this position for only one year, the impact it had on my views of educating children was life changing. This position was the first time I observed *how* children learn. It was the first time I considered different teaching strategies and the first time I started questioning the status quo of education in America. It was a wonderful, eye-opening experience.
For the next 20 years, I was a mother and homeschool teacher of two children. The experiences I had with the Montessori method and homeschooling caused a transition in my thinking about traditional schooling. When my children did attend public schools for their high school years, I noticed teaching methods had seemingly changed very little from what I had experienced years earlier. Their experiences in instruction and assessment sounded very familiar. Their tests continued to use mainly multiple choice, true-false, and short answer essay questions. It appeared my children rarely used higher order thinking skills such as critical thinking, problem solving or demonstrated learning on assessment tasks. They attended classes, listened to lectures, and took frequent pencil and paper tests covering classroom instruction. I did notice one difference—my son was required to take standardized tests in the form of Ohio Graduation Tests.

My personal, familial, and professional classroom experiences suggest little has changed in the secondary classroom. I am concerned with teaching practices that continue to use lower level skills such as recall and reproduction as the primary method of instruction and assessment. While Ohio educational leaders have determined higher order thinking skills will improve students being college and career ready, I am not confident higher order thinking skills are being utilized by teachers who may be more comfortable with traditional teaching practices. I am cautiously optimistic with the focus placed on the Ohio’s Learning Standards and the emphasis now being given to higher order thinking skills as part of a quality education. I understand the complexities involved with teaching in Ohio’s public schools and that reform standards and accountability measures may make teachers’ jobs even more challenging. However, the evidence
suggests to me that higher order thinking skills will go a long way in improving student academic achievement.

**Operational Definitions**

To gain a clear understanding of terms used throughout this study, operational definitions are provided in the following section. Operational definitions are statements that explain terminology specific to this research to ensure the reader understands and interprets the language of the study with the same intent as the researcher (Creswell, 2013).

**Administrators.** In the state of Ohio, individuals who possess an administrative license from the Ohio Department of Education and includes superintendents, principals, and administrative specialists.

**Alternative assessment.** A widely-used term referring to any type of assessment that provides an alternative to the standard assessment techniques used in traditional modes of assessment (Merritt, 2008) and deviates from the traditional one-answer, multiple-choice tests found on teacher-created tests and standardized examinations (Strickland & Strickland, 1998). Alternative assessment can offer comprehensive insight into students’ achievements and provide authentic information about their knowledge, abilities, skills, attitudes, and competencies developed during the teaching process (Letina, 2015).

**Authentic instruction.** Fosters learning by building knowledge, encouraging inquiry, and developing assignments that have immediate value beyond school through engaging and academically challenging issues that are personally or socially significant (Newmann, Marks, & Gamoran, 1996).
**Assessment.** A collection of information about what students know and what they are able to do (Dikli, 2003). Assessment is a measure that happens after learning has happened (Anderson, 1998) and viewed as a means of verifying student learning (Bintz, 1991).

**Common Core State Standards (CCSS).** “The knowledge and skills students should gain throughout their K-12 education to graduate high school prepared to succeed in entry-level careers, introductory academic college courses, and workforce training programs” (“Common Core,” 2015, para. 5).

**Contextualized Instruction.** Courses that are modified to incorporate materials from specific fields into the actual course content (Mazzeo, Rab, & Alssid, 2003).

**Curriculum.** A school’s public statement as to what students will learn in the form of written outcomes of intended learning (Danielson, 2006, p. 87) that may include lessons and academic content taught and what is important to learn in the school, course, or program (Toombs & Tierney, 1993).

**Dispositions.** Attitudes, beliefs, underpinnings, ways of being, a moral compass (“Council of Chief,” 2008).

**Educational Leaders.** School and/or district level personnel involved in educating students to include, but not limited to, teachers, principals, vice principals, directors, curriculum and instruction coordinators, superintendents, and vice superintendents.

**Educational Leadership.** See Leadership.

**Effective Teachers.** In Ohio public schools, effective teachers understand student learning and development, respect the diversity of the students they teach and hold high
expectations for all students to achieve and progress at high levels; know and understand the content areas for which they have instructional responsibility; understand and use varied assessments to inform instruction, and evaluate and ensure student learning; plan and deliver effective instruction that advances the learning of each individual student; create a learning environment that promotes high levels of student learning and achievement for all students; collaborate and communicate with students, parents, other teachers, administrators and the community to support student learning; and assume responsibility for professional growth and performance as an individual and as a member of a learning community (“Ohio Department…Ohio teaching,” 2012, p. 3).

**Experiences.** “Transactions in and across space and time within irreducible person-in-setting units” (Roth & Jornet, 2014, p. 107).

**Federal Level of Public Education.** Handled by the United States Department of Education. One of the major responsibilities is the development of rules and regulations to enforce federal laws (Kowalski, 2006).

**Formative Assessment.** “Formative assessment is a systematic process to continuously gather evidence about learning. The data are used to identify a student’s current level of learning and to adapt lessons to help the student reach the desired learning goal.” (Heritage, 2007, p. 141).

**Higher Order Thinking Skills.** Knowledge-based behaviors that include remembering, understanding, applying, analyzing, synthesizing, and evaluating (Bloom, 1956). Higher order thinking skills refer to an individual’s ability to apply, analyze, synthesize (create), and evaluate new knowledge (Bloom, 1956; Krathwohl, 2002). There
is general agreement that higher order skills can be distinguished from lower order skills such as rote memorization and basic recall (Krathwohl, 2002).

**Instruction.** The method or way of teaching to students (Difference Between, 2012).

**Intermediate School Districts of Public Education.** Intermediate administrative agencies between local and state departments of education (Kowalski, 2006).

**Leadership.** “A process distributed across an entire school system-its central office and all of its buildings-involving shared responsibility for and concerted action on behalf of improved instructional practice and school performance” (“Ohio Leadership,” 2017, para. 2)

**Lived Experiences.** How something appears or presents itself to us personally (Van Manen, 2014).

**Local School District of Public Education.** Subdivisions of state government that are generally given the duties of establishing schools and the policy and rules to govern them, raising and managing public funds, maintaining and establishing buildings, and employing a superintendent (Campbell, Cunningham, Nystrand, & Usdan, 1990).

**Metacognition.** “Monitoring and reflecting on the process and product of one’s own learning” (Zohar, Degani, & Vaaknin, 2001, p. 470).

**Ohio’s Learning Standards.** Ohio adopted the Common Core State Standards with the implementation of Ohio’s Learning Standards. They “outline the skills and knowledge that will help students become ready for success in college and careers” (“Ohio Department...Ohio’s learning standards revision,” 2017d, para. 1).
Ohio State Board of Education. Part of the executive branch of the Ohio State government and is made up of 19 members (11 elected and eight appointed by the governor) and the Superintendent of Public Instruction serves as secretary of the State Board of Education (“Ohio Department…About the state,” 2017a). “The State Board of Education’s vision is for all Ohio students to graduate from the PK-12 education system with the knowledge, skills, and behaviors necessary to successfully continue their education and/or be workforce ready and successfully participate in the 21st century global economy as productive citizens by…effectively delivering support for a high quality education, providing sufficient resources which are efficiently managed, and developing a statewide outreach and communication strategy on board policy and the importance of education in the 21st century” (“Ohio Department…About the state”, 2017a, para. 2).

Performance Assessment. A type of alternative assessment in which students demonstrate skills or proficiencies through creating, developing, producing a completed product or performance (Merritt, 2008) and where observation and judgments assess the process or product (Gilligan, 2007). It is a collection of tasks given in response to a request for information or action that can be rated for quality based on clear standards for the process of developing or creating the final product (Stecher, 2010).

Principals. In Ohio public schools, principals help create a shared vision and clear goals for their school and ensure continuous progress toward achieving the goals; support the implementation of high-quality standards based instruction that results in higher achievement for all students; allocate resources and manage school operations to ensure a safe and productive learning environment; establish and sustain collaborative
learning and shared leadership to promote learning and achievement of all students; engage parents and community members in the education process and create an environment where community resources support student learning, achievement, and well-being (“Standards for Ohio,” 2005b, p. 40).

**Professional Development.** “Opportunities for professional education faculty to develop new knowledge and skills through activities such as in-service education, conference attendance, sabbatical leave, summer leave, intra- and inter-institutional visitations, fellowships, and work in P-12 schools” (“National Council,” 2017, p. 6).

**Problem-based Learning.** Problem-based learning usually consists of a set of observable phenomena, situations, or events that are presented to small groups of students as carefully constructed problems (Schmidt, 1994).

**Project-based Learning.** “Project-based learning is a comprehensive approach to classroom teaching and learning that is designed to engage students in investigation of authentic problems” (Blumenfeld et al., 1991, p. 369)

**Rubrics.** “Written and shared criteria for judging performance that indicate the qualities by which levels of performance can be differentiated, and that anchor judgments about the degree of success” (“National Council,” 2017, p. 7).

**State Levels of Public Education.** May consist of state boards of educations where state departments of education and state superintendents are extensions of state boards and are part of the executive branch of government (Kowalski, 2006).

**Summative Assessment.** Evaluation that is concerned with gathering information after learning has taken place and is often used for assigning grades (Anderson et al., 2001).
Superintendents. Serve as chief executive officers at the federal, state, intermediate district, and local district levels (Kowalski, 2006), and their administrative roles generally incorporate two characteristic and essential organizational areas: leadership and management. As leaders, superintendents exhibit five role characterizations: teacher-scholar, democratic leader; applied social scientist; communicator; and manager (Kowalski, 2006).

Teachers. Teachers are educational leaders who are charged with the responsibility of applying curriculum standards, instructional practices, and assessment strategies within the classroom to improve student learning.

Teacher Leadership. Teacher activity to improve students’ educational experiences and outcomes by creating relationships, breaking down obstacles, and organizing resources throughout a school or school system (York-Barr & Duke, 2004).

Traditional Assessment. A class of assessments that measure traits (McMillan, 2001) that are often distinct activities different from teaching and learning (Abeywickrama, 2011) which measure an individual’s achievement or aptitude through a series of questions which may include multiple-choice, matching, short answer, true/false or essays (Dikli, 2003).

Summary

Higher order thinking skills are important features of CCSS and Ohio’s Learning Standards. Because of these demands, increased focus and attention is being directed to the development of knowledge beyond basic recall and rote memorization and towards deeper understanding, critical thinking, and problem solving. Public attention is increasingly focused on academic accountability and curricular alignment; however, until
an understanding of secondary classroom teachers’ experiences is gained about higher order thinking skills and their assessment, this important attribute to student learning will continue to be under-valued and overlooked.
CHAPTER II
REVIEW OF THE LITERATURE

In the literature review, no phenomenological research studies were found that specifically investigated teachers’ experiences of higher order thinking skills and their assessments. However, there were other qualitative and quantitative studies that examined traditional and alternative assessments of higher order thinking in relation to specific teaching disciplines (e.g. mathematics, science, language arts). In addition, studies about the instruction of higher order thinking skills provided a look at the interwoven nature of this phenomenon—where curriculum, instruction, and assessment are often connected without distinction given to such independent methods. In this review, I examined several of those studies to explore ways in which teachers are using higher order thinking skills in their instructional and assessment practices. Due to limited research that specifically targeted assessing higher order skills, relevant data were ascertained by reviewing related studies of teachers’ instructional practices and their perceptions of HOTS.

The first section of the review provides a common understanding of higher order thinking by examining Bloom’s Taxonomies (the original and revised) and Webb’s Depth of Knowledge schemas. Using hierarchical organization as a means for clarifying higher
order thinking skills, Bloom and Webb’s frameworks explain HOTS as cognitive skills that function beyond rote memorization and basic recall (Krathwohl, 2002). Secondly, I reviewed another body of knowledge relevant to this study of previous research conducted around higher order thinking instruction and assessment. Many of these research studies involved instructional practices such as authentic instruction, contextualized instruction, and alternative assessments (i.e., concept mapping, post-problem reflection). A third section of the literature review focused on teachers’ dispositions and perceptions about assessing higher order thinking skills. Concluding these three sections are summary remarks and a transition to the methods used in the study.

**Bloom’s Taxonomies and Webb’s Depth of Knowledge**

To simplify the development of comprehensive examinations, Benjamin Bloom, a University of Chicago researcher, and several of his colleagues determined a need to standardize the language used in teaching, learning, and assessing. In 1956 the *Taxonomy of education objectives: The classification of education goals, by a committee of college and university examiners. Handbook 1: Cognitive domain* was published. Bloom’s Taxonomy (as it is known) provided educators with a foundation to understand and discuss student learning and provided structure for formulating teaching objectives and strategies (Bloom, 1956; Boslaugh, 2013; Krathwohl, 2002). Intellectual skills were classified into increasingly complex categories (Boslaugh, 2013). Three domains provided structure for classifying thinking behaviors that were important in the processes of learning: cognitive--based on knowledge; affective--based on attitudes; and psychomotor--based on skills (Forehand, 2005). While the taxonomy referred to three
distinct domains, the cognitive domain, almost solely, was recognized as the most relevant in discussions about educational design (Bronk, 2009).

Within the cognitive domain, six hierarchical levels identified complex levels of thinking (Forehand, 2005). Levels of cognitive ability from simple/concrete to complex/abstract were identified as knowledge, comprehension, application, analysis, synthesis, and evaluation (Krathwohl, 2002). Sub-categories delineated components of each level to further clarify the level’s complexity and levels were considered cumulative, where each level was required for mastering the next (Krathwohl, 2002).

The taxonomy provided educators with a framework for classifying statements that served as a common language about learning goals and a way to determine specific meaning of broad educational goals found in local, state, and federal standards (Krathwohl, 2002). In using the taxonomy, educators would be able to determine the alignment of educational objectives, activities, and assessments in a unit, course, or curriculum (Krathwohl, 2002).

A revised taxonomy was developed in 2001, to re-align the structure based on new knowledge and current research. The revised taxonomy addressed some of the weaknesses of the original taxonomy, such as the rigidity of the hierarchical levels and the lack of metacognitive strategies (Amer, 2006). One of the changes that resulted was using a two-dimensional structure (the original had one) where the vertical axis represented the knowledge dimension and the horizontal axis signified the cognitive process dimension (Krathwohl, 2002; Appendix A). The knowledge dimension included four categories (sometimes referred to as sub-dimensions), versus three in the original taxonomy: factual, conceptual, procedural, and a new metacognitive category (Amer,
The cognitive process dimension retained the six categories as in the original but with several changes. With the revised taxonomy, the six major categories remained basically the same but were renamed to their verb forms: knowledge to remember, comprehension to understand, application to apply, analysis to analyze, synthesis to create, and evaluation to evaluate. The categories of create (synthesis) and evaluate were interchanged in the hierarchy from the original. Finally, in the revised taxonomy, the cognitive process categories were no longer cumulative. The six categories, while they may be cumulative, can overlap in complexity (Amer, 2006; Krathwohl, 2002).

Figure 1. Bloom’s original and revised taxonomies

Airasian and Miranda (2002) suggested the revised taxonomy’s two dimensions allowed for assessments to be more clearly defined in combination with the processes of stating objectives, planning, and instruction. “The power of assessments, regardless of whether they take the form of a classroom quiz, a standardized test, or a statewide
assessment battery, resides in their close connection to objectives and instruction” (Airasian & Miranda, 2002, p. 249).

Mayer (2002) suggested retention and transfer are two of the most important educational goals. Retention is the ability to remember information much in the same way it was presented, and transfer is the ability to use what was learned to solve new problems, answer new questions, or enable learning new subject matter (Mayer, 2002; Mayer & Wittrock, 1996).

Bloom’s revised taxonomy includes six cognitive process categories related to retention and transfer. The six categories are: remembering—the process where material presented through instruction is retained much in the same way in which it was taught; understanding—the process where students are able to construct meaning from instructional messages and build connections between new knowledge and prior knowledge; applying—using procedures to perform exercises or solve problems; analyzing—breaking material into its component parts and figuring out how the parts are interrelated to each other and the whole; evaluating—making judgments based on criteria and standards; creating—reorganizing elements into a new pattern or structure to form a coherent or functional whole (Mayer, 2002). One is most closely related to retention (remember) and the other five increasingly related to transfer (understand, apply, analyze, evaluate, and create; Mayer, 2002). These categories and sub-categories are intended to broaden how teachers assess learning (Mayer, 2002) and levels of higher-order thinking (applying, analyzing, evaluating, and creating; Krathwohl, 2002).

The Common Core Institute and Common Core State Assessments (and Ohio’s Learning Standards) use Webb’s Depth of Knowledge (DOK) as a tool for educators “to
analyze the cognitive demand (complexity) intended by the standards, curricular activities, and assessment tasks” (Hess, 2013, p. 4). The schema includes four DOK levels: Recall and Reproduction; Skills and Concepts; Strategic Thinking; Extended Thinking. Recall and Reproduction involves recalling a fact, information, or procedure and is similar to Bloom’s two lowest levels of knowledge and comprehension (Perkins, 2008). The DOK Skill and Concept level requires two or more steps that involve mental processes beyond routine responses that utilize information or conceptual knowledge (Perkins, 2008). Strategic Thinking comprises reasoning, developing plans or a sequence of steps, exhibiting some complexity, finding more than one possible answer, and using higher levels of thinking than the previous two levels (Perkins, 2008). Extended Thinking correlates to Bloom’s two highest levels and entails investigation, complex reasoning, planning, developing, and thinking (Perkins, 2008). Ohio’s Learning Standards use a combination of Bloom’s Taxonomies and Webb’s DOK (Appendix B).

Figure 2. Bloom’s Taxonomies and Webb’s Depth of Knowledge Schemas

Figure 2. Comparison of Bloom’s Taxonomies and Webb’s Depth of Knowledge as used by the Ohio Department of Education for the Ohio Learning Standards. Graphic reprinted with permission from creator Debbie Perkins.
Bloom’s Taxonomies and Webb’s Depth of Knowledge schemas provided this study with the defining features of what skills were regarded as higher order. In general, higher order thinking is considered anything beyond basic rote memorization and recall. These frameworks are commonly used among educators to “speak the language” when teaching and assessing. Ohio educators use the language found in these organizational structures as a basis for identifying the required standards they are to teach and assess. Ohio’s Learning Standards incorporate Bloom’s and Webb’s terminology to help clarify, identify, and target the skills they are being held responsible for when teaching and assessing in the classroom.

For this study, gaining an understanding of HOTS usage and how classroom teachers engage them in practice provided the grounds for exploring the meaning of teachers’ experiences with the phenomenon. Incorporating the language of Bloom’s Taxonomies and Webb’s Depth of Knowledge gave the study a comprehensive foundation for the cognitive levels of thinking being assessed. Seven individual teachers’ experiences were explored and interpreted in the context of Bloom’s and Webb’s schemas to discover any themes of commonality or dissimilarity among participants. This was important because from the experiences of those closest to student learning and achievement, discoveries were made of areas that may benefit from tailored professional development to enhance or encourage a better understanding of assessing higher order thinking skills in the secondary classroom.

**Studies of Higher Order Thinking Skills and Assessment**

Authentic instruction is a method of teaching higher order thinking skills. Newmann et al. (1996) revealed authentic instruction promotes constructing knowledge,
disciplined inquiry, and assignments that are of immediate value beyond school by challenging students academically and engaging them in issues that have personal or social significance (Newmann et al., 1996).

A study conducted by Newmann, Bryk, and Nagaoka (2001) reported yearly gains on standardized tests for students of diverse racial and socioeconomic backgrounds when teachers practiced authentic instruction. Third, sixth, and eighth grade math and writing teachers in Chicago provided their students with assignments requiring “challenging intellectual work” (Newmann et al., 2001, p. 18). These students achieved greater than average gains on the Iowa Tests of Basic Skills in reading and mathematics and demonstrated higher performance in reading, mathematics, and writing on the Illinois Goals Assessment Program (Newmann et al., 2001). The researchers indicated authentic instruction was an effective method of developing higher-order thinking which contributed to higher standardized test scores.

Preus (2012) investigated a public junior high school that was successful in implementing authentic instruction for students with and without disabilities. Using instructional methods that included asking open-ended questions, providing evidence to support answers, documenting thinking processes, and providing specific feedback as teaching strategies elicited higher-order thinking and deeper knowledge for students (Preus, 2012). Results of the study showed all students, regardless of their disability, benefitted from the authentic instruction approach of providing equally challenging work to all students (Preus, 2012).

Similarly, a study by Zohar and Dori (2003) found low and high achieving students made considerable progress from programs that were designed to foster higher
order thinking skills. They discovered teachers often believed stimulating higher order thinking tasks were only appropriate for high-achievers, whereas low-achieving students should be spared the frustration generated by engaging in such tasks as presenting arguments, applying value judgments, and understanding that some problems have multiple or no solutions. Four different science and technology projects were examined to explore teaching and learning strategies aimed at developing higher order thinking skills and the effects they had on low-achieving students. Findings revealed high-achieving students gained higher scores than low-achieving students however, both high- and low-achievers made progress with consideration to their initial scores (Zohar & Dori, 2003). One of the four studies revealed the improvement in scores for low-achievers was significantly higher than for high-achievers (Zohar & Dori, 2003). The findings suggested both low- and high-achieving students benefitted from instructional practices that engaged in instruction for higher order thinking.

Contextualized instruction is a method of instruction utilizing higher order thinking skills that involves teaching basic skills and knowledge relevant to students’ lives and can be applied to real world situations (Smith, 2014). Contextualized learning is based on theories of Piaget (2001) and Vygotsky (1980) that suggest learning is an active process where students build meaning by taking an active role in linking new ideas with existing knowledge. Smith (2014) reported adults who wanted to transition from low skills jobs to community college occupational careers improved their college and work prospects by enrolling in “bridge programs” (“U.S. Department of Education,” 2011). These programs included Adult Basic Education, English as a Second Language, General Educational Development and Adult Secondary Education students. Programs such as
these that used contextualized learning, integrated basic skills, and occupational education within classes produced positive results for both retention and learning outcomes.

Contextualized instruction through problem-based learning (PBL) and concept mapping are methods Smith (2014) promoted in teaching basic and higher order thinking skills for adult literacy for college and work. According to Smith (2014), PBL may increase the use of student content knowledge, basic skills, and higher order thinking skills because it involves solving real-world problems through active learning. Smith (2014) developed skills such as critical thinking, problem solving, and metacognition using concept mapping. This allowed students to organize interrelated concepts to make connections between concepts and basic skills. In presenting their concept maps to classmates, students were able to develop critical thinking skills through a form of cooperative discourse between classmates that encouraged listening to and discussing others’ perspectives (Smith, 2014). However, Smith found that “remedial pedagogy” of rote memorization and regurgitation continued to be the primary method for teaching basic skills in adult education classes, which he concluded, might be the reason for high dropout rates in adult learning classes (Smith, 2014, p. 50).

Hmelo and Ferrari (1997) reported problem-based learning cultivates higher order thinking skills. They noted a central principle of PBL is having students deal with ill-structured problems and then reflect on their experiences. With problem-based learning, students learn by solving authentic real-world problems. Often, due to the complexity of the problems, students work collaboratively to find solutions. Teachers work with students as coaches to guide students in reflecting on experiences, facilitating learning
and skills needed for collaboration and discussion, and the understanding the principles behind those skills (Hmelo & Ferrari, 1997). This method may require more time than traditional instructional and assessment approaches, but students learn conceptual knowledge more deeply along with metacognitive skills needed for lifelong learning (Hmelo & Ferrari, 1997). Unfortunately, as time pressures increase, reflection, which is an important aspect of problem-based learning, is often abandoned. Post-problem reflection is important for students to consolidate and abstract what they have learned and for the teacher to assess students’ understanding (Hmelo & Ferrari, 1997).

Jensen, McDaniel, Woodard, and Kummer (2014) analyzed low-level and high-level exams and quizzes given to two sections of an introductory biology class to test the effect of the levels of exam questions on developing student understanding. For an entire semester, students in each section were taught with a style of high-level inquiry and were assigned to assessment groups that used either high-level or low-level questions on quizzes and exams. Final exams that included 20 low-level and 21 high-level questions were given to both sections. Using Bloom’s taxonomy as the theoretical foundation, researchers predicted high-level exam questions would prepare students with better memory for the core information and encourage deeper processing of information (Jensen et al., 2014). The results of the study showed students in the high-level exam condition demonstrated higher performance on both the low-level and high-level final exam than students in the low-level condition. Researchers suggested the results supported the hierarchical nature of Bloom’s taxonomy and indicated students who tested with high-level questions developed deeper conceptual understanding of material and better memory for course information (Jensen et al., 2014). The findings revealed that
preparation for high-level questions (application, analysis, and evaluation) required mastering information at lower levels of the taxonomy (remembering and understanding) and that basic terminology was enhanced through answering high-levels questions (Jensen et al., 2014).

The results of the Jensen et al. (2014) study supported the assumption that assessments inform students of course expectations and are important for improving student learning outcomes. They reported that utilizing written exams that incorporate higher order thinking skills may be more challenging for teachers to develop but such assessments may be key to gaining a deeper understanding of material and better retention of core facts. Jensen et al. (2014) argued that adopting a more typical and perhaps easier approach of giving factual recall exams does a disservice to students. They suggested students who are given lower level thinking exams are less likely to foster critical thinking and application of knowledge, and further, when compared to giving higher-order exams throughout the course, gaining and retaining factual information is less likely to occur (Jensen et al., 2014).

Jideani and Jideani (2012) proposed using Bloom’s revised taxonomy as a framework to help teachers develop learning outcomes that moved beyond lower level skills (remembering and understanding) to higher-order skills such as application, analysis, evaluation, and creation. Learning outcomes are precise statements of teachers’ expectations of what students should know and be able to do in some measurable way as a result of completing a course of instruction (Anderson, 2006). This study involved nine food science and technologies’ class subjects from two universities that used Bloom’s revised taxonomy to identify specific cognitive levels of learning outcomes, student
assessment, and the extent of alignment between learning outcomes and assessment. Using Bloom’s terminology, learning outcomes were developed by instructors for students to “understand” procedural and “apply” conceptual knowledge. Instructors focused on developing learning outcomes that reached beyond lower order thinking (recall and recognition) to higher levels of cognitive knowledge (apply, analyze, evaluate, and create). Learning outcomes and assessments were then analyzed using Bloom’s revised taxonomy to estimate skill levels of the knowledge dimension (vertical axis) and its sub-dimensions (factual, conceptual, procedural, and metacognitive knowledge) and of the cognitive process dimension (horizontal axis) and its sub-dimensions (remember, understand, apply, analyze, evaluate, and create; Appendix A).

Results from this study showed a misalignment between developing, teaching, and assessing learning outcomes (Jideani & Jideani, 2012). In some cases, learning outcomes were identified and not assessed, and in other cases, information was assessed but not identified in the learning outcomes. Some questions were set to assess the ability to analyze factual and conceptual knowledge, but no learning outcomes were developed for evaluation of those abilities. Researchers reported learning outcomes and activities that were not developed with specific coordinated intent in mind would cause students to fail in their effort to analyze such facts and concepts (Jideani & Jideani, 2012).

Gezer, Oner Sunkur, and Sahin (2014) studied exam questions written by social studies teachers during the first term of the 2012-2013 school year. Using the knowledge and cognitive dimensions of the Bloom’s revised taxonomy, questions were independently examined by researchers and placed in the two-dimensional taxonomy. In the knowledge dimension (vertical axis), their findings showed questions were
represented in the highest levels of factual and conceptual knowledge while at the lowest level in the procedural knowledge sub-dimensions, with no questions prepared in the metacognitive sub-dimension. In the cognitive process dimension, questions were prepared in remember, understand, analyze, evaluate, and apply sub-dimensions. Researchers determined the cognitive sub-dimension was not used in preparing exam questions. Results revealed social studies teachers used evaluation and measurement methods that mainly assessed learning at the basic level (Gezer et al., 2014).

Afflerbach, Cho, and Kim (2015) reported the assessment of higher order thinking in reading was effective if two conditions were met: conceptualizing higher order thinking accurately and developing assessments that combine tasks and text that induce higher order thinking. Conceptualizing involves combining attributes of higher order thinking in reading with major curricular (e.g., Common Core State Standards) and assessment (e.g., National Assessment of Educational Progress; NAEP) initiatives (Afflerbach et al., 2015). Afflerbach et al. (2015) stressed reading is always accompanied by more basic or lower level thinking, and comprehensive assessment practices work to include both (basic and higher order) types of thinking. An important aspect to moving students towards higher order thinking is the need for formative and summative assessments that work together (Afflerbach et al., 2015). Formative assessments provide timely, regular feedback that inform instruction as students learn increasingly complex tasks and summative assessments are necessary to determine if standards have been met or if students can perform tasks that involve reading and higher order thinking (Afflerbach et al., 2015). This report emphasized the importance of teachers knowing the targeted higher order skills they are teaching and assessing. It
demonstrated a teacher’s ability to promote student progress from lower level thinking to higher when they are actively engaged in conceptualizing and developing appropriate assessments.

Studies such as these indicate educators in the classroom are teaching higher order thinking through various means and methods. Authentic instruction, contextualized instruction, and problem-based learning are several of the ways in which teachers are utilizing higher order thinking skills that have resulted in positive academic achievement for students. Some of these studies also revealed alternative assessments practices (i.e., concept mapping, post-problem reflection) are being utilized to assess students’ higher order thinking. However, several studies indicated a misalignment between the development, instruction, and assessment of learning outcomes and discovered teachers may think they are assessing HOTS when they are not. This is an important revelation since students have a better chance for a quality education when curriculum, instruction and assessments are aligned (Anderson, 2002). Looking at studies such as these show teachers may be gaining positive results in teaching higher order thinking skills with means such as problem-based learning and authentic and contextualized instruction, but there appears to be a disconnection when assessing higher order thinking which can lead to a misalignment between curriculum, instruction, and assessment. It may be that higher order thinking skills are being taught, but not being assessed. If this is determined to be the case, educational leaders will be able to use data from this study to tailor professional development and instructional strategies to create assessments that incorporate higher order thinking as part of a unified approach for a quality education.
Studies of Teachers’ Perceptions and Beliefs

Marlow and Inman (1992) described a workshop they conducted which emphasized teaching higher order thinking skills. One hundred teachers in grades K-12 were given pre- and post- workshop surveys that examined the perceptions and attitudes teachers have regarding the general nature of higher order thinking skills, prior training in the teaching of higher order skills, and personal abilities in teaching them. Both pre- and post-surveys indicated teachers felt higher order thinking skills were modeled or taught inadequately during their teacher training. Pre-surveys also revealed teachers were neutral or in disagreement over their ability to teach higher-order skills. After a four-hour seminar, post-survey results showed positive and consistent changes in teachers’ insights of their abilities to teach higher order thinking skills, which was attributed to an improved understanding of them (Marlow & Inman, 1992).

McMillan and Nash (2000) reported teachers’ beliefs and values were instrumental in deciding specific assessment and grading practices. Their study included 24 teachers, mainly English and math teachers, from seven school districts who participated in face to face interviews about factors that may influence their assessment and grading practices. Six themes were identified as influential factors: teacher beliefs and values; classroom realities; external factors; teacher decision making rationale; assessment practices; and grading practices. The main premise found teachers experience tension between their beliefs and values and the realities of the classroom and other external factors imposed on them (McMillan & Nash, 2000). This tension was apparent between teachers’ personal philosophies that revealed a need for flexible assessments and grading to accommodate individual students. Most teachers’ learning philosophies were
focused on doing whatever was needed to help students succeed by accommodating students with tests that were best for measuring student understanding. External pressures, such as state mandated testing, influenced teachers to use more objective assessments and grading to satisfy demands of accountability to stakeholders (McMillan & Nash, 2000). As a result, teachers made assessment and grading decisions based on individualized reasons influenced by external pressures, rather than on their teaching philosophies. McMillan and Nash (2000) reported tension tends to increase as external pressure increases and decreases as teachers gain professional experience.

Letina (2015) surveyed Zagreb and Zagreb county primary school teachers to determine the use of traditional or alternative assessment application in the areas of science and social studies to understand current teaching practices. The teachers who were surveyed had completed either a four-year (58 percent) or two-year (42 percent) program of study. The survey was used to identify teachers’ opinions on alternative and traditional assessment in science and social studies classes, the frequency of use of traditional and alternative assessment, whether there was a significant difference in the frequency of use and opinions between teachers with a four year degree and those with a two year degree, and whether there was a statistically significant difference in the opinions of teachers on alternative assessment and the frequency of its use in science and social studies (Letina, 2015).

The results of Letina’s (2015) study showed traditional forms of assessment were used more frequently than alternative forms in teaching science and social studies. In relation to the low frequency use of alternative assessments, the study revealed teachers had a significantly more positive opinion of alternative assessment compared to their
opinion of traditional assessment in teaching science and social studies. The researcher suggested possible reasons for the contradiction between opinions and practice were in the absence of clear definitions and specific guidelines in implementing alternative assessments, the time-consuming nature of alternative assessments, and teachers’ lack of instructional competencies in implementing alternative assessments (Letina, 2015).

Zohar, Degani, and Vaaknin (2001) conducted a study that explored teachers’ knowledge and beliefs about teaching higher order thinking to low achieving (LA) students. They identified high achieving (HA) students as students who generally do well in school with high academic achievement and low achieving students as those who do not do well in school and have low achievement. For their study, teachers determined high achievers from low achievers according to class participation of oral and written work, and by test scores. Semi-structured interviews of 40 teachers were conducted to gain an understanding of teachers’ beliefs on teaching higher order thinking to low achievers. Data revealed 45% of teachers believed higher order thinking was inappropriate for low achievers because they believed the “cognitive demands of tasks requiring higher order thinking were beyond the capabilities of LA students. Another related common reason was the belief that LA students would become frustrated by such tasks” (Zohar et al., 2001, p. 482). Other teachers (20%) did not believe their instructional practices teaching higher order thinking differed in approach between low and high achievers.

Findings from the Zohar et al. (2001) study revealed important implications for educational leaders. The data showed teachers’ beliefs are significant factors that shape their approach to classroom instruction and their beliefs are connected to their
instructional theories. This study showed teachers’ theories about students’ abilities in learning higher order thinking generally followed two lines of reasoning: one regarded learning as hierarchical where students’ cognitive levels were related directly to student achievement; and the second suggested thinking skills were integrated in the early stages of the learning process for students of both low and high cognitive abilities. Teachers who believed that learning progressed hierarchically, from lower to higher order thinking skills, were more likely to think teaching higher order thinking was not equally appropriate for low and high achieving students. In contrast, teachers who held the integrated learning process view tended to believe teaching higher order thinking was equally appropriate for low and high achieving students.

Findings from this study by Zohar et al. (2001) showed that teachers’ theories and beliefs are important factors in shaping classroom practice and suggested teachers’ in-service courses about teaching higher order thinking do not affect teachers’ beliefs about how low achieving students learn to think. They proposed “a deep restructuring of teachers’ beliefs should be related to a deep change in their views about the nature of teaching and learning” (p. 483). This change should be clearly addressed in teacher training and professional development programs dealing with the development of higher order thinking skills in students.

Often, teachers claim their classroom assessments incorporate higher order thinking (McMillan, 2001; McMillan, Myran, & Workman, 2002) however, most do not (Marso & Pigge, 1993). Several standards from the Standards for Teacher Competence in Education Assessment of Students (“American Federation,” 1990) reveal important considerations when assessing higher order thinking skills. Among others, teachers
should be skilled in choosing assessment methods appropriate for instructional decisions and should be able to develop assessment methods appropriate for instructional decisions.

These studies of teachers’ perceptions and beliefs reveal some of the challenges facing educational leaders. Foremost, the studies show there are discrepancies in interpretations, beliefs, and perceptions of those responsible for teaching and assessing students, and there is no unified view of curriculum alignment. While assessment standards state teachers should be skilled in choosing and developing appropriate assessment methods, these studies showed teachers often relied on their own experiences and beliefs rather than their professional teacher training. The studies also showed teachers often felt inadequately prepared for teaching and assessing HOTS. As an educational leader, this information is important to know because too often teachers’ experiences are given little consideration when new standards are written or implemented. Higher authorities frequently seem to dictate what should be taught in classrooms without much deliberation given to how such decisions will affect day-to-day operations in the classroom.

Discrepancies in the interpretations of implementing higher order thinking in instruction and assessment may result in teachers relying on past practices with which they are most familiar. This could translate into a pool of teachers that may act on their own; teaching and assessing students in ways they are most accustomed (e.g., standardized tests with multiple choice, true/false, fill-in the blank, etc.). Teachers may not have a comprehensive, coherent approach to teaching and assessing HOTS. For many, assessments in general, are often considered afterthoughts—more as a burdensome chore that is required by the state or district. It is important to explore this phenomenon at
the grassroots level to gain an understanding of what teachers’ experiences can tell in teaching and assessing higher order thinking skills.

State reform standards indicate teachers are to incorporate HOTS in their instruction and assessment practices. However, past research has not looked closely at the experiences teachers have with these practices. Gaining an understanding from those most closely involved may provide insight into the realities of assessing HOTS in the classroom. Hearing lived experiences from classroom teachers provided relevant and powerful images from those most involved in this phenomenon. This study allowed real teachers to tell their related stories. These lived experiences provided a glimpse into teachers’ practices of assessing higher order thinking.

**Summary of Literature Review**

In summarizing the literature related to higher order thinking skills and their assessments, studies showed teachers are using alternative methods such as authentic instruction, contextualized instruction, and problem-based learning to benefit student learning of higher order thinking skills. Studies of teachers’ experiences and perceptions showed little consideration is given to developing assessments that align with classroom instruction. Curricular alignment is important in teaching higher order thinking but these studies showed a lack of alignment between curriculum, instruction, and assessment. Working under the assumption that higher order thinking is a crucial element of students being college and career ready, results of this study will add to the knowledge base of how higher order thinking skills are utilized and assessed in Ohio’s secondary classrooms.
Studies revealed what teachers perceive and experience as effective methods of higher order thinking skills’ assessment and instruction may not characterize the assessment and instruction taking place in the classroom. While alternative assessments were frequently revealed as a positive means to assess HOTS, literature showed teachers often used traditional forms of assessments as a fallback.

This literature review showed researchers identified problems with teaching and assessing higher order thinking stemmed from a lack of teacher training with HOTS, failure of teachers to identify HOTS in instruction and assessment, and a reliance on personal beliefs and experiences that were not grounded in teacher training methods. Teachers’ voices were not always central to these studies and lived experiences relating to assessing were not explored to any degree. This study placed teachers as the key source of new understanding and explored their lived experiences to illuminate the reality of teachers’ involvement with assessing higher order thinking. Findings reported in chapter four and the conclusions and implications discussed in chapter five may enlighten school leaders.
CHAPTER III

METHODS

Research Design

The research design was a qualitative empirical phenomenology that used a social constructivist framework and an ontological philosophical basis. A qualitative research methodology is one that is “inductive, emerging, and shaped by the researcher’s experience in collecting and analyzing the data” (Creswell, 2013, p. 22). The approach of the social constructivist framework is one in which people try to understand the world in which they live (Creswell, 2013) and an ontological philosophical basis considers the nature of being. This type of design allowed a close examination of teachers’ first-hand experiences assessing higher order thinking skills when dealing with the plethora of requirements mandated by district and state standards. It provided teachers a platform to tell their stories and considered the phenomenon from the view of the public school, secondary classroom teacher.

In-depth interviews were conducted with seven experienced secondary teachers identified as effective by the district curriculum director and three district curriculum specialists. The Ohio Teacher Evaluation System (OTES) defines the qualities of effective teachers as those who:
understand student learning and development, respect the diversity of the students they teach and hold high expectations for all students to achieve and progress at high levels; know and understand the content areas for which they have instructional responsibility; understand and use varied assessments to inform instruction, and evaluate and ensure student learning; plan and deliver effective instruction that advances the learning of each individual student; create a learning environment that promotes high levels of student learning and achievement for all students; collaborate and communicate with students, parents, other teachers, administrators and the community to support student learning; and assume responsibility for professional growth and performance as an individual and as a member of a learning community. (“Ohio Department…Ohio teaching,” 2012, p. 3)

The in-person interviews sought to explore and reveal experiential material that was used to develop conversations with the participants about the meaning of higher order thinking skills' assessment (Van Manen, 1997). By exploring the meaning of stories told by effective classroom teachers, insight and understanding in how teachers manage the assessment of higher order thinking skills provided a lens through which similarities or dissimilarities of practice were discovered.

Phenomenology. Moustakas (1994) stated that empirical phenomenology explores a person’s experience of a phenomenon to determine the meaning, provide a rich description, and derive general or universal meanings (the essences or structures) of the experience. Van Manen (1997) described phenomenology as the study of lived meaning which involves descriptions and interpretations of these meanings to provide deep and
rich understanding. The aim of this phenomenology was to transform the lived experiences of teachers’ assessment practices of higher order thinking skills into textual expressions that reflected the essence of the phenomenon (Van Manen, 1997).

A phenomenological study was an appropriate method to explore secondary teachers’ experiences with assessing higher order thinking skills. Through interviews teachers related their experiences in their own words. Providing interviews with open-ended, non-directional questions allowed teachers to recount lived experiences from which I attempted to decipher meaningful themes and descriptions by using their first-hand accounts. This methodology was also appropriate when examining my own biases as a researcher and trying to eliminate pre-conceived notions I may have had when analyzing the data. Van Manen (1997) stated,

The phenomenology is such that it posits an approach toward research that aims at being presuppositionless; in other words, this is a methodology that tries to ward off any tendency toward constructing a predetermined set of fixed procedures, techniques and concepts that would rule-govern the research project. (p. 890)

**Philosophical Assumptions.** Creswell (2013) suggested including the philosophical assumptions of phenomenological research in a study to state and define the assumptions and show how they are used. The ontological assumptions for this study relate to the “nature of reality and its characteristics” (Creswell, 2013, p. 22). When conducting qualitative research, researchers view reality through multiple lens—participants, researchers, and readers—to understand the multiple realities of the phenomenon (Creswell, 2013).
It was by observing through these multiple lenses that this study was conducted. The participants’ experiences provided the study with an understanding of the assessment processes and procedures in their classrooms. These data were invaluable in revealing the phenomenon from each practitioner’s point of view. Another point of view to consider was that of the researcher, and what I brought to the study. Examining and understanding my own frame of reference was important as well. As a researcher, I needed to be continually aware of my biases during the in-depth interviews. I also needed to be cautious when writing my findings to present the participants’ experiences accurately and with credibility. And finally, considering the reader of this study was important. Understanding the audience to which I am presenting my findings challenged me to shape this study and the emerging implications and influence it may have with them in mind.

**Research Method**

A qualitative social constructivist method was used for this study. A social constructivist methodology is one where individuals seek to understand the world in which they live and work by developing multiple subjective meanings (Creswell, 2013). The researcher relies on the participants’ views as much as possible and looks for the complexity of views rather than narrowing them into a few categories or ideas (Creswell, 2013). “Rather than starting with a theory, inquirers generate or inductively develop a theory or pattern of meaning” (Creswell, 2013, p. 25). Furthermore, Creswell (2013) suggested that “qualitative research today involves closer attention to the political, social, and cultural context of the researchers, and the reflexivity or ‘presence’ of the researcher in the accounts they present” (p. 45).
The social constructivist approach was appropriate for this study because I wanted to gain an understanding of teachers’ experiences in their natural surroundings. Teachers related their direct knowledge of the phenomenon and provided first hand examples of how they assess higher order thinking. Providing teachers with a forum to tell stories, without judgment or a preconceived set of guidelines, encouraged an atmosphere of truthfulness and honesty when they conveyed real-life instances where higher order thinking was assessed and the thought processes that were involved in assessing such skills. I observed and listened closely as teachers told their stories to uncover areas of similarity among teachers perceived as highly effective by the district curriculum director and school curriculum specialists.

**Research Questions**

Qualitative research questions are open-ended, evolving, and nondirectional, written to narrow the purpose to several questions that will be addressed in the study (Creswell, 2013). Creswell (2013) recommended reducing the study to one central question and several subquestions. Central questions are broad, overarching questions to address the research problem and subquestions further specify or refine the central question (Creswell, 2013). One central question and three subquestions guided this study.

**Central Question**

What are the lived experiences of highly effective secondary teachers in assessing higher order thinking of their students?

**Subquestions**

In a phenomenological study, Creswell (2013) recommended using subquestions not only to further refine the central question but also to help establish the components of
the essence of the study (Creswell, 2013). Using an open-ended, evolving, and non-directional approach to interview questions is essential in a phenomenological study. However, as a novice researcher, I used Creswell’s suggestion and designed subquestions to guide interviews that strayed away from the central question:

1. What are the lived experiences of effective secondary teachers with assessments in the secondary classroom?
2. What contexts or situations have typically influenced or affected effective secondary teachers’ experiences with higher order thinking skills and their assessments in the secondary classroom? (Moustakas, 1994).
3. How have reform standards affected effective secondary teachers’ experiences in utilizing and assessing higher order thinking skills?

Setting

The setting for the study was three secondary public high schools in central Ohio. The specific characteristics of this study required a district that had more than one high school in the district. Obtaining access to a district with more than one high school allowed the findings to be reviewed in the context of the individual secondary school, as well as with other schools in the district. Exploring the experiences of teachers across the district, whether in individual schools or in comparison of schools within the district, could prove beneficial for teachers and administrators in the district. Not only did teachers’ experiences reveal similarities and/or differences across disciplines, but data were applicable across high schools throughout the entire district. Teachers and administrators could take the information gleaned from the in-depth interviews of highly effective teachers and apply the findings to enhance teacher effectiveness in assessing
higher order thinking skills throughout the district. For example, experiences of teachers in the same high schools may reflect the building principal’s goals and beliefs about assessment, which could then be reviewed in the context of independent high schools, and/or collectively as part of the school district. In this way, an examination of similar or dissimilar findings within and between schools could be analyzed. The findings were used to uncover deeper meaning and understanding of teachers’ experiences that could be applied to other teachers in Ohio public schools. Findings revealed teachers’ experiences were not dissimilar across the district and identifiable themes were similar for teachers within individual high schools throughout the district.

The classification of the Ohio school district where this study took place was a “suburban school with very low student poverty and large student population” (“Ohio Department…Typology,” 2015c) that educates students in elementary, middle, and high schools. The Ohio Department of Education classifies districts that are similar to provide a consistent way to stratify districts for research purposes (“Ohio Department…Typology,” 2015c). The district has been recognized as a high-performing school district by the Ohio Department of Education and more than 80 percent of graduates continue to post-secondary schooling.

**Participants**

Participants for this study were seven secondary school teachers from a large public-school district in the state of Ohio. The selection of participants for the study was through purposive (or purposeful) sampling. “Purposive sampling is most often used in qualitative research to select those individuals or behaviors that will better inform the researcher regarding the current focus of the investigation” (Krathwohl, 2009).
The number of participants was justified after considering research regarding two rationales for determining sample size in qualitative research: homogeneity and information power of the participants. First, a study by Guest, Bunce, and Johnson (2006) investigated data saturation and variability to determine the number of interviews that are enough when determining nonprobabilistic sample size. Their research involved sixty in-depth interviews involving women from two West African countries and found data saturation occurred within the first twelve interviews, with basic elements for meta-themes present as early as six interviews. Saturation, “the gold standard by which purposive sample sizes are determined,” was achieved sooner based on the homogeneity of the sample (Guest et al., 2006, p. 60). Saturation is a data collection term used in research studies “where emerging findings must feel saturated; that is, you begin to see or hear the same things over and over again, and no new information surfaces as you collect more data” (Merriam, 2002, p. 26). For this study, the purposive sample of secondary teachers identified as effective by school administrators met the measure of homogeneity. In other words, a sample size of seven was deemed sufficient for the purpose of this phenomenological study.

A second way of thinking about sample size came from Malterud, Siersma, and Guassora (2016). These authors referred to the inconsistent use of the term saturation across the body of qualitative studies, a chronic problem. In response, they created the concept of “information power” (p. 1753) as a guide for determining sample size. Information power comes from the concept of statistical power in quantitative studies. Statistical power is a calculated value (based on alpha, number of variables, and desired
effect size) that represents the likelihood of the design detecting a variable difference or a
tvariable relationship if one exists.

Information power, likewise, in the conceptualization of Malerud et al. (2016), is
a conclusion or expectation the researcher reaches about whether the sample has the
capacity to reveal meaningful findings in a particular study context. Information power
helps researchers determine sample size. In practice, information power connects the
number of participants needed for a study with the relevant information they possess
about the actual study (Malterud et al., 2016). The greater the sample’s information
power, the lower number of participants is needed for the study (Malterud et al., 2016).
Information power depends on the aim of the study, sample specificity, use of established
theory, quality of dialogue, and analysis strategy (Malterud et al., 2016). Two areas, the
aim of the study and sample specificity, are particularly relevant to the present study in
determining sample size.

A narrow study aim (such as this phenomenological study, that is focused on
secondary teachers’ assessing higher order thinking skills) confines the study to a tightly
defined targeted population and requires fewer participants to maintain sufficient
information power than would a more broadly defined reference group (e.g., all teachers
in Ohio; Malterud et al., 2016). Sample specificity relates to “the experiences,
knowledge, or properties among the participants” (Malterud et al., 2016, p. 1755) in the
study. Teacher participants’ experience and knowledge about assessing higher order
thinking skills in the secondary classroom would garner strong information power, and as
such would require fewer participants to achieve sufficient data from which to interpret
meaning. Regarding phenomenological research studies, Creswell (2013) suggested the
number of participants might vary from a group of three to four individuals who have experienced the phenomenon, to a group of 10 to 15. Based on the information gathered from these studies, a purposive sample of seven secondary (grades 9-12) teachers were selected to participate in the study.

**Recruitment**

Initially, I contacted the district superintendent via email to ask permission to conduct the study with teachers in the district. After obtaining permission from the superintendent for access to the school district, the district curriculum director and three high school building curriculum specialists were asked to provide names of teachers they perceived as effective. In using this approach, the administrators controlled access by providing names of those they deemed effective. I felt this approach would garner more support from the curriculum director (the gatekeeper) who might be more willing to permit me, an outsider, access to the district schools. This approach provided a narrower focus by restricting the range to effective teachers thus strengthening the information power by allowing a closer comparison of effective teachers’ experiences, rather than a random mix of those regarded as effective and those who were not.

**Sampling Procedure**

In determining the number of participants for this study I focused on the homogeneity and information power of secondary teachers as discussed in the participant section above and the collection of data was achieved through heterogeneous purposive sampling. Heterogeneous purposive sampling uses personal judgment to choose participants that may provide the best opportunity in answering the research question and satisfying the aim of the study (Saunders, 2012). School administrators were asked to use
personal judgment to provide potential participants for this study who they deemed as effective. In addition, by choosing participants with diverse characteristics, Patton (2002) argued such participant samples offer strength to the study in that any patterns that emerge are likely to be of value and interest in representing key themes.

Of the potential participants identified by school administrators, teachers were selected using a method of self-selection sampling where potential participants volunteered to participate in the research (Saunders, 2012). Saunders (2012) found participants who self-select do so because they have strong feelings or opinions about the research and as such are willing to devote their time to the study.

**Collection of Empirical Materials**

The intent of this qualitative phenomenological collection of empirical materials was to stimulate verbal and written accounts of participants’ experiences (i.e. reflections, judgments, meanings, etc.) to gain a deeper understanding and meaning of the essence of the phenomenon (Creswell, 2013; Ross, 2012; Van Manen, 1997). The data collection for this study was through individual in-depth interviews of seven teachers in one public school district in central Ohio. Teachers were selected based on school administrators’ identification of those deemed effective in their respective disciplines. Each participant provided data regarding their level of Ohio licensure, length of teaching experience, and subject matter taught.

**Phenomenological Interviews.** In-depth interviews were conducted to explore the experiences teachers had with higher order thinking skills and assessing them. Seidman (2013) revealed, “The root of in-depth interviewing is an interest in understanding the lived experience of people and the meaning they make of that
experience” (p. 8). Seidman (2013) reported in-depth, phenomenologically based interviews combine life history with focused, in-depth interviewing that primarily uses open-ended questions. Qualitative phenomenological research questions are non-directional, emerging, unrestrictive, open-ended, and evolving. The major task of open-ended questioning is for the interviewer to explore and build upon participants’ responses to those questions (Seidman, 2013). The interviewer should attempt to strike a balance when questioning participants. Questions should be designed to prompt the discovery process, but should not be restrictive and limit the exploration of the participants’ experiences. If an open-ended conversation does not reveal the participant’s experiences, then questioning measures may be used to assist in the discovery process. The following are examples of potential questions to stimulate participant responses: Can you provide some examples of how you use higher order thinking in your classroom? What can you tell me about assessments in your classroom? What experiences do you have with higher order thinking and assessing higher order thinking?

Preparation for the interviews with the teacher participants involved speaking with the school district curriculum and instruction director, interviewing three district curriculum specialists, and conducting two pilot interviews with teachers outside the district chosen for the study. The district curriculum and instruction director was the gatekeeper for this study. At our initial meeting, I presented my proposed study and discussed the process of gaining access to the sample population. My request was to interview eight to ten effective teachers. The director defined “effective teachers” as those who develop relationships with students and get to know them as people. She said they can “identify where students are in their learning and then build appropriate learning
opportunities to meet the needs of individual learners.” In addition, the director commented on the Ohio Teacher Evaluation System’s (OTES) definition of teacher effectiveness as well written, especially the component about assessment for learning, which states, “Effective teachers understand and use varied assessments to inform instruction, and evaluate and ensure student learning” (“Ohio Department…Ohio teaching,” 2012, p. 3). This information was useful in understanding the attributes of effective teachers from the school district curriculum and instruction administrator’s point of view.

I interviewed three curriculum specialists from the school district. These individuals were considered experts in their disciplines of teaching experience in their fields of science, mathematics, and English language arts. These individuals provided the background needed to understand teachers’ instructional and assessment practices in the classroom. For instance, teachers are not required to fill out daily or weekly lesson plans but instead use comprehensive student learning objectives (SLOs) as the focus for curriculum, instruction, and assessment practices in the classroom. Typically, teachers from departments of their specific disciplines are involved in writing the SLOs. Student learning objectives are written at the beginning of the school year and are measurable, long-term academic growth targets that demonstrate a teacher’s impact on student learning (“Ohio Department…Student learning,” 2014, p. 1). The SLOs provide the content objectives and standards that will be covered in the course over the school year. Pre-tests and post-tests are given in each discipline at the beginning and end of each year. Teachers’ value-added and student growth measures are, in part, based on the
improvement of scores from pre- to post-test. OTES uses data from these tests, along with other factors, in teacher evaluations.

The sample of seven effective teachers was selected though purposive sampling measures. Initial contact was made with the district superintendent via email correspondence, and permission was granted for access to the secondary school teachers through the district curriculum director, who served as the gatekeeper. Using a snowball sampling method, participants’ names were recommended and contacted by school level curriculum specialists. Potential participant names were provided to the district curriculum director, and then forwarded to the researcher. Initial contact was made via email, which included a description of the study, a Potential Participant Questionnaire, and the University of Dayton IRB information regarding participants’ rights if they chose to be part of the study (Appendices C, E, and F). Seven names were provided, and all seven teachers volunteered to participate in the study.

The method used to gather data for this study was through personal interviews with the seven participants. Interviews lasted approximately 45 minutes and were recorded. Each participant was given a pseudonym to protect his/her identity. The recorded interviews were transcribed to written accounts by a certified transcriber. Participants were provided copies of the transcriptions via email for them to verify, clarify, or elaborate on their lived experiences through member checking. For each participant, approximately three to five personal contacts were made—one in-depth, face to face interview, and three to four communications made by email or telephonic contact.

**Pilot Interviews.** As recommended by Seidman (2013), pilot interviews were performed to view the practical aspects of establishing access, making contact, and
conducting the interviews. Based on two pilot interviews, revisions were made to better support the objectives of the research. The pilot interviews allowed me to refine the interview questions and procedures (Creswell, 2013). Sampson (2004) suggested pilots help improve research instruments by finding and eliminating problems, framing questions, finding gaps and waste in data collection, and assessing researcher bias.

I identified two participants through snowball sampling. Through personal contacts, I connected with teachers who were willing to participate in a 15-minute telephonic interview. These recorded practice interviews helped in devising my approach to asking questions and reminded me to allow the interviewees to speak freely, without interruptions on my part. I found I tended to change the direction of the interview to other areas of interest that did not pertain to my study. The pilot interviews raised awareness to restrain my reactions, listen without interruption, and provide teachers enough time to relate their experiences.

**Building Rapport.** Seidman (2013) suggested striking a balance as central to developing rapport with participants. He recommended an interviewing relationship that is based on formality rather than on familiarity. This can be accomplished by extending common courtesies such as asking participants how they would like to be addressed throughout the interview and by introducing oneself (Seidman, 2013). Structuring the interview in this formal manner set a tone of respect for the participant—an important aspect in the interview process (Seidman, 2013).

This study was reviewed and approved by the Institutional Review Board (IRB) committee at the University of Dayton (“Institutional Review Board,” 2015) and
complied with all rules and regulations set forth by the committee (Appendices D, E, and F).

**Analysis of Empirical Materials**

The purpose of the data analysis of any phenomenological study is to examine the lived experience of the participants to gain a better understanding of the phenomenon (Creswell, 2013; Moustakas, 1994, Seidman, 2013; Van Manen, 2014). Moustakas (1994) provided an overview of the procedures for organizing and analyzing phenomenological data. He included horizontalizing and finding meaning units, finding clusters or themes, developing textural descriptions, and deriving meanings and essences of the phenomenon (Moustakas, 1994).

Using a process of horizontalization (Moustakas, 1994), every “horizon” or significant statement from the interview data revealing how participants experienced the phenomenon is highlighted (Creswell, 2013; Moustakas, 1994). The recorded interviews of each participant were transcribed verbatim and horizons were coded to examine teachers’ stories by critical analysis where interview statements were considered in the context of assessing higher order thinking. These coded statements were then organized into collective themes based on similar threads of meaning to provide a written (textural) description of the participants’ experience (Creswell, 2013; Moustakas, 1994).

An “imaginative variation” or “structural” description of the context or setting that influenced how the participants experienced the phenomenon was also written (Creswell, 2013; Moustakas, 1994, p. 99). Personal experiences and the role of the researcher was reflected at the beginning of the study (Creswell, 2013).
The interview transcriptions included approximately 66 pages of single-spaced text, with double-spacing between open-ended questions and answers. I edited the transcripts to remove extraneous material that did not pertain to my research question. From the textural and structural descriptions, a composite description was written to present the “essence” of the phenomenon that focused on the experiences of the participants and provided the reader with a better understanding of what it was like to experience the phenomenon (Creswell, 2013; Moustakas, 1994). Careful consideration was given during the editing process to ensure relevant information was not altered from the experiences teachers reported during their interviews. Many direct quotations from the participants were used to maintain the “essence” (Moustakas, 1994) of the interviews used in the composite description. Teachers were provided copies of the original transcripts and the edited composite descriptions via email so they could check the transcribed texts for accuracy in portraying their experiences. This provided them with the opportunity to review, modify, or add clarity to their stories.

The text was initially color-coded using computer highlighting and separated into thematic categories. The color-coded copies were printed and colored sections were cut out from the printed pages. I organized sections into categories and taped them to the wall to visualize the thematic content. This process helped me immensely as I could see all relevant comments made by the participants and could easily move them around on the wall to organize the transcribed material. Working closely with the written transcripts in this way was the most effective way to alleviate the struggle I had with organizing the amount of written material I had gathered in a cohesive, coherent manner. The most difficult challenge I faced was coding and re-coding the plethora of written transcripts.
**Trustworthiness**

Krathwohl (2009) described trustworthiness as the qualitative equivalent to scientific rigor and building credibility with the audience. Van Manen (2014) suggested phenomenological studies be assessed on the criteria of its suspension of personal or systemic bias, its originality of insight, and its scholarly treatment of sources. He noted that a common problem phenomenological researchers address is defending their research in terms of references that are not compatible with phenomenological methodology. Member checking and empirical generalization are examples of strategies that are concepts that belong to the “languages of different qualitative methodologies” (Van Manen, 2014, p. 347). Van Manen (2014) also pointed out that the notion of “lived experience” will not carry the same meaning across different social or human science methods (e.g. ethnography, narrative inquiry). Misinterpretations and misunderstanding may result from mixing methods if it is not realized that concepts will change with the change of method (Schutz, as cited in Van Manen, 2014).

Van Manen (2014) noted while it is commendable to ask participants whether data derived from their experiences is an accurate portrayal of the original experience, a validation of quality for a particular account does not represent a validation of quality for the whole study. More importantly is whether the descriptive interpretations of the underlying meanings are valid and scholarly and whether the emerging themes and insights are appropriate and original (Van Manen, 2014). “The validity of a phenomenological study has to be sought in the appraisal of the originality of insights and the soundness of interpretive processes demonstrated in the study” (Van Manen, 2014, p.
Van Manen (2014) stated that no predetermined strategies such as triangulation and members’ checking can fulfill a demand for validating a phenomenological study. Van Manen is a skeptic when it comes to external strategies for validation. Despite the potential limitations of these strategies, I applied what many qualitative researchers (Creswell, 2013; Lincoln & Guba, 1985, Merriam, 2002) would support as having some value in maintaining rigor in my research activities. As a novice researcher, I wanted to maintain my credibility by applying trustworthiness strategies within the context of the study assuring that the participant voices were accurate by using thick, rich description; member checking; clarifying researcher bias; peer review; and external audit.

**Thick, Rich Descriptions.** Lincoln and Guba (1985) referred to thick, rich descriptions as complete, accurate, and detailed description of the study—to include the site, setting, participant profiles, data collection, and analysis. Thick, rich description allow readers to transfer information from this study to other settings (Creswell, 2013).

**Member Checking.** Member checking involves taking data (analyses, interpretations, conclusions) back the participants so they can judge the accuracy and credibility of the accounts (Creswell, 2013). Lincoln and Guba (1985) view this as the most critical step to creating credibility for a study. The member checks ensure the researcher accurately represents the participants’ experiences and helps protect against researcher bias. Member checking was performed after interviews were transcribed. The original unedited transcriptions were sent, via email, along with the composite descriptions to participants to allow them to review, modify, or add additional comments to their interview data if they chose to do so. Two of the seven participants responded acknowledging their interview transcripts accurately reflected their experiences with
assessing higher order thinking skills. The remaining five teachers did not respond to the email correspondence.

**Clarifying Researcher Bias.** Clarifying researcher bias is revealed at the outset of the study to inform the reader of the researcher’s position relative to any biases that may affect the collection and interpretation of the data (Creswell, 2013; Merriam, 2002). The researcher’s position is presented in Chapter 1 of this study.

**Peer Review.** The peer review provided an external check on the research process and was an individual who kept the researcher honest through asking hard questions about the methods, meanings, and interpretations (Creswell, 2013; Lincoln & Guba, 1985). The chairperson of my committee, Dr. Carolyn Ridenour, provided ongoing peer review for this study.

**External Audit.** The external audit allows for an assessment of accuracy through an examination of the process and the product by an outside consultant (Creswell, 2013). Several personal contacts read this study and provided an examination of the content to ensure an accurate account of the study. An audit trail was maintained of all stored materials and transcribed interviews were reviewed by interested researchers and members of the dissertation committee.

**Summary**

The methods used for this study were based on a design that was a qualitative phenomenology that used a social constructivist framework and an ontological philosophical basis. Seven teachers from an Ohio secondary public-school district were the participants. Empirical data were collected through in-depth interviews and the analysis of the data was through horizontalizing and finding meaning units, finding
clusters or themes, developing textural descriptions, and deriving meanings and essences. Trustworthiness strategies of thick, rich description, member checking, clarifying researcher bias, triangulation, peer review, and external audit were used throughout the data collection and analysis. The intent of this phenomenological study was to give a voice to teachers by relating their experiences in assessing higher order thinking skills in a secondary, public school setting. To be clear, it was not a study on teacher performance.
CHAPTER IV

FINDINGS

Overview

To understand the phenomenon of teachers' experiences with assessing higher order thinking skills, I followed Van Manen's (1997) approach of enlisting teachers to "reflect and reconstruct" their lived experiences. I listened to seven secondary teachers over the course of several weeks as they talked with me about their experiences in assessing thinking skills. In this chapter, I report the findings from my interpretations of those interview transcripts. The narrative which follows explores assessment practices of effective teachers to uncover possible similarities in meaning from their experiences.

Seven teachers took part in the interview process—six women and one man. Participants were given pseudonyms to protect their identities. All participants held five-year professional licenses in the state of Ohio and all had master’s degrees.

This chapter is divided into three sections: teacher participants, themes, and summary of findings. Narrative descriptions of participant interviews provide a written detailed account of teachers’ experiences. In these descriptions, I attempted to use as many quotes as possible from the interviews to ground the data in “the meanings people have constructed about a particular phenomenon” (Merriam, 2002, p. 219). The identities of the participants have been masked to maintain confidentiality and reduce the likelihood that descriptive information about a participant could reveal his/her identity.
Themes were identified and analyzed through my lens as a researcher and educational leader particularly interested in the area of curriculum, instruction, and professional development.

**Participants**

Table 1

Demographics of Teacher Participants

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Gender</th>
<th>Subject Matter Instruction</th>
<th>Range of Years Teaching Experience</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adam</td>
<td>Male</td>
<td>Mathematics</td>
<td>10-15</td>
<td>Building #1</td>
</tr>
<tr>
<td>Barb</td>
<td>Female</td>
<td>Mathematics</td>
<td>10-15</td>
<td>Building #2</td>
</tr>
<tr>
<td>Charlie</td>
<td>Female</td>
<td>Science</td>
<td>15-20</td>
<td>Building #3</td>
</tr>
<tr>
<td>Dawn</td>
<td>Female</td>
<td>Science</td>
<td>10-15</td>
<td>Building #2</td>
</tr>
<tr>
<td>Eva</td>
<td>Female</td>
<td>Mathematics</td>
<td>15-20</td>
<td>Building #3</td>
</tr>
<tr>
<td>Fred</td>
<td>Female</td>
<td>English Language Arts</td>
<td>5-10</td>
<td>Building #2</td>
</tr>
<tr>
<td>Grace</td>
<td>Female</td>
<td>Science</td>
<td>1-5</td>
<td>Building #1</td>
</tr>
</tbody>
</table>

*Note.* All teachers hold Ohio 5-year professional licenses for grades 7-12 and all have master’s degrees in education.

**Adam.** Adam teaches mathematics to high school students. He has a master’s degree in education, a five-year professional license, adolescent to young adult (7-12) in the state of Ohio, and has been teaching for 10-15 years. He has an undergraduate degree in mathematics and a master’s degree in education. I met Adam in his classroom at High School #1, after students were finished for the day.

**Barb.** Barb teaches various classes of mathematics. She has taught for 10-15 years and has a five-year professional license in the state of Ohio for adolescents to
young adults (grades 7-12). I had a morning meeting with Barb at High School #2 in her classroom during a 45-minute planning period.

**Charlie.** Charlie has been teaching science for 15-20 years, holds an Ohio five-year professional license (grades 7-12), and has a master’s degree in education. Charlie and I met during her planning period near the end of the school day at High School #3.

**Dawn.** Dawn is a science teacher that holds an Ohio five-year professional license for adolescent to young adult (grades 7-12), a master’s degree in education, and has 10-15 years teaching experience. I met Dawn in the afternoon during her planning period at High School #2.

**Eva.** Eva is a mathematics teacher with 15-20 years of teaching experience, a master’s degree in education, and holds an Ohio five-year professional license for adolescent to young adult (7-12). I met Eva in her classroom after school dismissed at High School #3.

**Fred.** Fred is an English language arts teacher who holds an Ohio five-year professional license for adolescent to young adult (7-12). She has a master’s in education and has taught for 5-10 years. Fred teaches English classes to various high school grade levels. I met with Fred during her afternoon planning period at High School #2.

**Grace.** Grace was the last teacher I interviewed. I met with her in her classroom at High School #1, on a Friday afternoon at the end of the school day. Grace is a science teacher with an Ohio five-year professional license for adolescent to young adult (7-12). She has a master’s degree in education and has taught for 1-5 years.

**Themes**

Interviews were initially coded from written transcripts which involved describing, classifying, and interpreting the data (Creswell, 2013). Creswell (2013)
suggested codes not be counted to ensure all coded data would receive equal emphasis and to avoid the perception of a quantitative orientation that counting may represent. I chose not to count codes when developing themes and instead employed a horizontalizing approach. Moustakas (1994) described this as, “horizontalizing the data and regarding every horizon or statement relevant to the topic and question as having equal value” (p. 118). From the coding, themes were identified based on my unique perspective and dispositions as a researcher. In developing themes, Moustakas (1994) stated, “From the invariant constituents, the researcher, using phenomenological reflection and imaginative variation, constructs thematic portrayals of the experience” (p. 131).

In identifying themes, I used the epoche and bracketing processes to set aside any preconceived ideas, notions, or biases I might have had in viewing teachers’ experiences relative to the phenomenon. Epoche is a term used in phenomenological research meaning “abstention, or stay away from” (Van Manen, 2014, p. 215). It is a Greek word that means to suspend natural or taken-for-granted beliefs and attitudes (Van Manen, 2014). Bracketing is term used with phenomenological research where the researcher separates their own experiences from those of the participants to ensure the true phenomenon is revealed (Hislop, 2002). Patton (2002) deemed it critical to bracket one’s own experience and knowledge from that of the participants to better understand the collected data. With this awareness, I attempted to maintain an open mind to code the written verbatim transcripts and then re-coded them again, searching for meaning units that reflected various aspects of the participants’ experiences (Leedy & Ormrod, 2010). Twelve themes emerged from the data: defining higher order thinking, questioning, collaborative groups, problem-based/project-based learning, demonstration of skills,
instilling confidence, time, teacher training, collaboration with other teachers, Common Core, administrators, and professional development.

**Twelve Themes**

**Defining Higher Order Thinking.** Central to exploring the phenomenon of teachers’ experiences assessing higher order thinking skills was gaining an understanding how teachers defined them. This was necessary to establish a common meaning for how “higher order thinking” was understood and utilized during the course of our conversations. With one exception (Fred), teachers defined higher order thinking in general, non-specific terms that did not touch on terminology found in Bloom’s taxonomy or Webb’s Depth of Knowledge schemas.

Teachers had similar understandings and definitions of higher order thinking. In simple terms, they viewed higher order thinking as anything beyond rote memorization and regurgitation of basic skills. They described it as extended thinking and reasoning by using previous knowledge with new knowledge to solve problems. Few teachers spoke of specific higher order thinking skills (i.e., analyzing, creating, or synthesizing) in the context of Bloom’s taxonomy or Webb’s Depth of Knowledge. Higher order thinking was used more commonly, as an all-encompassing term that meant anything other than lower level thinking (i.e., knowledge, understanding).

Several teachers referred to the type of questioning they use to define higher order thinking such as asking, “Why is this working this way?” or “What wouldn’t work in this situation?” Eva explained it as “taking it above and beyond what the question is asking in the book or the workbook, you know, whatever we’re doing and going farther with the problem.” Similarly, Dawn thinks of more particular questioning and answering,
“Teachers can ask questions, students can ask questions. You want certain answers from your students and they want certain answers from you. So, I think of the things I’ve learned, the biggest, to help higher order thinking, is that the easiest thing to do is if a student comes up to you with a question, you never answer it directly.”

Barb indicated she was more familiar with Bloom’s taxonomy than Webb’s Depth of Knowledge levels, and provided a general definition of what higher order thinking is to her. “I would say that higher order thinking is going beyond just remembering, going beyond having things memorized…if you gave them [students] a question that they hadn’t seen that kind of question before, but it was asking them to apply a concept they learned in class to a new situation, they would be able to do that, would be one example.”

To remind her of the higher order skills she wants to target in her classroom, Fred keeps a small, laminated chart on her desk that shows Bloom’s taxonomy and Webb’s Depth of Knowledge skills integrated together. This chart shows how the use of technology could fit into the schemas, which she “really likes.” For her English classes, she indicated she wants students to “play” in levels three and four of Webb’s DOK for reading, levels two and three for writing with a lot of synthesizing, analyzing, and creating. She reflected that she does not have students use the skill of critiquing very often.

When thinking about what higher order thinking skills are, Grace spoke about the engineering design process as “not only conceptual understanding and application but being able to design something that applies what you know…and then not just designing it but looking at your partner’s or looking at other designs, going back and fixing yours—that entire process from start to finish would be higher order thinking for me.”
**Questioning.** A theme that appeared consistently with all teacher participants was the use of questioning as a method of assessing higher order thinking. Regardless of discipline, questioning was used to assess students’ reasoning ability by analyzing students’ interactions between questions and answers. Teachers talked about the need to use questioning as a means of bringing students to thinking with deeper levels of understanding or by eliciting reasoning skills that would require use of previous knowledge by applying it to new knowledge or processes. Eva indicated she assessed higher order thinking skills with her math teams, “I do a lot more of the assessment with my questioning and as I’m circulating [throughout the classroom] with my conversations that I overhear.”

When assessing students in her English class, Fred emphasized she does not question students based on basic factual recall, rather, she uses thinking questions such as, “Why did ancient Greeks feel all these things were necessary for the creation of the world?” She judges the responses to such questions to determine whether students can construct answers that use sound reasoning and understanding of important concepts.

Students are assessed on their responses to questions, but assessment of student learning is also ascertained from the types of questions the students ask as well. Dawn described the importance of having a classroom atmosphere that is based on questioning, “So, you’ve got to get them thinking in that frame of mind and they can never not be thinking in that frame of mind.” She underscored the value of listening to the questions students ask her as a means of finding out what students know.

Adam pointed out the new curriculum textbook does a good job in asking higher order questions. He said the text incorporates a lot of reading and writing. He
commented, “Nearly every question’s going to say, ‘What’s the answer? Explain how you got it,’ …which is great.” Eva’s experiences seemed similar. She noted the new math curriculum has team and individual assessments. They assess the teams on “the deeper questions, the questions that involve more communication, more steps…it’s more problem solving and how to tackle a problem.”

Barb noted the difficulty she has in developing good questions to assess higher order thinking skills. She commented that writing questions that assess “that kind of stuff” is something she has struggled with. She explained, “I also think when you’re a teacher, and you’re writing an assessment, or with me anyway, I always, I tend to be thinking about am I going to be able to grade this, because I’ve had questions where it’s a very open-ended question and I might get some really neat answers but those are hard to grade.” She admitted the lack of time she has for grading certain types of assessment questions limits her ability to use certain types of questions. Depending on the class she is teaching, Barb uses different resources for assessing student work. She noted when teaching AP Physics, she frequently used questions taken from old AP tests, which she felt were “good quality questions” that assessed higher order thinking.

**Collaborative Groups.** Collaborative grouping is a way to cause an effective learning environment by developing classroom activities to give students the opportunity to express their thinking so that feedback (formative assessment) can help develop thinking, guide improvement in learning, and incorporate activities so that everyone is included (Black, Harrison, Lee, Marshall, & Wiliam, 2004). Six of the seven teachers indicated they have their classrooms set up with students working collaboratively in groups. Teachers assess students in the way they work in groups. They move from group
to group and listen to the conversations and learning actively taking place and are able to quickly determine students who are not participating or engaging in the group activities.

Adam uses groups in his algebra I class. He presents questions that build on using previous knowledge. He mentioned that there is a fine line with providing the right amount of knowledge for students to work within groups. Groups are to work with each other and engage in discussion the whole time, explaining what and why they are doing certain processes or procedures. Adam admitted finding fault with this approach when students use information incorrectly. When this happens, time is wasted in re-teaching and re-learning the correct information.

Fred explained how she tackles working with 30 kids in the classroom. “I stand up here and talk, and give some direction. But then I give them the work and I have my stool and my chair, and I saddle-up beside this table and listen to the conversation, and poke and push and prod all of things here…and then move over there.” She said the work she creates for them must be something they can do collaboratively, but also something they can learn individually and independently without her beside them the whole class period. “You have teaching, so this student who gets it can then explain it to this student, so they’re learning because they’re teaching it…once they kind of get it, they can help somebody else or just hearing it through somebody else’s words so they understand it more.”

**Problem-Based/Project-Based Learning.** Problem-based learning is “to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem” (Savery, 2006, p. 9) and project-based learning is “similar to problem-based learning in that the learning activities are organized around
achieving a shared goal (project) (Savery, 2006, p. 9). These instructional approaches were described by teachers as strategies they implemented in their classrooms to determine student learning. Several teachers assessed students based on the projects they performed in labs or through simulations where students were assessed on their ability to demonstrate their knowledge of a particular topic. In her biology classes, Grace uses project-based learning through the labs they conduct with claim based reasoning. Instead of asking many content style questions at the beginning of a lab, as is often done in traditional settings, Grace has students write a claim that answers a question posed at the beginning of the lab project by incorporating different data to support their claim. They work through the lab, gathering evidence to support an explanation for what they are witnessing. The explanations students provide for whether their claim can be supported or not is how these types projects are assessed.

Charlie assesses students with full on simulations. She gives them a parameter to set up and then changes different components to engage students in determining the outcome. In this way, students cannot just read a question and base their answers on previous knowledge, they must physically do the simulation to lead them to a particular conclusion. Charlie commented this approach challenges students to reach higher level thinking, “It’s absolutely getting into that true evaluation instead of just waiting for the information to be provided from the test question itself.”

**Demonstration of Skills.** Teachers require students to demonstrate skills by using previous knowledge to understand new concepts and knowledge. This assessment strategy shows students know how to use information in analyzing, creating, or
synthesizing new information. Bowen and Phelps (1997) found that demonstrations also provide an assessment of the problem-solving capabilities of the students.

In her English classes, Fred assesses the demonstration of skills through writing. She asks students to write everything they remember from the assigned reading. Assessment grades are based on, “Did they get it? Did they kind of get it? Did they totally miss it?” Assessing skills in this way is better than multiple choice tests, because Fred can quickly determine whether students “get it” or not.

Charlie uses rubrics to assess demonstration of skills. She explained using a rubric creates a baseline measurement for everyone. It provides her with the expectations she has for students and a means of comparison when assessing students’ skills. Charlie indicated that demonstrating skills is a way for students to show mastery-based learning. When assessing students, she says, “I’m not trying to surprise you or trick you, I’m trying to actually see what you know.” She believes in mastering learning versus the whole “one and done approach,” where students learn something and then move on to something new, never to revisit the prior knowledge again.

Dawn uses practice tests to demonstrate skills students need for assessments. “Then for the tests, besides the fact that we’ve been doing all these thinking things in class, we do practice thinkers the day before, so that they can see—I don’t want any kid to think like, ‘Boo! Gotcha! So, we do the practice ones before…. I reveal the answer and I say, ‘This is what would be worth one point to me. This is what would be worth two points for me. The whole thing is three points.’” With demonstrations, such as these, students can develop skills based on what they have seen and experienced.
**Instilling Confidence.** Dawn spoke passionately about teaching students to have confidence in their thinking. Teachers do not expect students to have correct answers all the time, they want them to display their reasoning in answer choices they make. They want students to know it is okay to be wrong, and teachers want to understand students’ reasoning in making wrong and right answers. Building confidence in students provides teachers the ability to understand thought processes. The confidence they display in explaining their thoughts helps teachers guide students into understanding concepts and principles that are meaningful. Dawn provided an example of a science lesson about mass not being created or destroyed, she said, “you have to instill a confidence in them. You have to give them practice higher thinking questions before you can hold them to an assessment, or that’s completely unfair and you’re going to shut them down again.”

Allowing students to use their own words to explain their thinking provides teachers a way to assess student learning. Dawn said, “it’s a lot of trust between the students and just building them up to make them effective…. It’s okay if you fail. It’s okay if it is not right. It’s okay.”

**Time.** Time is an influential factor for teachers who consider assessing higher order thinking. Tierney (2006) stated the reason for maintaining traditional assessment practices in the classroom is a shortage of time. Developing and grading assessments that test higher order thinking may require more time than teachers can devote to the task and is a consideration when deciding how to assess their students. Fred commented, “It takes me forever if I’m going to create an essay question or…guided reading with questions that go [along with it] …you’re working with content, and then you’re thinking, ‘Okay,
what am I assessing by reading this? So, what kind of question am I going to ask?” [It takes] Hours.”

Administrators. A study by Taylor, Pearson, Peterson, and Rodriguez (2005) found schools in five American states that dealt with implementing high reform were more successful in changing teaching and assessment practices when they received structural support (i.e., allocation of time, curriculum resources, professional development) from school administrators for implementing instructional and assessment strategies in comparison to less successful schools who received less administrative support. Fred, Charlie, and Eva did not view administrators as being influential in their teaching or assessing. Teachers are left on their own and they can use the curriculum specialists as a resource if they want. Building principals evaluate teachers on their classroom practices once or twice a year, and they have pre- and post-conferences, but offer little guidance on instruction or assessment. Fred commented, “I think we come into our classroom and we’re autonomous. We just do what we do.”

Charlie provided insight into administrators’ limited influence in teaching or assessing higher order thinking skills. “I mean, we obviously are supposed to adhere to our courses of study. How well a teacher goes about doing that is for an administrator to kind of decide and to have that dialogue and those conversations, and hopefully through the evaluation system that’s happening. Would they necessarily recognize [assessing HOTS]? I wouldn’t think so.”

Similarly, Eva spoke of her principal as having little impact in her classroom practice. She mentioned her principal does trust her and backs her both as a staff member and part of the math department. Changes brought about by OTES and the process a
principal has had to go through to become trained has been beneficial because it has brought the principal into the classroom to see what is happening there. However, Eva mentioned, “If I had a question about the academic side of teaching or my teaching and learning, I probably would not go to him.”

**Professional Development.** Scher and O’Reilly (2009) found that professional development programs that include both content and pedagogy as part of the intervention have a larger positive impact on student achievement than those that focus only on content or pedagogy. Teachers in this study indicated the district has provided professional development training on waiver days that may touch on higher order thinking skills indirectly. For instance, with the adoption of the math curriculum, teachers were given seven days of instruction geared towards teaching the new curriculum. Eva commented,

That’s been really nice because that’s been the saving grace… I learn by watching…so to hear a teacher or have a teacher come in and tell me what they did in algebra II with this book, I mean that’s just huge.

Fred explained that the district does provide good professional development opportunities, “just not necessarily driven to higher order thinking at all.” She noted with a bit of frustration that most professional development is geared to general educational strategies. She said she feels too often the content areas are forgotten once they begin teaching.

You no longer get professional development in your content area…. How do you write a good essay question? How do you write a good rubric? And that’s the hard [part]…that’s what we do. How, what does your rubric look like? What is that?
What are you trying to measure? And, so I feel that is the weak link, is that we miss content and practice.

Barb told how the district has had professional development that focused on assessment and used language from Webb’s Depth of Knowledge to analyze exam questions. She was involved with a few committees to write exams for the algebra I course and recalled the leader of the committee wanted to have a certain percentage of questions that were higher order. Barb said she felt this approach was helpful in using such skills in the classroom and would make her think, “Okay. Are all these just simple recall or are we including some questions that are higher levels?”

Adam said he does not feel higher order thinking skills are given much attention. He said, “I honestly think other than that first class in grad school and the one class I took, I don’t feel we get that language a lot. I’ve taught the international baccalaureate curriculum, and I felt like that has helped me almost more, that’s like a professional development itself, just teaching that course, I feel like I get there. But no, I don’t feel that we get a lot of direct [professional development].”

Charlie spent professional development time with other teachers looking at the types of questions being asked on the state mandated tests. She felt the questions were very knowledge and comprehension based, not on the level of higher order. However, teachers were not in agreement on what skills the questions were targeting. Charlie explained, “We’re looking at the questions and trying to determine for ourselves where that [question] falls, and you’re having 85 people with 85 different opinions, you know? And that to me is a little bit of a problem.” She commented on the confusion teachers
have with identifying targeted skills with test questions and the frustration she has with ODE for not clarifying.

If you’re going to put out some of these test questions, then put out the rubric and the justification with it. They’re just releasing questions. And then they’ll say, “Oh, in general, it’s in this category.” What’s the justification? I mean, they’re wanting us to constantly do that, so I feel we should be able to challenge back and ask for the same, because I think once you clarify it for people and you get everybody standardized, then it’s like, “Oh, I see where they were coming from. I didn’t think about it that way.”

Teacher Training. Landrum, Cook, Tankersley, and Fitzgerald (2002) found many teachers place little or no value on university courses and research journals in which academic knowledge is disseminated. Barb, Eva, Grace, Charlie, and Fred spoke candidly of their teacher training, or lack of it, with preservice and in-service experiences. Student teaching and teaching mentors provided most of the practical knowledge they learned about assessments but it was not abundant or especially useful. They said they felt it would have been beneficial to learn how to write higher order questions and how to develop rubrics for grading purposes.

Barb said she felt she could use more in-service training, especially with developing higher order questions and using rubrics to grade them. She noted that rubrics, while they take a lot of time to devise, help with being objective when grading open-ended questions. Even so, Barb has difficulty using rubrics to grade answers, “I’ll get to a response that I think is just great but it’s so outside the box that if I went by the rubric, they would get like a zero. And so, I don’t give them a zero, you know what I
mean? I try to, I think it’s just by its nature higher order thinking questions are harder to
degree and take more time, you know?”

Eva spoke about the need for more in-service training on how to ask good
questions. She commented on the training math teachers in the district received from the
textbook company. They had multiple professional development classes associated with
using the new curriculum, with the main point of the training focused on “questioning,
questioning, questioning.” This was something Eva had trouble with, “You know, what
are good questions to ask in these situations and what questions do get them [students] to
go to that next level and, you know, which ones don’t give away the answer yet help
them a little bit?”

Grace commented on the lack of preservice training she has received with state
mandated tests and about the changes that she has encountered, “State testing has
radically changed in just the few years that I’ve been teaching, and so I …didn’t have a
clear picture of what that was going to look like…we had to learn it together and then
pull out of the state anything we could get so that we could at least try to get the kids
ready…to be more prepared for those assessments.”

Charlie said she felt her preservice teacher training adequately covered
assessments but noted the training was not always applicable to real teaching
experiences:

Sometimes when you’re taking the classes…it’s not always as easy…to apply it to
what I was dealing with or I felt like I was doing, without having a good
foundation of what it actually looked like in the assessment. Because it’s like, oh
yeah, I’m doing Bloom’s taxonomy. Oh, that’s an evaluation question. Oh, that’s synthesis…And it’s kind of like, Is it? And is that the best one?

Fred described her instructional design training in graduate school as outstanding and said she felt it provided her with the foundation she still uses to develop her lessons. She always approaches a lesson with the standards she is aiming to teach in mind and then determines the tools she will use to teach them. “I will always approach my lesson planning that way…that is just the way that we were taught how to do it.”

Common Core. Hall and Harding (2002) stated the impact of national policies on school priorities was considered detrimental to teachers’ assessment literacy. Eva and Barb viewed the implementation of the Common Core standards as a positive change and Charlie said she felt the standards restricted her teaching. Eva indicated she would not want to return to teaching as they had done before Common Core. She compared her current teaching practices with the way she taught before and explained,

The whole part of the Common Core and our math practices is understanding…that’s why we’ve completely switched to this is to get a deeper understanding. So, my first 16 years, I stood up there and we went over homework every day and we gave notes, and then they had practice, 20 practice problems, and at the end, everyone was happy. Now it’s not. The book itself, there’s a lot of reading. There’s a lot of problem solving, so it’s the same material just presented completely different. So, I never want to go back to what I was doing before…if you can’t factor 16 problems in two minutes, I don’t really care. As long as you can factor one and understand what you’re doing.
Eva said she felt the standards are also putting the responsibility of education back on the student, something she said she feels has not always been the case. “It’s getting us away from kids that can memorize and compute numbers, to kids that truly understand in the math world what they’re doing.”

Barb explained the standards are emphasizing students to become college and career ready. “Yeah, I think that’s definitely what they’re going for…it’s kind of a combination of the hands-on stuff and the engineering standards, with like science and math standards all mixed together, it’s kind of cool.”

Charlie spoke about how the standards make her feel accountable to someone else in all her classes. “So, it’s like everyone I have, I feel like I’m accountable to somebody else, okay? I need to know what their standards are, and I do adhere to their standards. Now it doesn’t mean that I won’t go into more in depth. If I can, I always will.”

Charlie also noted the changes brought about by the standards:

I feel that the expectations have changed drastically for the student in when they are going to learn about that material and holding them accountable to material that they learned prior to me, which becomes problematic because not every student has attended our district schools…I kind of feel like the standards don’t leave enough time for going back and refreshing, if that makes sense. So, that part is a burden to me, and I think it’s a burden to the kids, and so I’m, I do have some frustration that lies there because at the end of the day, I don’t care what the standards say, I have to meet a kid where a kid’s at.

Charlie commented on the pressure she said she feels as a teacher, and says “the days of putting a movie in for students to watch are long gone--if students don’t get the
point of the five-minute excerpt then they will need to watch it on their own.” This example shows a bit of the pressure teachers feel to teach all of what they are required to teach. Charlie said,

And that I don’t like because it would be nice for true research or…project-based learning, and allowing the kids to kind of decide where they want to go a little bit. And yeah, you can make it work, it’s not that you can’t, but boy you better be able to justify that and you better know exactly what you’re going for…. that part’s a little bit more difficult.

**Collaboration with Other Teachers.** A common thread for teachers developing assessments with the math and science teachers was the collaboration teachers had in developing department level tests. Sato and Atkin (2007) found when teachers collaborate they can see new possibilities by sharing expertise, exchanging practices, and raising questions. Adam, a math teacher from High School #1, and Eva, a math teacher from High School #3 spoke of how their math departments develop course level tests collaboratively. In devising SLOs for their content areas, teachers used collaborative efforts in writing objectives and standards that were to be used throughout the school year.

Adam described how working with other teachers improved his ability to devise test questions:

In the past…I think I would go through everything and teach and then kind of almost scramble and throw questions together. Now I do a much better job and this helps because we’re all working together…and I make a conscious effort to
make sure these types of problems that we see on the homework…are going to be on the test.

Adam also described how teachers work together to develop team challenges, where students work in teams and challenge other teams to be first in solving problems correctly, or team quizzes, where students work problems collaboratively and are given grades based on correct answers. Teachers select questions from question banks they have used in the past to develop such test materials. They alter questions to reflect the current instruction taking place in the classroom. With collaboration, teachers are able to modify questions from question banks and older tests to emphasize instructional areas being targeted for evaluation.

Similar to Adam’s experience, Eva spoke of teachers who worked together to form common assessments for their content areas or departments. Eva provided an example of how algebra II teachers met to gather ideas from their resources (i.e., past tests, successful evaluation methods from past instructional lessons, question banks, etc.), then discussed and modified test questions to evaluate their current instructional practices.

Charlie, a science teacher at High School #3, considers the collaboration she has with others in her department as having had an enormous impact in her teaching and assessing. She talked about the conversations she has about teaching and assessing with a classroom neighbor who teaches similar courses.

**Two Domains of Meaning**

From the twelve themes emerged two domains of meaning—those internal and external to the classroom. These two domains helped conceptualize elements that
effective teachers experienced in telling their stories about the phenomenon of assessing higher order thinking by identifying themes found inside and outside of the classroom.

**Internal Classroom Themes.**

*Figure 3. Emergent internal classroom themes from secondary teachers’ lived experiences assessing higher order thinking skills.*

Internal classroom themes include defining higher order thinking, questioning, collaborative groups, problem/project-based learning, demonstration of skills, instilling confidence, and time. These themes emerged as areas of commonality in teachers’ experiences found in the classroom setting.

Teachers defined higher order thinking skills as those skills requiring new knowledge to be used with prior knowledge, and to go deeper in understanding skills and
concepts. All the teachers, except Fred (who kept a chart with her), gave general definitions of higher order thinking without using specific terminology found in Bloom’s taxonomy such as creating, synthesizing, critical thinking, etc. However, teachers discussed their understanding of higher order thinking skills by providing straightforward, thoughtful examples that illustrated HOTS in the context of lessons or general classroom practices such as collaborative groups. For instance, definitions included comments such as, “going beyond just remembering,” “applying new concepts to a new situation,” “including conceptual understanding and application…to apply knowledge to design something.” Throughout the course of the interviews, examples of classroom practices were discussed, and it was through such conversations that teachers used terms such as application, critical thinking, and analysis to explain their definition of higher order thinking.

The use of questions in assessing higher order thinking was a common thread found throughout the interviews. Teachers spoke about not accepting simple answers from students when assessing their written tests or classwork. They explained much of their assessing is in the form of questioning students verbally to show they are “getting it.” Teachers want to know what students know and are not trying to “catch or trick them” with hard questions.

Collaborative groups, problem/project-based learning, and demonstration of skills were some of the instructional practices used by teachers to assess higher order thinking. Math and science teachers use collaborative groups to allow students to learn and teach each other, to have discussions about projects or lessons, and to assess higher order skills through projects or demonstrations. When teachers use these assessment practices, they
move throughout the classroom, probing and prodding students with questions to challenge those who are not engaged in the group and by directing questions to students to encourage deep thinking and to demonstrate understanding. Students who explain their reasoning for answers to questions help teachers assess where students are making mistakes and measure progress in understanding. Teachers want students to take risks in their learning and want to help instill confidence in their abilities. They want students to be able to express themselves, not only when they are giving correct answers, but also when they are reasoning incorrectly. Displaying confidence in expressing oneself is helpful for teachers trying to understand where students’ reasoning may be “off track.”

Several teachers talked about the limited time they have in devising tests and grading them. Adam said the new curriculum asks great questions but it requires students to take time to answer them completely. Barb and Charlie said they would like to do more project-based learning but did not know how to work within the time limits of their 45-minute class periods. Barb said if you give a lot of essay type questions, you must have the time to grade them, something she doesn’t have.
The domain of meaning for external classroom themes emerged as I coded the data. Classroom teachers’ experiences show commonalities with elements outside the classroom that should be considered in the context of this phenomenon. The themes that were discovered from the transcribed interviews were administrators, professional development, teacher training, Common Core (Ohio’s Learning Standards), and collaboration with others.

*Figure 4. Emergent external classroom themes from secondary teachers’ lived experiences assessing higher order thinking skills.*
Administrators, mainly school principals, can influence classroom learning (“Standards for Ohio,” 2005b). However, for the participants in this study, principals appeared to have little influence in teaching and assessment practices in classrooms. Teachers spoke about the trust their principals had in them and how they backed them with implementing standards, but teachers indicated their principals did not influence the way they conduct assessments in their classrooms.

Professional development is an area of influence that can impact how teachers approach teaching and assessing (“National Council,” 2017). Math teachers spoke of the professional development conducted by the curriculum company of the math series the district had adopted. Teachers were taught by teachers who had used the curriculum in other school districts. This professional development was useful, practical, and relevant to the math teachers, and especially helpful in exhibiting the need to use questions effectively. Barb spoke of attending professional development sessions to learn how to identify higher order thinking questions. She now looks at questions she uses in the classroom and tries to determine what skills are being tested, and whether the skills being tested are accurate. Teachers said they would benefit from professional development training in the areas of questioning and writing rubrics to help them assess more effectively.

Teacher training is influential in how teachers assess their students. Based on the training received in undergraduate/graduate school, or through student teaching experiences, teachers revealed what they remembered about higher order thinking and assessments. Most teachers said they felt the training they received was very limited in practical application, however, Barb spoke of using her teacher training in her everyday
practice by first determining what standards she would be targeting in her lessons, a technique she learned in her training.

The Common Core and Ohio’s Learning Standards are other factors influencing assessments of HOTS. Ohio’s Learning Standards are addressed through SLOs and teachers develop pre-and post-tests to measure student improvement in their content areas. Teachers spoke of meeting standards and were cognizant of the specific standards they are measuring when they develop lessons and tests to evaluate student learning. Teachers generally had favorable opinions about how they now teach and assess, compared to how they did prior to the adoption of the standards. Math and science teachers used project-based learning, demonstration of skills, and collaborative learning in groups to teach and assess mandated standards. SLOs were written collaboratively in departments, and pre- and post-tests were devised to adhere to district and state standards.

Collaborating with other teachers to write and develop assessments was a common theme. Math teachers and science teachers worked together in their disciplines devising test questions and projects to use in the classroom. Teachers spoke about working with other teachers, and I concluded they viewed collaboration with other teachers as one of the most important influences they have in teaching. Talking with other teachers, and learning from them provide teachers with concrete ways in which they can incorporate skills or concepts in their classrooms, based on others who have similar experiences.

**Summary of Findings**

The purpose of this study was to explore the lived experiences of those most directly involved in assessing students’ higher order thinking skills through a process of
interviewing seven effective secondary teachers’ experiences in one Ohio public school district. By exploring teachers’ experiences, I found myself “discovering the extraordinary in the ordinary” (Van Manen, 2014, p. 298) with the phenomenon of assessing higher order thinking skills in the secondary classroom. Qualitative analysis involves interpretation or making sense of the data (Creswell, 2013). Using the epoche and bracketing as basic ideas “to return to the world as we live it in the natural attitude” (Van Manen, 2014, p. 222), the narrative descriptions of teachers’ experiences were examined to discover similarity or commonality in experiences. It is important to note however, similarity of experiences does not diminish the importance of singular ones, as Moustakas (1994) commented that every statement or horizon related to the topic has equal value. Qualitative analysis can and does include pattern recognition that involves seeing something repeatedly in one case or across a selection of cases (Sandelowski, 2001). “Finding that a few, some, or many participants showed a certain pattern, or that a pattern was common, thematic or unusual in a group of participants, implies something about the frequency, typicality, or even intensity of an event” (Sandelowski, 2001, p. 231).

Working with the data gathered from the participants’ interviews, I engaged in a heuristic process of analysis from my own unique perspective. The aim was to examine the experiences of participants in assessing higher order thinking skills and to provide a comprehensive description (Moustakas, 1994) of those experiences for close examination. The heuristic process refers, to an internal search through which one discovers the nature and meaning of experience and develops methods and procedures for further investigation and
analysis. The self of the researcher is present throughout the process and, while understanding the phenomenon with increasing depth, the researcher also experiences growing self-awareness and self-knowledge. (Moustakas, 1994, p. 17)

From this process, twelve themes emerged from my focused attention of the data and my own self-awareness. The twelve themes were then classified into two domains: internal and external to the classroom.

**Internal Classroom Themes.** Internal classroom themes of commonality among teacher experiences were defining higher order thinking, questioning, collaborative groups, problem- and project-based learning, demonstration of skills, instilling confidence, and time. These notable areas of similarity in teachers’ experiences revealed a common pattern that implied something of the “typicality” of an event (Sandelowski, 2001, p. 231).

Teachers’ understanding of higher order thinking skills was defined as those skills requiring new knowledge to be used with prior knowledge and gaining a deeper understanding of skills and concepts. Teachers felt they assessed higher order skills through the types of informal questions they asked in the classroom and the types of formal questions they asked on tests and quizzes. They also assessed higher order thinking skills using instructional practices such as problem-based and project-based learning, collaborative groups, and performance assessments in the demonstration of skills.

The use of questions in the classroom was common to all participants. Questions used in the classroom were informal in nature, where students were asked to explain their
reasoning on why they answered the way they did; or formal, where students were asked to provide answers to questions on tests that would result in a grade or an evaluation. Students answered informal and formal questions in written or verbal formats.

Collaborative groups, problem- and project-based learning, and demonstration of skills were several of the instructional practices used by teachers to assess higher order thinking skills. Math and science teachers used collaborative groups for instructional practices and assessed students through projects or demonstrations.

Several teachers talked about the limited time they have in devising tests and grading them. Adam, Barb, and Charlie mentioned time as a consideration when assessing higher order thinking. This influential element causes teachers to decide or determine the use of certain types of assessments based on the amount of time they have to give an assessment or grade them.

**External Classroom Themes.** Teachers’ stories revealed common threads from their experiences that are external to the classroom setting. These external threads may influence assessment practices inside the classroom. The external themes explored in this study are administration, professional development, teacher training, Common Core (Ohio’s Learning Standards), and collaboration with others.

School principals have little influence in the assessment practices of the participants and professional development is a positive way for teachers to learn from other teachers who have taught similar curriculum series. Several teachers spoke of the confusion teachers had in reaching a consensus about what higher order skills were being targeted by certain questions provided on state tests. They felt ODE should provide a rubric to explain the way higher order skills questions are classified. Teachers said they
would benefit from professional development training in the areas of questioning and writing rubrics to help them assess more effectively.

Teacher training is one factor that may influence how teachers assess their students. Most teachers felt the training they received was limited in practical application.

The Common Core and Ohio’s Learning Standards are other factors influencing assessments of HOTS in the classroom. Teachers write student learning objectives (SLOs) and develop pre- and post-tests in their content areas. When devising assessments, teachers are aware of the standards and objectives they are teaching and assessing. Math and science teachers used problem/project-based learning, demonstration of skills, and collaborative learning in groups to teach and assess higher order thinking. Traditional, written, or online tests are mainly given to test standards.

Collaboration with other teachers was a theme teachers had in common with writing and developing assessments. Math teachers and science teachers worked together in their disciplines devising test questions and projects to use in the classroom. This area of influence appeared to be one of the most important in developing assessment questions for students.

Together, these internal and external themes exhibit a multitude of forces teachers encounter when assessing in the secondary classroom. Teachers are not necessarily focused only on higher order thinking when they assess student learning. Many of these identified themes affect teachers’ decision making when evaluating learning. Exploring the lived experiences of teachers’ assessment practices of higher order thinking skills allowed for an in-depth look into this phenomenon and provided a deeper understanding
of effective teachers’ assessment practices. As a result, the following discussion and suggestions are made with consideration given to this newfound understanding.
CHAPTER V
DISCUSSION AND SUGGESTIONS

Summary of the Study

The purpose of this study was to explore the experiences of effective secondary teachers in assessing higher order thinking skills. This study contributes to the literature for secondary teachers who are mandated to teach and assess such skills. Examining the experiences of effective teachers in secondary classrooms and deciphering areas of similarity may prove beneficial in developing professional development programs to foster such practices in other classrooms. For students to graduate an Ohio public school, they are to have the resources and skills to be college and career ready and according to Ohio’s Learning Standards (“Ohio Department...Ohio’s learning,” 2017b) developing higher order thinking is part of this mandate. Students who are provided an education with curriculum, instruction, and assessment cohesively aligned have the best chance in attaining success in college and career.

To provide a foundation of understanding and common language for the study, Bloom’s Taxonomies and Webb’s Depth of Knowledge were reviewed. Teachers explained “higher order thinking” in their terms which provided a common understanding for the narrative interviews about their experiences. Three science, three math, and one English teacher gave their personal accounts relating to their assessment practices. Some of these practices included using problem/project based learning, collaborative groups,
questioning techniques, and demonstration of skills. Teachers’ experiences revealed some of their dispositions and perceptions about assessing higher order thinking skills in context of curricular alignment and the Ohio Learning Standards.

**Domains**

The similarities found in teachers’ experiences when assessing higher order skills centered around themes that were internal and external to the classroom setting. Internal classroom themes included common threads that teachers discussed about assessing higher order thinking using questioning, collaborative groups, problem- and project-based learning, demonstration of skills, instilling confidence, and time. Similarities of teachers’ experiences were also found regarding themes external to the classroom: administration, professional development, teacher training, Common Core (Ohio’s Learning Standards), and collaboration with others.

**Internal Classroom Themes.** Underlying this study was teachers’ understanding and use of the terms “higher order thinking.” Central to discussing the use of assessments to measure students’ higher order thinking skills was understanding how teachers defined what higher order thinking meant to them. Teachers defined higher order thinking as reasoning beyond basic fact and recall. They spoke of asking questions of students to cause them to think about their reasoning, to encourage them to use new knowledge with old, and to help them develop the ability to ask questions and express themselves to show what they know and what they do not know. Teachers commented that higher order skills allow students to use new information and apply it with previous information to form a deeper understanding of concepts and ideas. This is in line with Mayer’s (2002) statement that retention and transfer are two of the most important educational goals. Remembering information as it is presented and transferring what is learned in solving new problems,
answering new questions, or learning new subject matter (Mayer, 2002; Mayer & Wittrock, 1996) are ways in which teachers defined higher order thinking. Retention is most closely related to Bloom’s lowest level of remembering and transfer is related to Bloom’s higher levels of understand, apply, analyze, evaluate, and create (Mayer, 2002). While teachers did not use technical jargon of Bloom’s taxonomy or Webb’s Depth of Knowledge to explain higher order thinking skills, they did exhibit an inherent understanding of using these skills in their classrooms.

In assessing higher order thinking skills, the use of questioning was a common theme found in all teachers’ experiences. Teachers assess higher order thinking with questioning in two ways—by asking students various types of questions to elicit certain responses, and in the way students ask questions of them. Questioning by teachers allow formative evaluations of students’ understanding of concepts and ideas. Black et al. (2004) stated effective questioning is an important aspect of “impromptu interventions teachers conduct once the students are engaged in an activity” (p. 12). Students’ questioning of teachers is also a form of assessing student understanding. Teachers can assess levels of cognitive reasoning when students ask questions. Based on their understanding, students’ questions often reveal areas where there is a disconnection in reasoning. Black et al. (2004) suggested students should be allowed to brainstorm ideas to allow “teachers to learn more about the student’s prior knowledge and about any gaps and misconceptions in that knowledge, so that teacher’s next moves can better address the learners’ real needs” (p. 12).

Robitaille and Maldonado (2015) noted critical thinking and problem solving as two of the skills most sought-after by business owners and educators in high school
graduates. One of the most effective methods for teaching how to master these skills is through questioning and discussion. They stated,

Demonstration of questioning and discussion at the exemplary level goes beyond asking students higher order questions. It is more about students having authentic and deep conversations about content, which includes their generation of higher order questions followed by collaborative discussion about those questions. Questioning and discussion cannot happen unless the classroom has an established culture of respect, rapport, and high academic and social expectations.

(p. 14)

Another area of commonality found in teachers’ experiences was the use of collaborative grouping of students in classrooms. Black et al. (2004) found, “Collaboration between teachers and students and between students and their peers can produce a supportive environment in which students can explore their own ideas, hear alternative ideas in the language of their peers, and evaluate them” (p. 19). Students learn by using their own words to explain and reason (Black et al., 2004). An advantage of having a classroom environment that engages in collaborative grouping is that a teacher can work with one group intensively by challenging the ideas and assumptions of its members while knowing the other class members are also working (Black et al., 2004). Collaborative groups provide students an opportunity to teach others in their groups and to work together in solving problems.

Teachers assess students’ higher order skills through listening, observing, and interacting with the groups. Collaborative grouping is a way to cause an effective learning environment by developing classroom activities to give students the opportunity
to express their thinking so that feedback (formative assessment) can help develop
thinking, guide improvement in learning, and incorporate activities so that everyone is included (Black et al., 2004). Further, they found collaborative groups challenge and train students to listen to and respect one another’s ideas, ensure students are active participants in the lessons, and emphasize that learning may depend less on their capacity to spot the right answer and more on the readiness to express and discuss their own understanding (Black et al., 2004, p. 19).

Teachers spoke about using problem-based learning where students are given problems to practice and apply new knowledge and skills in finding solutions. With problem-based learning, teachers serve as tutors by guiding the learning process and providing feedback to students after the learning experience (Savery, 2006). In this study, teachers assessed students with problem-based learning through observation and questioning techniques, and by evaluating the collaborative interactions they had with others in completing problems in their group settings.

Another teacher used project-based learning to assess higher order skills. Students were asked to use claim based reasoning to develop claims about a proposed project. This approach of working on class projects allows for students to use their higher order thinking skills by developing and supporting claims about specific concepts. Students work and interact in collaborative groups as they work on projects aimed at applying new concepts and building on previous knowledge. Learning activities center around shared projects where students are given specific directions for completing them (Savery, 2006). This type of instructional and assessment approach is about following correct procedures.
and teachers are seen more as instructional coaches and assessors who offer guidance, feedback, and suggestions for improving final projects (Savery, 2006).

Several teachers commented students were often assessed by demonstrating their skills through verbal responses to questions, or through completing problems or projects that required assessment by observation. Bowen and Phelps (1997) found that using demonstrations as an assessment tool was beneficial in two ways: students may pay more attention to demonstrations if they know they will be assessed on them, and demonstrations can help teachers assess the problem-solving capabilities of the students.

One teacher spoke of instilling confidence in students’ learning ability as another way to understand students’ use of higher order thinking skills. She indicated confident students will ask questions, whereas less confident students may not. Creating an atmosphere of trust where students feel comfortable answering questions, correctly or incorrectly, builds confidence in students’ willingness to take risks. A study by Mabry, Poole, Redmond, and Schultz (2003) found state mandated tests place too much pressure on students and overwhelm them. Students’ self-esteem is affected by test scores and nothing is in place for those students who do not meet the standards (Mabry et al., 2003). Students who show self-confidence in their abilities to answer questions allow teachers to assess what they know and where there may be a lack of understanding of concepts or ideas. Building self-confidence through classroom practices such as questioning, collaborative grouping, and problem/project-based learning, help students develop self-assurance in their own abilities, and use their metacognitive abilities to assess themselves, rather than relying on a teacher’s ability to tell them what they know or do not know.
Time was a factor that was mentioned when discussing the assessments of higher order thinking. Teachers noted the difficulty in developing assessments that would capture a true picture of what students know in a 45-minute class period. Teachers also spoke of the time required to develop assessments that target higher order thinking and reasoning. They said it is possible to develop multiple choice questions to assess higher order thinking skills but noted they are difficult to make and require more time to develop than pre-made tests they can select from textbooks or questions from online resources. Assessments that are in the form of projects or that require more than one class period are sometimes used, but additional steps are needed in developing rubrics, and additional time is then required on the teachers’ part for developing assessments that ensure a measure of objectivity in grading.

Grading and evaluation of assessments is another area where time is a factor that teachers consider when assessing higher order thinking skills. “Assessment itself takes time. And teachers can be overwhelmed with the volume of marking they have to do to give students meaningful feedback on how well they are meeting the new expectations” (Miller, 2005). Tierney (2006) stated the reason for maintaining traditional assessment practices in the classroom is a shortage of time. With reform measures that require a change in process, teachers are concerned that new assessment practices will take away from teaching the required curriculum (Borko, Davinroy, Bliem, & Cumbo, 2000, p. 291), and that these assessment practices will be too time-consuming (Hargreaves, Earl, & Schmidt, 2002; Mabry et al., 2003). Tierney (2006) identified time as a factor for hindering the implementation of classroom assessment that supports student learning.
**External Classroom Themes.** Classroom teachers’ assessment practices are affected from elements outside of the classroom such as administrators, professional development, teacher training, Common Core (Ohio’s Learning Standards), and collaboration with others. Educational leaders (i.e., CIPD directors, school principals, superintendents, etc.), in their respective capacities, have an opportunity to affect students’ ability to become college and career ready, as Ohio’s Learning Standards (“Ohio Department...Ohio’s learning,” 2017b) state, through the assessment strategies and practices that are adopted and carried out in the school district.

Tierney (2006) stated educational leaders, such as school principals, can affect reform efforts by allocating time and resources for professional development and team meetings. During this study, when speaking about their experiences with their school principals, teachers commented about their autonomy. Principals conduct one or two evaluations per school year, but other than for formal evaluations, teachers are left to teach and assess on their own. These teachers’ stories were similar in that they felt their principals supported them as teachers, but they would not seek advice or mentoring from them regarding their assessment practices. Akert and Martin (2012) found that student achievement was higher in schools where principals trusted teachers to take leadership roles. Such schools experienced a culture for learning through higher incidents of positive morale, effective teacher collaboration, teacher retention, and an environment of respect that was created by the principal at the school wide level (Akert & Martin, 2012; Robitaille & Maldonado, 2015).

Teachers indicated professional development often takes place in this district but it usually focused on general education strategies rather than content areas. Scher and
O’Reilly (2009) found that professional development programs that include both content and pedagogy as part of the intervention have a larger positive impact on student achievement than those that focus only on content or pedagogy. Other teachers indicated they would like specific professional development on developing and improving their questioning abilities. They would like to know how to write good rubrics and would like the ODE to provide examples and explanations of what higher order skills are being targeted through state-wide assessments.

Scher and O’Reilly (2009) indicated that for math and science teachers, professional development is an investment that is useful and necessary. They note however, professional development programs are often short-term efforts that are not supported by empirical evidence. Professional development experts recommend more intensive programs focused on content should be developed to enhance teacher knowledge, improve classroom practices, and increase student achievement (Scher & O’Reilly, 2009).

Teachers’ discussed their experiences as they pertained to assessing higher thinking skills and their teacher training programs. Very little, if any, instruction was given in learning about higher order thinking skills’ instruction, much less assessments of them. Only one of the teachers indicated they received some training in graduate level classes and another kept a pamphlet on her desk to provide a daily reminder to incorporate HOTS from Bloom’s taxonomy and Webb’s Depth of Knowledge in her instructional and assessment practices. Teachers said their teacher training mentors (i.e., student teaching mentors) provided the most relevant information about assessing, but specific targeted higher order skills were not covered. McMillan (2003) suggested
teachers struggle to accommodate external pressures (such as state and district test policies) in their decision making due to the lack of appropriate training in classroom assessment in teacher preparation programs. A Washington state study found insufficient teacher training in assessment due to uneven and inadequate preparation hindered the ability to meet mandated expectations (Hargreaves et al., 2002).

Hayward, Priestley, and Young (2004) commented on the effect of education reform on classroom practice by using a hurricane metaphor first described by Cuban (1993). “Hurricane winds sweep across the sea tossing up twenty-foot waves; a fathom below the surface turbulent waters swirl while on the ocean floor there is unruffled calm” (Cuban, 1993, p. 2). This aptly describes the effect the adoption of the Common Core standards has had on public schools in the state of Ohio. Top down reform measures (e.g., Common Core or Ohio’s Learning Standards) are mandated changes affecting public teachers throughout the state. Teachers commented that the implementation of the Common Core standards has mainly been a positive influence in their classroom instructional practices. New curriculum purchased for the district’s math departments impressed teachers with the changes made due to implementing the standards. Teachers indicated they teach differently, by incorporating more collaborative groups and by implementing student discussions over what they know about a new subject before they engage in teaching. However, the assessment requirements were an area of the reform measures teachers did not view in a positive manner. District wide pre- and post-tests given to show achievement and value-added gains, have caused teachers to revert to more traditional tests that include multiple choice answers, true-false, and short answer essays. Teachers said tests can be relevant to learning, but they are difficult to make if higher
order skills are a specific target, since these types of tests require more time to develop for teachers and more time to take for students. As previously stated, national policies impact school priorities, such as the Common Core, and are often seen as detrimental to teachers’ assessment practices, however, there is some evidence that these policies can be mediated through local administration (Hall & Harding, 2002).

Collaborating with other teachers in their departments is an area teachers use to develop assessment materials and discuss classroom practices. Black et al. (2004) stated, collaboration between teachers to exchange ideas and experiences about good questions is very valuable. The questions themselves then become a more significant part of teaching with attention focused on how they can be constructed and used to explore and then develop students’ learning. (p. 12)

Teachers seem to value this interaction and view it as a place to talk about things that have worked in their classrooms, share ideas, and discuss questions they will use for department level assessments. Collaboration between teachers was a recurring theme with teachers’ experiences and seemed almost a standard practice where many assessment ideas, practices, and procedures are discussed and determined. Tierney (2006) commented, “Colleagues are most valued as a source of information for teachers, but professional development is also considered important” (p. 242).
Discussion of Results

Figure 5. Themes that Influence Teachers’ Assessment of Higher Order Thinking Skills

Figure 5. Themes identified that affect effective secondary teachers when assessing higher order thinking skills.
Many forces affect teachers’ assessment practices. Internal and external themes can be viewed as forces exerting pressure on teachers’ assessment decisions. From participants’ narrative descriptions, one can gain an understanding of how assessment experiences are affected by forces external to the classroom setting--mainly from administrators, accountability standards, time, teacher training, and professional development. Internal forces affecting assessment decisions included the use of questioning and instructional practices which were intended to elicit higher order thinking. Assessment practices seemed to be a by-product of internal and external forces rather than a primary component in the comprehensive alignment of curriculum, instruction, and assessment. In some instances, these forces appeared to work against each other. For example, accountability standards and time constraints affected the ability of teachers to use more subjective assessment strategies to assess instructional practices, such as project-based learning or demonstration of skills, for more objective and timely traditional assessments such as multiple choice and short answer essay. However, as noted previously, traditional assessments often focus on the lower level skills of basic fact and recall.

Ohio teachers have been mandated to teach and assess higher order thinking skills as part of an education where Ohio students will be college and career ready upon graduation. Research shows curriculum, instruction, and assessment must be aligned for students to receive the best chance for a quality education. One of the ways effective teachers who participated in this study revealed they assess higher order skills was through the use of questioning. The practice of using questions to elicit higher order thinking and reasoning was a common thread found throughout the lived experiences that
were studied. Teachers provided examples of their skillful use of questioning to ascertain students’ understanding and their ability to go beyond basic knowledge of rote memorization or regurgitation of facts. They asked students questions that would assess such higher order skills from Bloom’s revised taxonomy in areas of apply, analyze, evaluate, and create by incorporating instructional practices of collaborative grouping, project/problem based learning, and demonstration of skills.

The term *curriculum alignment* illuminates some of the challenges I encountered with this study. Trying to separate the elements of alignment, notably instruction and assessment, revealed the complexity of narrowing this study to assessing only higher order thinking skills. In real time, listening to teachers’ voices and the experiences they shared revealed a comprehensive view of their assessment practices, not only higher order thinking skills. Often, instruction and assessment were not separate entities. Teachers use a combination of informal, formative assessments strategies such as questions and answers, observation, and listening when evaluating student learning and use more formal, summative assessments (i.e., written or online tests with multiple choice, short-answer essay, etc.) to provide more objective grades for accountability purposes. Examining teachers’ stories shed light on the fluid way teachers evaluate students learning. But to be sure, this study was not about grading or grading practices.

As previously noted, it was difficult to fully separate the components of curricular alignment: curriculum, instruction, and assessment. While textbook curriculum series and content may be similar across classrooms of the same discipline (i.e. algebra I, biology, etc.), instruction and assessment vary depending on individual teachers’ practices in the classroom. Taking this into account, participants’ experiences revealed similar strains of
instructional methods. The three math and three science teachers use collaborative grouping throughout their classrooms. Students work together in groups, discuss lessons, teach each other, and sometimes copy each other’s work while teachers move throughout the classroom listening, engaging students in discussions, and making judgments on whether students are understanding concepts provided in the lessons. In these collaborative settings, teachers conduct formative assessments through their interaction with groups and the individual participation of students within them. One on one attention is provided for students who fail to participate or show a lack of understanding for the lesson being covered.

Demonstrated skills, problem-based, and project-based learning are other ways students’ higher order thinking skills are assessed. Students may be provided with problems or projects where they show they have mastered understanding by demonstrating skills or completing projects, or where problems are given for collaborative groups or individuals to solve. Using alternative instructional methods such as these allow teachers to assess students through observation as they engage in solving problems or demonstrating their understanding of concepts and ideas.

Understanding how teachers defined higher order thinking was revealing. Most teachers described higher order thinking skills in non-specific terms. Instead of using terminology reflective of Bloom’s taxonomy or Webb’s Depth of Knowledge schemas, teachers provided more esoteric definitions. They gave general descriptions of higher order thinking as anything other than rote memorization and basic recall. Teachers often noted higher order thinking is going beyond simple, one-word responses to questions.
They explained higher order thinking as asking more in-depth questions, such as “why?” or “explain…” to elicit students’ reasoning for answering questions the way they did.

**Recommendations**

Assessment literacy is a term first mentioned by Stiggins (1991) and defined as an understanding of sound assessment principles. Educators in effective schools understand how to collect dependable data of student achievement and use the assessment process and its results either to support or certify student achievement depending on the context (Stiggins, 2014). Assessment literacy also involves teachers’ making appropriate decisions about assessments in their classrooms. McMillan (2003) noted that while many argue assessment and instruction should be seamlessly coordinated, with the goal of each contributing to improved student learning, principles of classroom assessment and instruction remain mostly separate and teachers continue to use assessments that experts contend are not consistent with best practices (McMillan, 2003; Stiggins, 1991).

The phenomenon of assessing higher order thinking skills has practical application for Ohio educational leaders. Findings contained in this study could supplement a cohesive curricular alignment strategy by enhancing assessment practices that are often overlooked in schools and school districts. District superintendents, particularly those interested in measuring student achievement and accountability, could implement staff development programs to advance the assessment literacy of educational leaders and teachers in their districts. Using a transformational leadership style (where administrators work with and through others in accomplishing shared goals; Bass, 1985) as an instructional leader, superintendents could create a more cohesive alignment between curriculum, instruction, and assessment by implementing a collaborative vision and mission for the district that incorporates assessment as an important learning tool for
students and district instructional leaders. A district vision and mission that incorporates curriculum, instruction, and assessment may lead to better student academic achievement and could be useful in assessing teacher performance and curriculum effectiveness.

Functioning as liaisons between implementing the district strategic mission and classroom implementation, principals could augment and reinforce resources designed to improve teacher assessment literacy through such methods as collaborative work groups or by using the Ohio Department of Education assessment literacy resources. Curriculum and instruction specialists could further assist teachers by developing training in areas of assessment literacy, Bloom’s and Webb’s schemas, developing good questioning techniques, and writing rubrics.

Throughout the 2013-2014 school year, the Ohio Department of Education, in conjunction with Battelle for Kids, offered full-day Assessment Literacy presentations to Ohio educators to introduce the foundations of assessment literacy and quality assessment design which focused on key skills and knowledge needed to critically design and review assessments (Battelle for Kids, 2013). A significant portion of this professional development program focused on using Hess’ (2009) Cognitive Rigor Matrix that combines Bloom’s Revised Taxonomy and Webb’s Depth of Knowledge schemas with curricular examples to provide a foundation for developing assessment literacy of Ohio educators (example of math/science matrix found in Appendix G).

Currently, educators have access to regional field specialists who “offer professional development that includes a variety of tools to facilitate the effective, meaningful design and implementation of assessments in classrooms.” Other resources provide 30-minute online learning labs, PowerPoint presentations, facilitation guides, and information about
Webb’s Depth of Knowledge. Participants can learn key skills need to critically develop, review, and score varied types of assessments (“Ohio Department...How to design,” 2016a). The materials are appropriate for all educators but are especially helpful for those developing measures of student growth through student learning objectives.

The data collected for this research study provide school district curriculum and instruction personnel, principals, and administrators an opportunity to incorporate targeted professional development for improving assessment literacy and improving teachers’ classroom decision making by implementing strategies for assessing higher order thinking skills. Popham (2009) reported that assessment literacy is teachers’ familiarity with measurement as it is directly related to what happens in classrooms and is a “commodity needed by teachers for their own long-term well-being, and for the educational well-being of their students” (Popham, 2009, p. 11). The basic function of assessment is collecting evidence and making inferences about students’ skills and knowledge (Popham, 2009).

Popham (2009) recommended tailored professional development programs to improve teachers’ assessment literacy by targeting specific skills and content knowledge. Of interest to this study was improving teacher assessment literacy of higher order thinking skills in three areas: constructing and improving test items; scoring student responses using well-constructed rubrics; and determining appropriate test measures for accountability in evaluating the quality of instruction (Popham, 2009, p. 9). Teachers could benefit from learning questioning techniques such as writing good questions for tests, asking the right kind of questions to elicit higher order thinking, and using follow-up questions to probe a student’s understanding of skills and concepts. Teachers indicated
it would be helpful to know how to write good questions, and how to develop them to evaluate HOTS. My recommendation would include professional development sessions to improve assessment literacy in areas that demonstrate useful questioning techniques and strategies teachers could use in determining students’ understanding and acquisition of higher order thinking skills.

Another component of becoming assessment literate is understanding the need to align assessment with curriculum, instruction, and learning. As previously mentioned, cohesive alignment of curriculum, instruction, and assessment provides the best opportunity for students to be college and career ready and have a better chance for a quality education (Anderson, 2002). The Ohio Department of Education’s Assessment Literacy FAQs (2015a) offers the following guidance for teachers in making assessment decisions:

Selected Responses (Matching, True/False, Fill-in the Blank and Multiple Choice) are good matches when assessing recall or knowledge. Constructed Written Responses (Short Answer, Extended Response) are useful when assessing understanding or reasoning. Remember to have a written scoring guide or rubric already created; it is suggested you share rubrics with the students in advance as well. Performance Assessments are useful choices when a product needs to be reviewed or a performance needs to be observed. A written rubric is also necessary for Performance Assessments. (para. 4)

Another FAQ from the same Ohio Department of Education (Ohio Department...Assessment Literacy,” 2015a) webpage addressed using multiple choice items to assess higher order thinking. The response:
The appropriateness of an assessment method (for example, multiple choice or other selected response methods) depends on the purpose and context of the assessment. When speaking of “higher-level thinking,” we are usually referring either to higher levels of Bloom’s Taxonomy or higher levels of Webb’s Depth of Knowledge (DOK). While it is not impossible to assess higher-level thinking (for example, DOK level 3) with multiple choice items, it may not serve the purpose well. For example, a student may be asked to evaluate a situation in which they must draw a conclusion based on evidence from a text. It is possible to structure an item such that the student must reason through the question and pull information together, justifying their reasoning in their mind in order to select the correct response(s). However, it is very difficult to write such items well, and higher-level thinking tasks often involve an extended period of time to perform. It is also important to keep the purpose of the assessment in mind. If the purpose is for the student to demonstrate mastery of the knowledge and skills in a DOK 3 standard (which is usually what is desired), then constructed response or performance would be more suitable assessment methods, since these methods require the student to show their reasoning more directly. (para. 5)

I would recommend Ohio leaders use the resources already available to them through the Ohio Department of Education. The Assessment Literacy presentation and resource materials would be a cost-effective means to improve educators’ assessment literacy by providing information about possible assessment methods (i.e., selected or constructed response, performance assessment, multiple choice) to use for assessing higher order thinking. Educators could improve their decision-making ability by choosing
methods that align with the curriculum, instruction, and learning that is taking place in the classroom. Using these resources would allow teachers to access online sessions at their own convenience and re-visit the sites when needed.

James (2008) suggested that assessments need to be aligned with the kind of learning that is being taught (James, 2008). James (2008) outlined three generations of ideas and implications about learning and assessment. The first generation (behaviorist approach) involved assessing what is taught and how well knowledge is transmitted and absorbed by learners (p. 21). These types of assessment practices include features that focus on performance, where performance is defined as demonstration of ability to recall facts, information, or skills. Characteristics of the first generation are still very prevalent in our educational culture (James, 2008).

The second generation (constructivist approach) of assessment practice involves assessing learning as individual sense-making (James, 2008). Similar to the first generation, it continues to focus on the individual and acquisition of knowledge and skill, but it takes a more active view of learning and recognizes what is learned is rarely identical to what is taught (James, 2008). Second generation assessments go beyond testing factual recall to tap into deeper understanding. The constructivist view of learning argues learning is largely determined by what goes on in people’s heads and involves people actively making sense of the world so that they can interpret new information (James, 2008). Assessments of this type of learning may include essays, concept maps, think-alouds, open-ended assignments, or projects. Elements of both behaviorist and constructivist approaches are used on these types of tests because the approach remains focused on the acquisition and processing of knowledge (James, 2008). An example
would be a test that begins with short answer questions based on factual recall and progresses to more extended problem-solving tasks or essay-type questions.

The third-generation (interactionist approach) assessment practice is learning as building knowledge a part of doing things with others (James, 2008). This socio-cultural perspective on learning involves the interactions between thought and action in context (James, 2008). Often seen as more complex than behaviorism, which concentrates on behavior, or cognitivism which focuses on thought process, the interactionist approach views human development as an interaction between the individual and the environment (James, 2008). The implications for assessment, especially in school contexts, have not been fully worked out but James (2008) suggested assessment practices be carried out alongside learning, rather than an “after learning” event. The third-generation assessment values group learning as important as that of the individual. Assessments may be in the form of learning outcomes that are captured and reported through recordings of narrative accounts with audio and visual media, portfolios, and collaborative group projects (James, 2008).

Chadwick (2004) reported constructive alignment of curriculum, learning outcomes, teaching and learning approaches, assessment techniques, and course evaluation should complement each other for effective learning to take place. Two important aspects of constructive alignment involve students constructing meaning from what they learn and teachers planning learning activities and assessments that truly evaluate gains in student learning (Biggs, 1996.; Jideani & Jideani, 2012). I would recommend teachers attend professional development sessions to incorporate training on how to align curriculum, instruction, and assessment. Teachers and administrators should
know the assessments they are using are measuring what is being taught in the classroom, and they should be able to choose appropriate assessment tools to measure student learning. Curriculum and instruction specialists could promote and design professional development towards improving teachers’ assessment literacy to include curricular alignment strategies that would ultimately provide students with more meaningful instructional and assessment data.

Professional development to provide training in instructional practices such as problem-based or project-based learning, the demonstration of skills, and collaborative learning would be beneficial for improving assessment of higher order thinking. Teachers should have multiple opportunities to learn and become proficient in using these instructional practices and how to assess them so they can incorporate them into their classroom settings.

School principals could develop their own instructional leadership abilities through professional development geared towards enhancing their knowledge and practice of assessment practices. Principals should do more to encourage and support teachers in their efforts to incorporate higher order thinking instruction and assessments in the classroom by providing time and resources necessary to accommodate such practices.

Administrators and school personnel should take an active part in working and creating an environment that values curiosity and builds confidence in students. Using instructional practices such as problem-based learning may improve students’ metacognitive skills that could build self-confidence through collaborative learning and post-problem reflection. Students should feel comfortable taking risks with learning and
assessments to build confidence in their reasoning abilities and to realize incorrect answers do not necessarily mean failure. They should be comfortable expressing their reasoning for answering questions the way they did so teachers can understand and guide them in the right direction if they are off course.

**Future Research Suggestions**

My suggestions for future research include continuing to explore teachers’ assessment literacy and assessment practices of higher order thinking skills in the classroom. Exploring how teachers use HOTS and whether they target and assess the skills would be useful for moving students forward with using higher level thinking skills. A study that focused on teachers’ perceptions on how often they use or assess higher order thinking and what takes place in the classroom would be beneficial in finding out if teachers are teaching and assessing what they think they are.

A longitudinal study of instructional practices such as problem-based learning, project-based learning, collaborative groups, and where demonstrated learning takes place would be beneficial to teachers and students to understand the long-term implications of using these strategies when assessing (and teaching) higher order thinking skills.

Another area for consideration is addressing how grading is handled in teaching and assessing HOTS. With the Ohio Teacher Evaluation System (OTES), pressure is placed on a teachers’ ability to demonstrate student growth. The question is, what assessment measures are in place to ensure student learning is reflecting the necessary components of an education that is “college and career ready?”
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*Promoting college and career readiness: Bridge programs for low-skill Adults.* Washington, D.C.


APPENDIX A

TWO-DIMENSIONAL REPRESENTATION OF BLOOM'S REVISED TAXONOMY

In this model, each of the colored blocks shows an example of a learning objective that generally corresponds with each of the various combinations of the cognitive process and knowledge dimensions.
APPENDIX B

LEVELS OF THINKING

Permission to use granted by creator Debbie Perkins. Original chart included shading which was eliminated for clarity.
APPENDIX C

INTERVIEW IRB APPLICATION

Fast-Track Survey / Interview IRB Application

FOR APPROVAL OF EXEMPT HUMAN SUBJECTS RESEARCH (Category b-2)

This Checklist may be used by researchers at the University of Dayton who want to conduct anonymous paper surveys, confidential online surveys, or non-sensitive interviews using only adult subjects. Any other type of research must use the appropriate exempt or non-exempt form available at the IRB web site. This application form may NOT be used if the research is sponsored with federal funds, if prison populations are used, if compensation is involved, or if minors under the age of 18 are involved. This form can only be submitted to the IRB by a University of Dayton faculty member or full-time staff member. If you are a student, you must ask your faculty mentor to approve the checklist and submit it, along with the Invitation to Participate/Information Sheet and list of survey/interview questions to IRB@udayton.edu. Visit: http://www.udayton.edu/research/compliance/irb/

1. PRIMARY RESEARCHER

Researcher name, department, and UD e-mail:
Rachael Miser, Department of Educational Leadership, miserr2@udayton.edu

Faculty Sponsor Name (required for student projects), department and e-mail:
Dr. Carolyn Ridenour, Department of Educational Leadership, cridenour1@udayton.edu

2. PROJECT TITLE: A Phenomenological Study of Teachers’ Experiences with Assessing Higher Order Thinking Skills.

3. CHECKLIST:

X☐ No federal funds will be used in this research. (You may not use this form if federal funds are used.)

X☐ No compensation will be offered to participants. (You may not use this form if compensation is used.)

X☐ No subjects under the age of 18 will be used in this research.

X☐ No prisoners will be used in this research.

X☐ No deception will be used in this research.

X☐ The researcher has approval to conduct their research at the data collection site.

LOCATION:________
The researcher will not be collecting or recording any identifying information from the subjects.

If interviews are involved, NO sensitive topics are involved. (If for any reason the subject might be at risk if their identity and their responses are linked, you may not use this fast-track form.)

Survey Data and Interview Responses will be secured and kept private using lock-and-key (paper data) or password-protected computer files (digital data) on a computer with limited access.

Access to the research data will be protected and restricted to the researcher and/or faculty member.

This type of research does not require the researcher to document informed consent. In lieu, the researcher will use the University-approved Invitation/Information Sheet template (see the IRB web site). This sheet will be provided to the subjects prior to data collection.

I have included the Invitation to Participate/Information Sheet and Survey/Interview Questions for this study with this form for review.

Only a faculty or staff member may submit this form to the IRB.

IF ANY OF THE BOXES ABOVE ARE NOT CHECKED, you may not use the FAST-TRACK FORM. Please visit the IRB web site for the regular application for exemption or non-exempt research application.

Fast-Track Survey / Interview IRB Application
FOR APPROVAL OF EXEMPT HUMAN SUBJECTS RESEARCH (Category b-2)

4. FACULTY/STAFF MEMBER CERTIFICATION OF FAST-TRACK APPLICATION: This form may only be submitted by a full-time faculty or staff member of the University of Dayton. This form must be submitted, along with the Invitation to Participate/Information Sheet, and list of survey/interview questions for this study, by e-mail to IRB@udayton.edu prior to any data collection. By submitting this form via e-mail to the IRB, the faculty/staff member is certifying that the above information has been reviewed and is true to the best of your knowledge. The person signing/submitting this form accepts responsibility for the protection of the human subjects recruited to this research study, and for the ethical conduct of this research.

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INVITATION TO PARTICIPATE IN RESEARCH

Surveys and Interviews

Research Project Title: A Phenomenological Study of Secondary Teachers’ Experiences with Assessing Higher Order Thinking Skills.

You have been asked to participate in a research project conducted by Rachael Miser from the University of Dayton, in the Department of Educational Leadership.

The purpose of the project is to explore the experiences teachers have with assessing higher order thinking skills in the secondary classroom.

You should read the information below, and ask questions about anything you do not understand, before deciding whether to participate.

• Your participation in this research is voluntary. You have the right not to answer any question and to stop participating at any time for any reason. Answering the questions will take about 30-45 minutes.

• You will not be compensated for your participation.

• All the information you tell us will be confidential.

• If this is a recorded interview, only the researcher and faculty advisor will have access to the recording and it will be kept in a secure place.

• If this is a written or online survey, only the researcher and faculty advisor will have access to your responses. If you are participating in an online survey: We will not collect identifying information, but we cannot guarantee the security of the computer you use or the security of data transfer between that computer and our data collection point. We urge you to consider this carefully when responding to these questions.

• I understand that I am ONLY eligible to participate if I am over the age of 18.
Please contact the following investigators with any questions or concerns:

_Name of Student, University of Dayton E-mail Address, Phone Number:_ Rachael Miser, miserr2@udayton.edu, 614-943-1918

_Name of Faculty Supervisor, University of Dayton E-mail Address, Phone Number:_ Dr. Carolyn Ridenour, cridenour1@udayton.edu, 937-229-3308

If you feel you have been treated unfairly, or you have questions regarding your rights as a research participant, you may contact Candise Powell, J.D., Chair of the Institutional Review Board at the University of Dayton, IRB@udayton.edu; Phone: (937) 229-3515.
APPENDIX E

INVITATION TO PARTICIPATE IN A DOCTORAL RESEARCH STUDY

Subject: Participation in a Doctoral Research Study

Dear ________________,

My name is Rachael Miser. I am a doctoral student at the University of Dayton pursuing a PhD in Educational Leadership. I am conducting data collection to complete the research for my dissertation entitled: *A Phenomenological Study of Secondary Teachers’ Experiences with Assessing Higher Order Thinking Skills*.

I am inviting you to participate in this study of the experiences teachers encounter in reference to the assessment of higher order thinking skills in the secondary classroom. You were selected to receive an invitation because your school uses Ohio’s Learning Standards for guiding curriculum, instruction, and assessment and you are considered a highly effective teacher by your administrators.

For your review, I have attached a copy of the University of Dayton’s IRB Invitation to Participate in Research form. If you have any questions about this form or the study itself, please do not hesitate to contact me at miserr2@udayton.edu or 614-943-1918.

Thank you for taking the time to consider this invitation.
# APPENDIX F
## COGNITIVE RIGOR MATRIX


<table>
<thead>
<tr>
<th>Revised Bloom’s Taxonomy</th>
<th>Webb's DOK Level 1</th>
<th>Webb's DOK Level 2</th>
<th>Webb's DOK Level 3</th>
<th>Webb's DOK Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall &amp; Reproduction</td>
<td>Understand</td>
<td>Apply</td>
<td>Analyze</td>
<td>Evaluate</td>
</tr>
<tr>
<td>COGNITIVE RIGOR MATRIX</td>
<td>COGNITIVE RIGOR MATRIX</td>
<td>COGNITIVE RIGOR MATRIX</td>
<td>COGNITIVE RIGOR MATRIX</td>
<td>COGNITIVE RIGOR MATRIX</td>
</tr>
<tr>
<td>Remember</td>
<td>Recall, observe, list, recognize facts, principles, properties</td>
<td>Recall identify conversations among representations or numbers (e.g., customary and metric measures)</td>
<td>Specify and explain relationships in e.g., non-examples/exceptions, cause-effect</td>
<td>Use concepts to select, create, and evaluate</td>
</tr>
<tr>
<td>Understand</td>
<td>Construct meaning clarify, paraphrase, re-state, summarize, illustrate, give examples, classify, categorize, summarize, generate, infer a logical conclusion (such as an item, event, or process), simplify, explain, formulate, construct models</td>
<td>Evaluate an expression</td>
<td>Solve linear equations</td>
<td>Compare information within or across data sets and tasks</td>
</tr>
<tr>
<td>Apply</td>
<td>Carry out or use a procedure in a given situation, carry out (apply) to a familiar task, or use (apply) an unfamiliar task</td>
<td>Evaluate simple procedures (describe in directions)</td>
<td>Solve linear equations</td>
<td>Compare information within or across data sets and tasks</td>
</tr>
<tr>
<td>Analyze</td>
<td>Break into constituent parts, determine how parts relate, differentiate between relevant/irrelevant, distinguish between, organize, outline, list, coherence, deconstruct</td>
<td>Remove information from a table or graph to answer a question that involves identifying whether specific information is contained in a graphic representation (e.g., graph, chart, diagram)</td>
<td>Compare information within or across data sets and tasks</td>
<td>Use multiple sources of evidence</td>
</tr>
<tr>
<td>Evaluate</td>
<td>Make judgments based on criteria, check, detect, correct, re-organize, or re-fine, judge, critique</td>
<td>Analyze graph to answer a question that involves identifying whether specific information is contained in a graphic representation (e.g., graph, chart, diagram)</td>
<td>Compare information within or across data sets and tasks</td>
<td>Analyze complex abstracted theories</td>
</tr>
<tr>
<td>Create</td>
<td>Generate, organize, re-organize, or re-arrange information, evaluate, hypothesize, design plan, construct, produce</td>
<td>Use a table or graph to answer a question that involves identifying whether specific information is contained in a graphic representation (e.g., graph, chart, diagram)</td>
<td>Use multiple sources of evidence</td>
<td></td>
</tr>
</tbody>
</table>

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