2016

The Role of Real Time Checking for Understanding in the Middle School Classroom

Earl Dalke
Walden University

Walden University

COLLEGE OF EDUCATION

This is to certify that the doctoral study by

Earl Dalke

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Billie Andersson, Committee Chairperson, Education Faculty
Dr. David Falvo, Committee Member, Education Faculty
Dr. Marilyn Robb, University Reviewer, Education Faculty

Chief Academic Officer

Eric Riedel, Ph.D.

Walden University
2016

Abstract

The Role of Real Time Checking for Understanding in the Middle School Classroom

by

Earl D. Dalke

MEd, Southwestern Oklahoma State University, 1992

BA, Southwestern Oklahoma State University, 1991

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Curriculum, Instruction, and Assessment

Walden University

August 2016

Abstract

The purpose of this study was to explore the value teachers give to the process of formative assessment and their experience with the process. This study was conducted at a rural middle school where formative assessment was not effectively used as reflected in state assessment data. The social constructivist framework, which views students as active participants in their own learning, guided this study. Research questions focused on how the teachers participated in and felt about the process of formative assessment. Eleven teachers, all of whom use formative assessment as part of their practice, were purposefully selected for this study. Data sources, including semi-structured interviews, classroom observations, and a questionnaire, provided data about teachers' perceptions of and experiences with the formative assessment process. Data analysis in the form of manual hierarchical coding, including open and axial levels, was performed to identify themes. The key findings were that the formative assessment process was viewed as important, that the effective use of formative assessment varied, depending on whether a skill was being taught or information was being disseminated, and that the refined and deliberate use of the formative assessment process is needed in order to improve student learning. This study and the associated project, a professional learning experience aimed at improving teachers' abilities to use formative assessment, may provide an approach to addressing the individual learning needs of students and, thereby, narrow academic achievement gaps among various subgroups to promote positive social change.

The Role of Real Time Checking for Understanding in the Middle School Classroom

by

Earl D. Dalke

MEd, Southwestern Oklahoma State University, 1992

BA, Southwestern Oklahoma State University, 1991

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Curriculum, Instruction, and Assessment

Walden University

August 2016

Dedication

This work is dedicated to all the students with whom I have had the privilege of sharing the journey of learning over the years. In particular, this study is dedicated to my favorite student and my son, Joshua Dalke, who is my inspiration and biggest source of pride.

Acknowledgments

There are many people who have made significant contributions to my own learning journey that I would like to thank. Dr. Francis Feeley taught me to think as a scholar. Boris and Eugene Tribuloff became my intellectual models. Nadia Tribuloff who was like a sister, mother, and friend to me taught me that kindness is at the heart of social change. Jacob Quinten, as a student, challenged me to be a better teacher. My professors at Walden University taught me the value of the formative assessment process. My Committee Chair, Dr. Billie Andersson, was always helpful and understanding as she guided me through the process of conducting this study. Dr. David Falvo, gave me sound advice while conducting this study. Most importantly, I would like to thank my wife, Rena Dalke, who made countless loving sacrifices and was my support and motivation throughout.

Table of Contents

Section 1: The Problem

Introduction

Although the educational community recognizes the process of formative as an essential component of learning, it is often not effectively used at Crestview Middle School (pseudonym) as reflected in the local public data and reported by the building principal. The purpose of this study was to explore the value teachers at Crestview place on the process of formative assessment as well as their experiences with the formative assessment process. Crestview is a rural middle school located in the mid-south-central part of the United States. The school population of just over 230 students in grades six through eight is approximately divided in thirds between African-Americans, Native Americans, and European-Americans according to a report from the department of education in the state. The region served by Crestview is one with a high poverty rate and has been designated as one of five Promise Zones by the Presidential Administration (The White House, n.d.a.). Promise Zones are the five cities and small regions in the United States determined by the Presidential Administration to be in the most economic need. The federal government partners with these zones to improve economic conditions.

While educators are gaining an understanding of the significance of the formative assessment process, not all educators have embraced this strategy for improving academic performance and closing academic achievement gaps. For teachers to properly facilitate learning, they must continuously gather data regarding student engagement and understanding and use that data in real time to guide students along learning progressions.

Current literature demonstrates a strong link between high quality formative assessment and improved academic achievement (Clark, 2012; Wiliam, 2011).

This study sought to understand the perceptions of teachers at Crestview Middle School regarding the process of formative assessment. This process involves checking for understanding as learning takes place and making adjustments to instruction in real time to maximize student learning. Examining the perceptions of teachers is important because these perceptions influence what and how they choose to teach.

Although educators attribute many negative trends to the era of high stakes accountability in which we find our educational system today, the accountability movement has focused the attention of educators on both the overall efficacy of practice and on the academic achievement gaps that exist. There is a strong association between the proper use of formative assessment as an integral part of instruction and academic achievement (Aylward, 2010; Nolen, 2011). Teachers need to know what students are learning as they progress toward learning targets. Formative data should be collected frequently using feedback loops involving the interaction of all students and the teacher, and then used by the teacher to guide each student to the successful accomplishment of the learning objectives. From the deep understanding of the perceptions of teachers at Crestview about formative assessment gained from this study, I have developed a professional learning strategy aimed at improving overall academic performance while closing academic achievement gaps. The collective societal goal of educating citizens in an equitable manner may be advanced through a better understanding of the use of the formative assessment process to improve academic achievement.

Renowned educator, Madaline Hunter, challenged educators almost 3 decades ago to embed checking for understanding into the standard lesson plan (Younglove, 2011). A desire to reduce the complexity of the process of checking for understanding among educators has allowed testing companies in our current era of high-stakes accountability to supplant the concept of formative assessment to sell educators interim exams incorrectly labeled as formative assessment (Younglove, 2011). The nature of formative assessment in meeting the needs of individual learners and specific groups of learners in real time makes it imperative that teachers construct the assessment prompts. This supplanting has led to the development of a misconception of formative assessment that views the concept as a collection of a certain type of assessment tools. The process of formative assessment is the checking for understanding espoused by Dr. Hunter. This study clarified the definition of the process of formative assessment.

The purpose of this qualitative case study was to explore the process of formative assessment at Crestview Middle School through the perceptions of teacher-participants. Data were collected in order to discover how teachers perceive the role of checking for understanding and adjusting their instruction accordingly as learning experiences progress in real time. This study explored how teachers used the formative assessment process, the value they placed on the process, and the barriers they perceived to exist that limited their use of the process. This study provides an understanding of the process of formative assessment at Crestview as perceived by the teachers at the school.

Definition of the Problem

Academic achievement at Crestview Middle School is relatively low compared to other middle schools in the state. The academic achievement gap between the bottom and upper quartiles at the school is relatively wide. Public data indicate low levels of student engagement in standards-based learning. Student performance on the core curriculum tests at Crestview ranks low among other middle schools in the state in spite of efforts to improve student learning at the school. Formative assessment is used to identify the levels of engagement and understanding of individual students during ongoing learning experiences so that adjustments in instruction can be made in real time to improve learner engagement and understanding. The low level of learner engagement in standards-based learning as reflected in the local public data suggests inconsistent use of effective formative assessment at Crestview. This study provides an understanding of this gap in practice.

Rationale

Evidence of the Problem at the Local Level

Crestview received an "F" rating on the state's A-F Report System for the 2013-2014 School Year. This report system is based on state-mandated subject area assessments. The school's grade has dropped over the past three years, since the implementation of the A-F Report System in the state. In 2011-2012, Crestview earned a "C" and in 2012-2013, a "D". The department of education in the state has designated Crestview as a Focus School for the past two years as a consequence of a significant academic achievement gap between the assessment results of African-American students

compared with the assessment results of the other students at the school. Schools in the state are designated as Focus Schools when one of three subgroups of students performs in the bottom ten percentile on the state-mandated reading and mathematics assessments. In the case of Crestview, this subgroup was African-American students. Crestview earned "F" grades in all subject areas; 59% of the students at the school scored proficient or advanced in reading, 43% scored proficient or advanced in mathematics, 39% scored proficient or advanced in science, and 47% scored proficient or advanced in social studies. The student achievement data from Crestview published as public data by the department of education in the state highlight the need for improvement in instruction of which the proper use of the formative assessment process is a major part.

Enrollment at Crestview in grades six through eight totaled just over 230 students. All teachers at Crestview were considered highly qualified in the subjects they teach by the department of education in the state. The state uses the definition established by the No Child Left Behind Act of 2001 to determine this status. The ethnic breakdown of the student population at the Crestview included: 21.7% African-Americans, 30.3% Native Americans, 45.5% European-Americans, and 2.5% Hispanic-Americans according to a report from the department of education in the state for the 2013-2014 School Year. The poverty rate at Crestview during the 2013-2014 School Year, as measured by students who qualify for free or reduced lunches was 78.7% according to a report from the department of education in the state.

Under the leadership of the building principal, teachers at Crestview Middle School have been engaged in the process of data analysis in an effort to improve

academic achievement. Core curriculum test results for reading and mathematics are displayed on a data wall for analysis. Collaborative efforts to improvement academic achievement are being made using Professional Learning Communities (PLCs). In addition to the strong link shown in the literature connecting the poor use of the formative assessment process with low academic achievement, a personal communication with the building principal revealed additional support for the need to investigate how teachers at Crestview participate in and feel about the process of formative assessment. The building principal identified a connection between the low core curriculum test scores and the limited or improper use of formative assessment as well as other factors.

Formative assessment is a process that shapes instruction. It is not simply a type of assessment instrument (William, 2011). Barriers, such as a lack of training and the pressure to move quickly through the curriculum, often limit the use of formative assessment (Clark, 2012). Best practices focused on improving student achievement include the frequent use of effective formative assessment. Current literature suggests a strong connection between academic achievement and the proper use of the formative assessment process (Brookhart, 2011; Doubet, 2012; Hattie, 2012). The local data showing poor academic performance and the literature demonstrating a strong connection between academic performance and the proper use of formative assessment suggests an inconsistent or improper use of formative assessment at Crestview Middle School.

Evidence of the Problem from the Professional Literature

The successful use of formative assessment requires that teachers choose to use the strategy to improve student learning. Teachers recognize the importance of their own

assessment in making decisions about what and how to teach. In a study by Clarke, Clarke, and Sullivan (2012), teachers rated the results of their own summative assessment as the biggest influence on what they decide to teach. While a great deal of the process of formative assessment happens informally, teachers making a deliberate choice to use the process vary tremendously (Dorn, 2010). Low levels of student engagement resulting in poor academic performance can be attributed to limited use of formative assessment (Clarke, 2012).

Crestview uses a qualitative teacher evaluation instrument that includes three key indicators related to the process of formative assessment. Substantial improvement in average teacher-performance on these three indicators is needed according to the building principal. The building principal stated that a more in-depth investigation of these key indicators would be helpful in providing teachers with professional learning opportunities to narrow the existing achievement gaps while improving overall academic achievement. These indicators of teacher performance include the use of questioning to engage all students, monitoring student progress toward achieving learning objectives, and making adjustments in instruction based on monitoring.

This study was prompted by a need to investigate how teachers participate in and feel about the process of formative assessment at Crestview. This need to investigate the problem is based on three significant pieces of evidence. First, the literature shows a strong correlation between the formative assessment process and academic achievement (Hattie, 2012; William, 2014). Next, the building principal has identified a need to improve the use of the process of formative assessment at the school. Finally, the

building principal has specifically identified a need for the average teacher at Crestview to improve on three key performance indicators directly associated with the process of formative assessment. These indicators include monitoring student progress toward stated objectives, changing instruction based on monitoring, and involving all learners.

The current focus on accountability in education today has resulted in the identification of many concerns that must be addressed. Data from these assessments drive needed reforms. Madaus and Russell (2010) called the paradox of high-stakes testing, "peiragenics (p. 28)," the negative unintended consequences on students, teachers, and schools. We must address the unintended consequences of mandated testing, including the limiting of content and decreasing the attention given to non-tested subjects. It should be noted that a great deal of the negative effects of high-stakes testing have resulted from the stakes and not the tests (Madaus & Russell, 2010). The higher the stakes, the less valid a measure becomes because the focus changes to the measure (Scherer, 2014). Data from state-mandated assessments have been valuable in identifying the need for improved instructional practices, including the use of the formative assessment process.

Data clearly show that academic achievement gaps between various subgroups of students are significant. The gap between the academic performance of European-American students and African-American students has existed relatively unchanged for decades (Templeton, 2011). Efforts that show promise in closing this academic achievement gap are based on data collected through state-mandated testing. Formative assessment improves the engagement and academic achievement of all students, but even

more so for low-performing students (Aylward, 2010). The proper use of the process of formative assessment offers research-based hope that this achievement gap can be closed.

Low level of student engagement is a key factor in poor academic performance (Errey & Wood, 2011). In Errey and Wood's (2011) study, students identified high quality feedback as very important in their engagement. Formative assessment creates meaningful feedback loops that inform the process of learning for both the student and the teacher (Neuman & Roskos, 2012). The process of formative assessment includes the gathering of real time data about the level of engagement of students (Dede, 2011). With this real time data, teachers are able to make adjustments to improve the engagement of all students.

A key facet of the process of formative assessment is the involvement of students in their own learning. A great deal of professional development for teachers should be focused on learning how students learn (Ostashewski, Moisey, & Reid, 2011). Secondary teachers tend to be subject experts rather than pedagogical experts (Ostashewski et al., 2011). A balance between the two is needed to maximize learning. As a process of engaging students in meaningful learning, formative assessment is constructivist pedagogy in action.

Definitions

Educational policies often reflect a misunderstanding of the process of formative assessment (TICCA, 2009). In order to prevent possible misunderstandings of the material presented, definitions related to the process of formative assessment and other aspects of this study are listed below.

Anticipation Guide: A learning strategy and formative data collection technique in which a learner is prompted to voice or record prior knowledge of a topic about to be addressed and his or her expectations for learning about the topic (Conderman & Hedin, 2012).

Assessment for Learning (AfL): Everyday practice in which students and teachers respond to information from dialog, demonstration, and observation to improve ongoing learning (TICCA, 2009).

Chalkboard Splash: A formative data collection technique in which all students respond to a prompt by writing their responses to a prompt on a chalkboard or whiteboard so all students may see them with the purpose of generating a discussion (Himmele & Himmele, 2012).

Collaborative Inquiry: A process in which teachers work together using multiple sources of data to improve student-learning (Love, 2009).

Core Curriculum Tests: Summative assessments of learning mandated by state law in certain subject areas such as math and reading (Matlock, 2013).

Diagnostic Assessment: Testing that identifies preconceptions, lines of reasoning, and learning difficulties (Tweed & Wilkinson, 2012).

Dialogical Education: A learning process involving discourse between student and teacher during which the teacher is able to diagnose the student's needs and provide assistance to advance the student's learning (Sarid, 2012).

Differentiated Instruction: An instructional strategy in which instruction is targeted to each student as an individual, considering his or her strengths, interests, and

styles in order to maximize individual student learning (Dixon, Hardin, McConnell, & Yssel, 2014).

Executive Function: The ability to recognize and control one's own cognitive processes (Desoete & De Weerdt, 2013).

Exit Ticket/Slip: A formative data collection technique in which students respond to a prompt that is typically focused on the closure of a lesson, summarizing the lesson or describing how the knowledge or skills from the lesson may be applied. The completed response becomes the student's ticket out of the classroom (Conderman & Hedi, 2012).

Feedback Loop: A proactive two-way communication system in which teachers collect and analyze data in real time from students to give immediate feedback to improve student learning (Roskos & Neuman, 2012).

Formative Assessment: An interactive measure of learning activities in real time that engages students and informs instruction in such a way that learning is improved for every student (Clark, 2012).

Frayer Diagram: A visual organizer used by a learner to express his or her understanding of a concept. Students provide their own definition of a concept along with facts and examples (Doubet, 2012).

Google Forms: An online program used to create polls, surveys, and quizzes to collect data that can be used in real time to provide an understanding of where a student is along a learning progression (Waters, 2012).

KWL Chart: A chart completed by a learner at the beginning of a learning experience that includes what the learner currently knows about the topic at-hand as well

as his or her expectations of the learning about to take place. After the learning experience, the learner records what he or she has learned about the topic (Buck & Truth-Nare, 2011).

Metacognitive Skills: The ability of an individual to use an understanding of his or her own cognitive processes to advance his or her learning (Eker, 2014).

Muddiest Point Paper: A formative data collection technique which prompts students to describe what they believe they understand the least from a particular lesson so adjustments can be made in instruction to clear up the muddy points (Boboc & Vonderwell, 2013).

One Minute Paper: A formative data collection technique which gives students one minute to quickly respond to a prompt provided by a teacher with the purpose of checking for understanding so adjustments can be made in instruction (Boboc & Vonderwell, 2013).

Personal Response System (Clickers): An electronic tool which provides each learner with a hand-held device to respond to prompts projected for the larger group to view. As the learners respond to each prompt, immediate feedback is given and the responses are recorded for analysis (Ducette, Schiller, Stull, & Varnum, 2010)

RAFT (Role, Audience, Format, Topic): A writing strategy in which a learner assumes a particular role and addresses his or her writing to a particular audience in a particular format about a particular topic (Doubet, 2012).

Response to Intervention (RtI): The process of identifying and serving students who need additional learning experiences in order to reach certain learning targets (Matlock, 2013).

Scaffolding: The intervention, instruction, and guidance provided by a teacher to help a student advance along a learning progression (Bondi & Wiles, 2011).

Social Constructivism: A student-centered view of learning in which learners construct meaning from their experiences that become authentic to them (Splitter, 2009).

Socratic Questioning: Thought-provoking discourse between a student and a teacher focused on the development of reasoning and problem-solving (Sarid, 2012).

Standards-Based Learning: The practice of basing learning activities on the accomplishment of established common standards upon which assessments are derived (Killion & Roy, 2009).

Summative Assessment: A measure of the accomplishment of established standards used to evaluate learning in students and for school accountability purposes (Clark, 2012).

Three-Color Quiz: A learning and formative data collection technique in which students first respond to quiz questions on their own in black ink; then collaborate with others to make corrections in green ink; and then consult resource materials to make further corrections in blue ink (Danielson, Fluckiger, Pasco, & Vigil, 2010).

Think-Pair-Share: An engagement technique in which a learner is given a prompt and then (a) considers the prompt independently, (b) discusses the prompt with a partner,

and then (c) shares the ideas and thoughts generated from the process with the larger group (Buck & Truth-Nare, 2011).

Visual Formative Assessment (VFA): Visual images used by a learner to demonstrate his or her understanding about a particular concept (Aylward, 2010).

Voki: An online program in which learners make avatars that are used to demonstrate an understanding of a particular topic (Waters, 2012).

Significance

Gaining an understanding of the perceptions of teachers at Crestview Middle School regarding the role of the process of formative assessment has improved an understanding of the variation in the level of student engagement in standards-based learning that results in overall poor academic achievement and in academic achievement gaps. The local core curriculum test results provided the primary data needed to identify the problem of a lack of proper engagement and a variation of the level of engagement among the students at Crestview in standards-based learning. The Overall 2014 Performance Index, combining all assessment data, was 49% according to a report from the department of education in the state. The Overall Performance Index combines the average subject area scores into one score to be used on the A-F Report Card. The 2014 Bottom Quartile Student Growth Performance Index was 54%. The Bottom Quartile Student Growth Performance Index is a comparative measure showing growth within the bottom quartile cohort between the two most recent years. These data show most students at Crestview are not mastering the tested objectives and the bottom quartile of students is not progressing toward mastery at an acceptable rate.

A review of the literature indicates a gap in research regarding the perceptions of middle school teachers about the process of formative assessment. This study first offers an understanding of how teachers check for understanding as lessons progress. Next, this study demonstrates how teachers adjust their practice based on checking for understanding. This study shows what formative assessment techniques teachers use. Finally, this study identifies barriers teachers perceive to exist that limit the use of formative assessment.

The potential of formative assessment to improve learning depends on educators developing a better understanding of the process. Scherer (2014) stated that, "The teacher needs to practice the assessor's art: find out what students know and can do – and lead each to the next step upward" (p. 7) This process of leading students to the next step fits well with the social constructivist framework, which views teachers as guides to the learning process (Splitter, 2009). Teachers must be able to develop and use multiple ways of gathering data from students about their thinking (Scherer, 2014). While summative assessments, including state-mandated testing, provide valuable data, the formative assessment process has more potential to improve learning than high-stakes testing (Scherer, 2014). Adding to the understanding of the proper use of the formative assessment process is the intent of this study.

Research Questions

Educators at Crestview Middle School are struggling to improve student learning. Through collaborative inquiry and action, teachers and administrators at Crestview are using student data to develop strategies to increase summative assessment performance.

While the structure for improvement is in place, the process appears not to have yet identified improvement in the use of formative assessment as a specific strategy for improving student learning. Research suggests that the proper use of formative assessment has great potential for improving student learning (Bakula, 2010; Nolen, 2011).

The phenomenon under inquiry in this study guided the development of the overall research question and sub questions as suggested by Yin (2014). As Merriam (2009) recommended, an open-ended structure was used in developing these research questions to enhance the exploratory nature of the case study methodology and the inductive approach of qualitative research in general. These research questions were designed to achieve an alignment between the insight gained through inquiry and the suggested improvements in teaching strategies to be accomplished through a professional learning experience. The overall research question and sub-questions that determined the purpose of this project study are:

How do classroom teachers at Crestview Middle School participate in and feel about the process of formative assessment?

1. How do the teacher-participants use the process of formative assessment as a part of their practice?
2. How do the teacher-participants feel about the process of formative assessment as a part of their practice?
3. How do perceived barriers affect the use of the process of formative assessment in the practice of the teacher-participants?

Review of the Literature

Formative assessment is a process embedded in the progression of learning. It involves measuring the engagement of students and making adjustments in the facilitation of learning to maximize the acquisition of knowledge and skills as learning takes place. This process guides students through learning progressions and helps them develop cognitive skills (Boboc & Vonderwell, 2013). The literature about the efficacy of formative assessment as a tool to advance learning is significant. Hattie (2012) synthesized meta-analyses of studies related to student achievement and found that strategies associated with the process of formative assessment have among the highest effect sizes of any strategies studied. Student to teacher feedback had an effect size of 0.73; formative evaluation of programs had an effect size of 0.90; and questioning had an effect size of 0.46 (Hattie, 2012). A great deal of variability in effect size exists related to content areas (Briggs, Furtak, Ruiz-Primo, Shepard, & Yin, 2012). A review of the literature has yielded (a) a working definition of the process of formative assessment, (b) its relationship to summative assessment, (c) a description of the tools used in the process, (d) context issues, (e) design, (f) barriers, and (g) its impact beyond content and process learning.

This review of the literature concentrated on the process of formative assessment as it fits into the social constructivist framework. Literature searches were made to outline the associative foundational work, to define the formative assessment process, to identify the relationship among various modes of assessment, and to discover which formative assessment instruments are typically used in teacher practice. These searches

of the literature (a) provided an understanding of the elements of the formative assessment process including feedback and questioning techniques, (b) explored the variations in the use of the formative assessment process, (c) identified the barriers to the proper use of the formative assessment process. Saturation was reached as additional searches yielded little new information related to the process of formative assessment. These online literature searches used EBSCO Host and a variety of databases including ERIC and Educational Research Complete. Search terms used included: *formative assessment, formative assessment tools, the formative assessment process, formative assessment barriers, students with special needs and formative assessment, differentiation, self-directed learning, questioning techniques, feedback, feedback loops,* and *social constructivism*. In examining the foundational work related to formative assessment and the social constructivist framework, a few secondary print sources were used. Most of the primary source articles used were peer-reviewed and were written within the past 5 years.

While other studies have explored teacher perceptions of the use of specific formative assessment tools, this study explores perceptions of the overall process of formative assessment. A study done by Beckett and Volante (2011), targeting two school districts in Canada, investigated the perceptions of teachers about the use of formative assessment and suggested that similar studies be done in other contexts. The purposeful sample used in the Beckett and Volante (2011) study was made up of teachers chosen by their schools to take part in the study based on their interest in assessment. The districts in the Beckett and Volante (2011) study had undergone initiatives focused on the use of

formative assessment. The Beckett and Volante (2011) study was limited to the examination of a few significant techniques associated with formative assessment. The study site of this study is substantially different from the districts used in the earlier study and has yielded data that is significantly different. This study goes beyond looking at only a few techniques to include an examination of the larger process of formative assessment. It explored participant perceptions of the elements of the formative assessment process, including questioning and feedback, as well as the differentiation among subject areas and the perceived barriers preventing the effective use of the formative assessment process in improving student learning. By doing so, this study provides a more comprehensive understanding of teacher perceptions of the process of formative assessment.

Conceptual Framework

The process of formative assessment fits well within the social constructivist framework. The framework purports that students form meaning from their experiences (Jackson, 2009). Elements of constructivism, such as dialogical education and techniques such as Socratic questioning, can be part of the formative assessment process (Sarid, 2012). Gathering, analyzing, and using formative data to make adjustments in learning experiences require dialog. This dialog may be between a student and a teacher, between students, or may even be an inner dialog as students become self-directed learners, reflecting on their own progress toward a learning target. At its best, the process of formative assessment involves a teacher as a witness and a guide to the construction of meaning going on within every student.

Constructivism views students as active players in their own education (Bondi & Wiles, 2011). A constructivist view encourages the development of a mastery orientation in students as well as metacognitive skills that improve the ability to apply learning to novel situations (Doige, 2012). Formative assessment measures and reacts to the degree to which learners are engaged in the process of learning. Highly effective formative assessment monitors and guides the process of cognition. In this respect, formative assessment encourages higher order thinking and differentiation in the products of cognition.

An authentic examination of the process of formative assessment should include the role of technology. The use of technology in learning correlates well with the constructionist framework (Grabel, Overbay, Patterson, & Vasu, 2010). In our current era of high-stakes testing, teachers often feel pressure to use technology in ways that are not centered on students (Grabel et al., 2010). The constructivist view works against this tendency in order to focus efforts on active learning. Formative assessment is a key part of this process, checking for understanding and facilitating adjustments in real time. Technology should be used in such a way that it engages students and leads them into critical thinking about the subject matter (Grabel et al., 2010). Formative assessment is used to measure the ongoing level of engagement to ensure progress is being made toward learning goals.

When examining learning from a constructivist framework, it is important to consider effective associative instructional methodologies. Collaborative project-based learning (CPBL) is an instructional strategy that fits ideally within the constructivist

framework in that it is a student-centered approach to learning. A study conducted by Chen, Hernandez, and Dong (2015) found that learning outcomes were achieved at higher rates using CPBL. In addition, this study found that the CPBL process significantly enhanced the self-efficacy of students. Constructivist strategies such as CPBL positively affect future self-directed learning by instilling confidence in students about their own learning abilities.

Academic learning is a voluntary behavior. Students choose whether or not they will participate in a learning experience. When students know that their ideas and previous experiences are part of the development of their own knowledge, they tend to choose to engage in the advancement of that knowledge (Splitter, 2009). By allowing students to make choices, students see themselves as authentic participants in the learning process. The proper use of formative assessment must include allowing students to make choices. The formative assessment process is complex in that if goes beyond the product of learning to include the process of learning. A constructivist-oriented classroom is a community of inquiry (Splitter, 2009). The formative assessment process provides instructors and learners with feedback related to the quality of engagement. It facilitates improved engagement as learning takes place.

Although the overall concept of the formative assessment process fits best into the constructivist framework, elements of the process are often utilized effectively in teacher-centered strategies such as direct instruction as well (Belcher & Lowe, 2012). Direct instruction uses lectures, demonstrations, and testing to disseminate content from teacher and text to students. It rejects inquiry-based learning and student-centered approaches.

In high-stakes testing environments, discovery, exploration, and self-directed learning are used less frequently than rote rehearsal of tested content and test preparation. Formative assessment may be frequently used in direct instruction to measure the degree to which students have learned the content so adjustments can be made to increase content knowledge acquisition.

Foundational Work

Although formative assessment has always been an essential element of the process of learning, a great deal of the literature identifies the writings of Black and Wiliam as the seminal work related to the modern concept of formative assessment (Brookhart, 2011; Buck & Trauth-Nare, 2011; Dorn, 2010). A guiding belief in the work of Black and Wiliam (1998) was that assessment profoundly influences motivation and self-esteem. According to Black and Wiliam, assessment is formative when data about learning is gathered, analyzed, and used by instructors and students to guide progression toward a learning goal (Brookhart, 2011). The process of formative assessment can be described as a feedback loop involving the interaction of a teacher and students to move students forward along a learning progression (Neuman & Roskos, 2012). The crucial element that makes data formative is using the data in real time to make adjustments in learning experiences to advance students toward a learning target.

The works of Dewey and Vygotsky contributed a great deal to the elements that make up the modern concept of formative assessment within the social constructivist framework (Clark, 2012; Crossouard & Pryor, 2012; Neuman & Roskos, 2012). Dewey believed that teaching students to think for themselves and to learn on their own should

be the major focus of schooling (Crossourd & Pryor, 2012). Formative assessment includes the development of metacognitive skills through self-assessment (Roskos & Neuman, 2012). The interaction that occurs in Vygotsky's Zone of Proximal Development (ZPD) includes the formative assessment process (Corssouard & Pryor, 2012). Learning takes place within this zone as a more knowledgeable other (teacher) provides scaffolding (supports) for a student to reach incremental learning targets. As the student is able to accomplish incremental learning targets working toward the overall learning targets, the scaffolding is removed. The formative assessment process is the interaction that occurs between the teacher and student that informs both the teacher and the student as to the need for particular scaffolding and when the scaffolding may be removed (Clark, 2012). While this foundational work has helped to generate widespread belief in the efficacy of formative assessment, there remains a persistent gap between theory and consistent classroom practice.

Process of Formative Assessment Defined

The Third International Conference on Classroom Assessment (TICCA) in 2009 built on the work of Black and Wiliam (1998) to formulate a working definition of the formative assessment process: "Assessment for learning is part of everyday practice by students, teachers, and peers that seeks, reflects upon, and responds to information from dialogue, demonstration, and observation in ways that enhance ongoing learning" (TICCA, 2009, P. 2). Seeking, reflecting, and responding to learning activities collectively forms the process of formative assessment. Aylward (2010) wrote that formative assessment, "flavors the instruction" (p. 41). It is naturally embedded in in the

learning process (Clark, 2012). Formative assessment and data-driven instructional decision-making go hand-in-hand as tools used to continually improve student learning (Dorn, 2010).

Formative assessment is assessment for learning (Buck & Trauth-Nare, 2011). Its efficacy with low achieving students is even more significant than with other students (Aylward, 2010). Low achievement is typically associated with a lack of engagement in learning (Busby, Stork, & Smith, 2014). The formative assessment process measures and responds to this lack of engagement, helping each student to make continual progress toward learning targets. Low achievement is also often associated with limited metacognitive skills (Kim & Ryu, 2013). Properly used, the formative assessment process fosters an awareness of one's own learning and develops metacognitive skills. Identifying where each individual student is in relation to the learning goals and providing the scaffolding needed for each student to reach those goals is crucial to differentiation (Doubet, 2012). Differentiation is the process of providing learning experiences for students based on their individual learning needs.

Responses to Intervention (RtI) efforts also depend on the formative assessment process in much the same way as differentiation does (Dorn, 2010). In the process of RtI, students who need additional instruction to reach a learning target are identified and provided with that additional instruction (Matlock, 2013). Fisher and Frey (2011) explained the process as one that includes, "feed-up, feedback, and feed-forward" (p. 26). Feed-up includes establishing the purpose of learning in the minds of students; feedback involves the scaffolding of understanding, and feed-forward informs the teacher so

ongoing adjustments can be made (Fisher & Frey, 2011). This working definition of the process of formative assessment made it possible to properly study the perceptions of the participants at Crestview Middle School concerning the phenomenon.

The Relationship between Formative and Summative Assessment

Alonzo (2011) asserted that summative assessment and formative assessment can be in tension with each other, but should be coordinated so they support each other. Summative assessment is typically used to quantitatively measure the efficacy of formative assessment. Ducette et al. (2011) used the variation in summative assessment scores between the experimental and control groups in studies of four different formative assessment efforts. While it is true that the efficacy of formative assessment is often measured by summative assessments, it should be noted that formative assessment does more than increase summative assessment scores; it fosters a deeper understanding and the development of metacognitive skills and self-directed learning (Bakula, 2010). Summative assessment can be used as formative assessment when it is used to inform ongoing instruction (Beckett & Volante, 2011). Both formative and summative assessments inform instruction and the curriculum (Boboc & Vonderwell, 2013). This study examines the views of teachers at Crestview Middle School regarding conflicts teachers may see between formative and summative assessment, ways in which they may use summative assessment for formative purposes, and other benefits and drawbacks teachers may have noted about formative assessment.

Formative Assessment Tools

Teachers need to be provided with high quality formative assessment tools and strategies as a means for them to embrace the process (Jenkins, 2010). To understand the formative assessment process, it is necessary to know how the tools of the process are used. When looking at formative assessment as a process, it becomes important to look at the tools used to determine where students are at the beginning of a learning experience, sometimes referred to as diagnostic assessment. Buck and Trauth-Nare (2011) suggested the use of KWL charts and think-pair-share activities as ways of determining the current knowledge of students. KWL charts give students the opportunity to consider their current knowledge about a topic, what their expectations of a learning experience are, and then after the experience, what they have learned (Buck & Trauth-Nare, 2011). Think-pair-share activities give students the opportunity to engage in student-to-student discourse as a way to enhance their ability to express their current understanding about a concept (Buck & Trauth-Nare, 2011). Using think-pair-share, students engage in thought about a given prompt or problem in three stages: (a) think independently about the prompt, developing their own ideas (b) pair with another student to discuss their ideas; and (c) share their ideas with the larger group.

Doubet (2012) identified several creative tools used to check for understanding in real time, including Role, Audience, Format, Topic (RAFT) writing and Frayer diagrams. RAFT writing involves students assuming a particular role to write about a topic in a given format to a particular audience. For example, the learner may assume the role of the U.S. President in writing a speech delivered to a business group about social justice.

The product of a RAFT becomes valuable formative data that a peer or teacher can analyze to determine a learner's current level of knowledge about the topic at-hand in order to develop strategies to move the student forward along the learning progression. Frayer diagrams allow students to demonstrate knowledge of a concept by defining the concept and providing facts about and examples of the concept. A Frayer diagram, like a RAFT, can be used as data to inform instruction in real time. The process of formative assessment focuses engagement. By adding interesting and creative techniques such as RAFTs and Frayer diagrams, engagement is enhanced even further.

Aylward (2010) described what he called visual formative assessments (VFA). This creative way for learners to demonstrate their understanding about a topic was shown to be effective in helping elementary level students grasp science concepts and applications (Aylward, 2010). VFAs were developed by Aylward as a way to quickly collect, analyze, and respond to formative data. VFAs are simple visual images used by students to demonstrate their level of understanding about an ongoing lesson. Concept cartoons and student drawings can be used effectively as formative assessment tools for teachers to learn about student-misconceptions and where students are on progressions toward learning targets (Chin & Teou, 2010). Visual representations such as VFAs, concept cartoons, and student drawings provide excellent formative data upon which adjustments in instruction can be made to foster increased engagement and to move each student along a learning progression toward the learning target.

Educational technology, such as personal response systems (clickers), can be used effectively in the formative assessment process (Ducette et al., 2011). Electronic clicker

systems include individual handheld devices for each student, software to select or create prompts, and a means to project the prompts to which students respond. Each student responds to every prompt and the responses are recorded. Students are given immediate feedback that ideally includes discourse about why a particular response was correct or incorrect. Unlike typical question-and-answer sessions, clickers engage all students in every prompt. Clickers have been shown to be helpful for students with attention deficit hyperactivity disorder (ADHD) (Ducette et al., 2011). Student response systems can be high tech or low tech such as the use of individual dry-erase boards (Wiliam, 2014). A common flaw with student response systems is that teachers often fail to make adjustments based on the data collected (Waters, 2012).

More complex online tools do a better job of involving students in their own learning and in developing meta-cognitive skills (Waters, 2012). Using *Voki* to create avatars, students can analyze their own progress in developing language skills. *Google Forms* allow the creation of questionnaires and surveys with just-in-time scoring. Social media tools allow student-to-student dialog. When multimedia presentations are used, formative assessment should be embedded to engage students in thought and reflection about the material (Curtis, Derksen, & Roscoe, 2013). Simply presenting information without engaging students with the information limits the ability of students to focus on the information. Technology often makes assessment more convenient. It must be noted, though as Wiggins (2012) wrote, "It is the pedagogy that matters, not the technology" (p. 80).

Boboc and Vonderwell (2013) described the use of the formative assessment process in online learning. As our society embraces both online learning and blended learning, an understanding of how formative assessment tools are used in these contexts is needed. As with most schools today, Crestview Middle School provides online learning opportunities for students. Formative assessment prompts provided online can serve a valuable purpose, providing timely individualized opportunities to think and reflect in a low-risk environment (Doige, 2012). They also allow instructors necessary time to respond thoughtfully to clear up misconceptions and move students forward toward the learning target. Discussion posts, blogs, and emailed formative assessment prompts allow learners necessary reflection time that face-to-face questioning often does not.

Many formative assessment tools used in brick-and-mortar schools can also be used in online schooling. Some examples of formative assessment tools that work well in an online environment include student writings such as journaling, reflective papers, one minute papers, muddiest point papers, as well as role playing, and question walls (Boboc & Vonderwell, 2013). Instructors can collect various forms of student writings as formative data to give feedback and make adjustments in instruction. Role playing activities provide creative and engaging opportunities for students to apply the knowledge and skills being developed. These activities provide instructors with data, often associated with higher-order thinking about the knowledge and skills being developed. Question walls allow students to initiate discussions about the concepts they do not fully understand, engaging them and their peers in self-directed learning that

fosters the improvement of metacognitive skills. This study includes an exploration of the formative assessment tools used by the teachers at Crestview Middle School as well as the views of the teachers regarding the importance and efficacy in learning of these various tools.

Formative data should be collected and used to advance three aspects of learning, including process, progress, and product (Danielson et al., 2010). Various assessment tools lend themselves to assessing these aspects of learning better than others. Three-color quizzes can be used to analyze process involving the synthesis of various sources (Danielson et al., 2010). Three-color quizzes are completed in three phases: (a) students first respond to quiz questions on their own from memory; (b) they then collaborate with others to make corrections in green ink; (c) finally, they consult sources such as textbooks to make additional corrections in blue ink. One-on-one student conferences in which focused discourse takes place between learner and teacher provide an opportunity for a detailed analysis of progress with the goal of advancing learning (Danielson et al., 2010). The ungraded feedback given to a student over a project in-process is an example of the use of formative assessment focused on the product of learning (Nolen, 2011).

As lessons progress, the type of formative assessment tools should vary. Before instruction begins, anticipation guides may be used (Conderman & Hedin, 2012). An anticipation guide involves a student voicing or recording his or her prior knowledge associated with a topic about to be addressed and his or her expectations for learning about the topic. During instruction, dry erase board may be used (Conderman & Hedin, 2012). Dry erase boards are a low-tech version of personal response systems in which

every student responds to prompts by writing their responses on individual dry erase boards and holding them up so the teacher and other students can see them. Another good formative assessment tool used during instruction is a chalkboard splash during which total participation is achieved by having all students respond to a prompt on the chalkboard at the same time (Himmele & Himmele, 2012). After instruction, exit tickets may be used (Conderman & Hedin, 2012). Exit tickets are used as a closure activity in which students respond to a prompt in writing summarizing the lesson or demonstrating how the lesson can be applied. The product is then used as a ticket out of the classroom.

The formative assessment process in the context of social constructivism involves students as active participants (Doige, 2012). Students should be encouraged to reflect on their own learning as it takes place and to ask questions of each other and of the teacher to guide themselves toward the learning target. Learning targets should be made clear to students as lessons are initiated. Students should be involved in the construction of formative assessment tools. Student-made questions are excellent formative assessment tools (Babri, Kippers, Papinczak, Peterson, & Wilkinson, 2011). They provide both formative data upon which a teacher may act as well as a tool that can be used to collect formative data from other students. Writing to learn is an example of formative assessment at its best (Rider-Bertrand, 2012). An example of writing to learn used as a formative assessment tool is a carefully designed notebook in which students record observations, questions, reflections, and predictions. Such writing to learn activities allow students to construct meaning and deepen their understanding of concepts

(Rider-Betrand, 2012). The notebooks can be used as sources of formative data to make adjustments in the learning experience.

The 5E Instructional Model, based on five phases of learning, is widely used in the development of curriculum materials and as an instructional sequence model (Creghan & Creghan, 2013). Various formative assessment tools fit with the respective parts of the 5E Instructional Model. In the engage phase, during which prior knowledge is assessed and curiosity about the upcoming lesson is elicited, having students list the top five ideas they have about the topic works well (Creghan & Creghan, 2013). In the explore phase, during which conceptual change is facilitated through investigation, a checklist to verify rather or not students are on track can be used (Creghan & Creghan, 2013). In the explain phase, during which understanding is demonstrated, thoughtful questioning will provide formative data (Creghan & Creghan, 2013). In the elaborate phase, during which a deeper and broader understanding is developed, it is important to differentiate based on formative data obtained from the previous phases (Creghan & Creghan, 2013). In the evaluate phase, during which progress toward the overall goals is assessed, students should do a self-reflection of their learning (Creghan & Creghan, 2013).

Feedback

Teachers giving proper feedback to students, upon which students act to improve their learning and advance toward a learning target, is a key element of the process of formative assessment. According to Duckor (2014), "feedback must be timely, specific, addressable, ongoing, and content-rich" (p. 28). High quality feedback is focused on the

learning target, is given while learning is taking place, considers incomplete knowledge, fosters student-thinking, and is actionable (Chappuis, 2012). Because students may be unfamiliar with the formative assessment process, they should be told what is going to take place and why it is happening (Duckor, 2014). In a constructivist environment, students must be actively involved in the formative assessment process.

Various formative assessment techniques help provide timely feedback. Polling technologies reduce the feedback gap, improving metacognitive reflection (Magana & Marzano, 2014). The technology gives immediate feedback upon which students may act, avoiding the lag time needed for a teacher to respond to each individual student. In addition to student response systems, tools such as *Poll Everywhere* can be used. With this tool, teachers create prompts to which students respond using mobile devices such as smart phones (Grandgenett, 2012).

Students must first know the learning targets (Chappuis, 2012). If students think that completing an assignment is the goal, responding to feedback will seem like additional unnecessary work. The most effective feedback includes both strengths and information to guide improvement (Chappuis, 2012). Empty praise provides no actionable information to students and, therefore, no guidance to improve learning. Misconceptions should be identified so they can be corrected (Chappuis, 2014).

Teachers giving feedback to students without including grade marks is controversial. However, research suggests that it is an effective formative assessment tool (Beckett & Volante, 2011). While the participants in Beckett and Volante's (2011) study placed a high value on the technique of feedback without grades, there was a

significant amount of associative tension among secondary teachers in the study. Punitive grading systems decrease the value of feedback (Nolen, 2011). When grades are included along with feedback, students tend to look at the grades and ignore the feedback. When formative assessment that is supposed to focus on improvement is used as summative assessment, the purpose of formative assessment is undercut (Nolen, 2011). Nolen's (2011) study suggested that informative feedback without grade marks is more motivating than feedback which includes grade marks. Feedback without grades was shown to increase persistence as well (Nolen, 2011). Chappuis (2014) stated that, "trying shouldn't result in the punishment of a low grade assigned too soon" (p. 21).

It needs to be noted that detailed and specific feedback is far more important when learning new problem-solving strategies and can actually harm the problem-solving process in students who have developed appropriate problem-solving skills (Fyfe & Rittle-Johnson, 2016). As metacognitive skills are developed in students, external feedback is replaced by internal feedback and learning becomes more self-directed. The most effective teachers are those that gather significant data on students as individuals and differentiate their approaches with each student based on the analysis of these data. Summative feedback may serve the needs of students who have at least some past success with a task better. When students have not previously mastered a task, feedback becomes more important.

Questioning

Questioning is the most common and most recognized tool used to check for student understanding so that adjustments can be made in ongoing learning. The qualities

of questioning techniques vary. For example, some teachers use wait time to allow students to think before they respond and others simply answer their own questions or value only the exact right and quick answers (Clark, 2012). Nolen (2011) explored the perceptions of students regarding questioning and emphasized that students determine what they believe is important from assessments like questioning. Even younger children can tell the difference between formative questioning or what they may call "helping questions" and summative questioning or what they may call "testing questions" (Nolen, 2011). Good questions size up the context for learning, are focused on the learning targets, and are ideally related to larger essential questions (Duckor, 2014). Teachers should plan for and ask questions at different levels – basic, proficient, and advanced (Magana & Marzano, 2014).

The standard classroom transaction model in which the teacher asks questions and chooses those with raised hands to respond limits participation and discourages student engagement (Wiliam, 2014). This model fosters both the Matthew Effect and the Multiplier Effect (Wiliam, 2014). The Matthew Effect in education suggests that students who start out well continue to do well and those who do not typically do not catch up. When questions are frequently posed only to those students who raise their hands, other students tend to become disengaged and fall behind. The Multiplier Effect refers to the tendency of those who are successful at something at first compared with others attempting the task to work harder at improving their abilities. By frequently posing questions only to those students who raise their hands, teachers encourage future engagement of those students who begin well and discourage future engagement of those

students who do not begin well. Those students who choose to participate or are more capable of participating at first continue to be the chief participants in and benefactors of the learning model while others fall farther and farther behind (Wiliam, 2014). This traditional classroom model should be rejected in favor of techniques such as "no hands up." Using this technique, students who typically do not volunteer must participate and, therefore, learn because the teacher calls on them (Wiliam, 2014). Teachers should plan questioning, considering learning targets, common misconceptions, and the learning progressions of individual students (Wiliam, 2014). Questioning should go beyond a simple question-and-answer format to include probes that encourage meaningful dialog (Bulunuz, Bulunuz, & Peker, 2014).

The types of questions used affect student engagement and progression toward a learning target. Marshall and Smart's (2012) study showed positive correlations between student engagement levels and certain aspects of questioning including questioning level, complexity of questions, and questioning ecology. The teacher-participants in the Marshall and Smart (2102) study who asked more higher-order questions elicited higher levels of cognitive engagement among students, while the teacher-participants who asked more lower-level questions elicited lower levels of cognitive engagement among students. The teachers in the study who focused more on evidence and reason elicited higher levels of cognitive engagement among students, while the teachers who focused more on the correct answers elicited lower levels of cognitive engagement among students. The teachers in the study who typically required students to explain phenomenon elicited higher levels of cognitive engagement among students, while

teachers in the study who typically explained phenomenon themselves elicited lower levels of cognitive engagement among students. In making the transition from using mostly lower order questioning to higher order is not a simple task for students and teachers. Peterson and Taylor (2012) suggested that such an effort requires collaboration, the involvement of internal and external expertise, and persistence.

Not only do many teachers need to make the transition to higher order questioning, but also to multimedia-rich modes of questioning in order to provide authentic learning experiences for today's digital students. There are many ways in which teachers can utilize technology to involve students in discourse that yields formative data including virtual reality, blogs, and online discussions (Adams, 2012). One teacher in Adams' (2012) study had her students engage each other in conversation using course content vocabulary in an online virtual world. Teachers can use blogs to engage students in collaborative online discussions related to the given course of study. Teachers can facilitate online discussions that go far beyond instant messaging and texting to engage students in meaningful discourse. Technology-based questioning provides both a source of formative data and an opportunity for teachers and peers to guide students toward particular learning targets.

Context Issues Related to Formative Assessment

For formative assessment to be successful, it must be embedded in a culture of learning orientation (Neuman & Roskos, 2012). The culture has to support the idea that ability is not fixed. The idea that educators might believe that ability cannot be improved through learning experiences may seem absurd, but it is somewhat prevalent in

discussions of subjects such as advanced mathematics. A belief that ability is fixed is counter to valuing equity in education. Within the proper context, formative assessment can be what Neuman and Roskos (2012) called a "gap minder" (p. 535). The process of formative assessment closes the gap between current knowledge and skills and target knowledge and skills. This study examines the context of Crestview Middle School and relates the context to the process of formative assessment.

Formative Assessment Design

Formative assessment can be seen as an independent inductive loop (Dorn, 2010). The process of formative assessment seeks to find evidence of where each student is in relation to learning targets as learning takes place and to use the evidence to modify the learning experiences in such a way that all students reach the learning target. The process of design is complex and context dependent (Nolen, 2011). Because of the nature of formative assessment, teachers must engage in significant focused professional learning to develop the necessary adaptive expertise to design or select formative assessment strategies and embed these strategies in the learning experiences teachers provide for students (Clark, 2012; Doubet, 2012). This professional learning needs to be collaborative and ongoing (Nolen, 2011). Learning progressions are a good frame for formative assessment design (Alonzo, 2011). By breaking down the learning process and looking at the learning target first, evaluating current knowledge, and then identifying the steps needed to reach the target, teachers can more easily connect assessment tools to each progression. One systematic technique that can be used to break down the learning

process is Reciprocal Teaching (RT) in which sequential strategies are used to improve reading comprehension (Meyer, 2014).

Impact beyond Content and Process Learning

Students should be appropriately involved in the design of formative assessment (Brookhart, 2011; Jenkins, 2010). This exemplifies the connection between the formative assessment process and social constructivism. The formative assessment process reaches its ultimate utility when students gather and use formative data about their own progress toward learning targets (Beckett & Volante, 2011; Boboc & Vonderwell, 2013; Brookhart, 2011; Buck & Trauth-Nare; Neuman & Roskos, 2012). As formative assessment is often called "assessment for learning," self-assessment can be seen as "assessment as learning" (Beckett & Volante, 2011, p. 240). Students need to have a measure of autonomy concerning their own learning (Brookhart, 2011). To begin to do so, students must know the learning targets (Bakula, 2010). Students must be taught how to engage in self-assessment and given the tools to do so.

The benefits of teaching students to self-assess go beyond improving academic achievement. Assessment affects motivation and self-esteem (Clark, 2012; Nolen, 2011). By giving students tools to honestly self-assess, educators are giving students the wherewithal to build positive self-esteem and to motivate achievement in all areas of life now and in the future. By fostering improved problem-solving skills, formative assessment develops another important life skill (Dorn, 2010). Self-evaluation develops metacognitive skills that will serve students throughout their lives (Boboc & Vonderwell,

2013). The process of formative assessment allows students to share their thinking with an expert guide in the absence of penalties (Buck & Trauth-Nare, 2011).

Students need to know that they truly do learn from their mistakes. The absence of mistakes demonstrates mastery, indicating that learning is not happening. In a classroom where formative assessment is properly used, students should see the process as a means of improve their academic abilities, not of assigning grades (Tomlinson, 2014). Teachers should clearly define and communicate to students what they need to know and be able to do (Tomlinson, 2014). The process needs to be differentiated for individual students to be the most effective. The goal should be to elicit cognitive responses from students, not emotional ones (Wiliam, 2011). "Praise and shame shut down learning far more than they catalyze it" (Wiliam, 2011, p. 12).

Formative Assessment Probes

Formative assessment needs to be purposeful in order to be effective. Although formative assessment is dynamic in nature, probes designed to encourage learning at various stages can be prepared in advance (Keeley, 2011). During the engagement and readiness stage, probes should be designed to determine prerequisite learning goals. During the eliciting prior knowledge stage, probes should be designed to identify preconceptions. During the exploration and discovery stage, probes should be designed to initiate a prediction or an explanation and encourage inquiry. During the concept and skill development stage, probes should be designed to evaluate how well students have gained the target knowledge and developed the target skills. During the self-assessment and reflection stage, probes should be developed to provide feedback about how students

feel their ideas have changed as a result of their learning (Keeley, 2011). A good example of an effective formative assessment probe is the *Birthday Candles* probe developed by Keely (2012). Students studying light and vision are asked how far the light from the candles on a birthday cake travel. Their responses determine how well they understand the concepts of light and vision.

Formative Assessment in Athletics

Fletcher (2013) wrote that, "Formative assessment's focus is on coaching students to higher levels (p. 14)." Athletic training provides an excellent model of the process of formative assessment. Good coaches are constantly collecting real time data about where players are on learning progressions aimed at specific learning targets. They do not allow players to continue practicing a skill in the wrong way (Chappuis, 2012). They provide timely feedback to correct misconceptions and provide scaffolding for players to move toward mastery of a given skill. Effective coaching involves more than superior knowledge of a particular sport; it includes superior teaching techniques as well (Stewart & Owens, 2011).

Formative Assessment in Arts Education

Similar to athletic training, the arts have traditionally been a place where the process of formative assessment has naturally existed. A feedback loop occupied by instructor and student, both focused on the development of a skill has been the typical model for arts education. In music education, modeling and corrective feedback are crucial elements of learning (Belcher & Lowe, 2012). An example of the successful purposeful use of the formative assessment process was seen in the Artful Learning

Communities Project. The project used ongoing assessment to improve student achievement in the arts (Andrade, Heffern, & Palma, 2014). Instructors focused on the basic principles of formative assessment including ensuring that they and their students understood the learning targets, an awareness of the difference between where each student is currently in relation to the learning targets and the accomplishment of the learning targets, and working collaboratively to close the gap (Andrade et al., 2014). Significant improvements in student achievement resulted from the implementation of the project.

Formative Assessment to Assist Students with Special Needs

The Individuals with Disabilities Act (IDEA) and the No Child Left Behind Act (NCLB) both have encouraged the inclusion of students with special needs in the "regular" classroom (Cornelius, 2013). They include the involvement of students with special needs in high-stakes assessment. Modified assessment, once common, has all but disappeared. This is an important step in providing equity in education, but has presented a serious challenge for teachers. The proper use of the process of formative assessment has been proven to improve the performance of students with special needs even more so than with their non-disabled peers (Cornelius, 2013). A major barrier to the use of proper formative assessment with students with special needs is the lack of time teachers have in planning instructional strategies (Cornelius, 2013). There are several time-saving techniques that teachers may employ (Cornelius, 2013). Anecdotal seating charts are observational tools used to take notes about individual students in order to analyze progress being made toward a learning target. Daily scorecards are used to rate various

aspects related to student progress. Objective grids are used to chart progress toward specific learning objectives. The formative assessment process is a crucial part of helping students with special needs consistently move toward the individual education plan (IEP) goals (Cornelius, 2014).

Barriers

There is a research to practice gap related to the formative assessment process (Dorn, 2010). Teachers tend to lack a proper understanding of the formative assessment process and, therefore, do not use it effectively as part of their practice (Clark, 2011). Teachers often feel trapped in environments that make enacting new strategies difficult (Clark, 2011). High-stakes summative assessment and accountability narrow learning content and encourage lower-order thinking which is at odds with the purposes of formative assessment (Clark, 2011). Gathering and using data in real time to improve instruction, and thereby student learning, does not fit well with the concept of high-stakes accountability (Dorn, 2010). The use of formative assessment by teachers is an extremely complex process (Gavriel, 2013). Formative assessment should be multidimensional and authentic. It relies on the design expertise of teachers (Risko & Walker-Dalhouse, 2010). This complexity, making high quality professional learning a necessity, presents another barrier to the effective use of the formative assessment process.

Major Themes from the Literature Review

This review of the literature has yielded several major themes related to the need to study the perceptions of teachers about the process of formative assessment at

Crestview Middle School. The process of formative assessment has been defined, clearing up many misconceptions. Data were be collected from the teacher-participants at Crestview regarding their understanding of the process of formative assessment. A wide variety of formative assessment tools have been identified. This study examines the use of formative assessment tools by the teachers at Crestview.

Feedback, as it is used in the process of formative assessment, has been explained in this review of the literature. The ways in which teachers at Crestview use the formative assessment process have been explored. Questioning techniques used to gather formative data have been described. The use of questioning by the teachers at Crestview was examined. Differentiation in the use of the process of formative assessment among various disciplines has been outlined. This study includes an exploration of differentiation in the use of the formative assessment process at Crestview. Finally, the major barriers to the proper use of the process of formative assessment have been included. The teacher-participants at Crestview were prompted to describe those factors they perceive as barriers to their use of high quality formative assessment.

Implications

Improving the use of formative assessment improves academic achievement and develops important life skills (Aylward, 2010). By examining the perceptions of teachers at Crestview regarding the process of formative assessment, this study provides tools that can be used to improve the skills of teachers in achieving their goals of improving student summative assessment performance. The findings have been used to inform the development of a professional learning strategy which fits well into the structure of

collaborative inquiry and action used by the teachers at Crestview. The goal of this strategy is to improve student learning through the improved use of the formative assessment process.

Summary

The public data related to student achievement at Crestview Middle School indicate a lack of consistent student engagement in meaningful learning and a significant academic achievement gap between various subgroups of students at the school. This case study explores the perceptions of teacher-participants at Crestview regarding the process of formative assessment. A review of the associative literature has provided substantial evidence that student achievement at Crestview may be improved through the improved use of the formative assessment process. An examination of teacher perceptions of the formative assessment process has provided a rich description of how the process is used at Crestview.

This study uses a social constructivist framework. High quality formative assessment involves students in efforts to accomplish learning goals. The development of self-directed learning and metacognitive skills is fostered by the proper use of the formative assessment process. In a classroom properly using the process of formative assessment, students know the learning targets; they ask questions; and they monitor their own progress. In such a classroom, everyone shares in the responsibility for learning. Data collected for this study have fostered a discovery of how well the classrooms at Crestview use the process of formative assessment from a constructivist point-of-view.

The associative literature includes both a wide range of formative data collection tools and how to properly use these tools to improve academic achievement. It is still common for educators to view formative assessment as simply a category of assessment tools rather than as a process used to improve student learning. Such misconceptions among the teachers at Crestview have been examined. Discourse among students and between students and teachers in which feedback loops are established is a typical mode of functioning for the process of formative assessment. This study has explored how questioning and feedback are used at Crestview. The process of formative assessment is somewhat context-dependent. The study has shown the differences in the use of the formative assessment process with various disciplines at Crestview.

Section 2 describes this qualitative instrumental case study that has explored teacher-perceptions of the formative assessment process at Crestview Middle School. The section shows how the study was prompted by the local data that indicate low levels of student academic achievement at Crestview. The data collection techniques are outlined, specifying that this study has collected data from the teacher-participants in the forms of observations, interviews, and a questionnaire. How research protocols were followed to maintain integrity and to protect the participants from harm are described. Finally, the section explains how data was analyzed to produce valid and reliable findings.

Section 2: The Methodology

Introduction

The methodology of this study is discussed in this section. I also explain the research design of a qualitative case study, including the collection, analysis, and coding of data to produce the study findings. I describe how I improved the quality of the design by enhancing dependability and credibility. Finally, I describe the volunteer teacher-participants from Crestview Middle School, as well as the procedures used for respecting and protecting the participants from harm.

As suggested by Creswell (2012), the research design of this study is a qualitative instrumental case study that illuminates the perspectives of the teacher-participants at Crestview Middle School regarding the process of formative assessment. The case has been described to provide insight into the phenomenon of the use of the process of formative assessment. While the use of formative assessment is highly valued among educators today, it is often not used well in practice (Dorn, 2010). This gap between research and practice is an important topic that warrants investigation. Public student achievement data at Crestview Middle School indicate poor academic achievement, as well as a substantial gap in achievement between various subgroups of students at the school. The associative literature suggests that poor academic achievement and achievement gaps between groups of students is likely due to a lack of consistent engagement in standards-based learning (Duckor, 2014; Risko & Walker-Dalhouse, 2010).

This study explored the local gap in practice that has resulted in poor academic achievement and a significant achievement gap between various subgroups of students at Crestview as it relates to the proper use of the process of formative assessment. The purpose of this study was to provide a thick rich description of the teacher-participants' views about and experiences with the process of formative assessment.

The setting of this case study, Crestview Middle School, is a low-performing rural middle school in an impoverished region of the south-central part of the United States. The voluntary participants in the study included 11 teachers of various subjects at the school. These teachers are the key informants for this study. The guiding research question for this study was: How do classroom teachers at Crestview Middle School participate in and feel about the process of formative assessment? Data were collected in the form of observations, interviews, and a questionnaire. Data were analyzed to identify emerging themes related to the perceptions of the teacher-participants about the process of formative assessment. The findings were developed in the form of a thick rich description that has been used to develop a professional learning strategy for teachers with the potential to significantly improve student learning through the improved use of the formative assessment process.

Qualitative Research Design and Approach

A case study is an investigation of a current phenomenon in its actual context (Yin, 2014). The phenomenon under inquiry in this case study is the use of the process of formative assessment. The case in a case study is the main subject (Yin, 2014). The case of this case study is the institution of Crestview Middle School, which is the

bounded system in which the study was conducted. Because this study purported to gain a thorough understanding and real-world perspective about the complex nature of the process of formative assessment, the case study methodology is appropriate according to Yin (2014). Crestview is what Yin (2014) referred to as a common case because it is representative of other sites where the phenomenon of the use of the formative assessment process is seen. During the collection of the data, I had adequate access to the school and teacher-participants who were able to illuminate the research questions as suggested by Yin (2014).

This qualitative case study is a thorough exploration of the bounded system of Crestview Middle School as suggested by Creswell (2012). This study was an inductive search for meaning and understanding of the perceptions of the teacher-participants about the formative assessment process at Crestview as suggested by Merriam (2009). Data were collected in multiple forms, as suggested by Lodico, Spaulding, and Voegtle (2010), including observations, semi-structured interviews, and an open-ended questionnaire. Data were analyzed through manual hierarchical coding to identify the themes that make up the narrative of this study. A detailed narrative derived from a qualitative case study is an ideal manner in which to provide the depth of understanding needed to be useful in improving learning at Crestview. The data were triangulated to strengthen validity (Lodico et al., 2010). The thick rich descriptive narrative may be used to guide decision-making and to inform instructional practices at Crestview. These findings were used to develop a professional learning strategy aimed at improving student learning through the improved use of the formative assessment process.

Qualitative Tradition

Researchers sometimes refer to qualitative research as interpretive or field research. The qualitative approach uses inductive reasoning or "bottom up" processing, in which the researcher moves from the specific to generalizations (Lodico et al., 2010). Data are typically collected in the forms of interviews and observations. Qualitative research usually involves close interaction between the researcher and the study participants (Lodico et al., 2010). While quantitative research has historically received wider support among the scientific community because of its rigorous approach to providing numerical evidence to make decisions about hypotheses, qualitative research has gained support because of its ability to explore phenomena in great detail (Arghode, 2012). Often, quantitative research simply cannot provide the level of description needed to understand specific points of inquiry.

Case studies produce a thick, rich description of a phenomenon in narrative form (Lodico et al., 2010). The rationale for using a case study emerges from a problem identified by a researcher which requires a detailed explanation. In a case study, purposeful sampling is used in order to include participants who are most likely to make significant contributions to an understanding of the phenomenon being studied (Lodico et al., 2010). Ideally, a case study (a) uses multiple forms of data; (b) uses semi-structured interview questions; and (c) responds to the exploratory nature of the methodology with flexibility (Glesne, 2011).

Justification of the Research Design

Low levels of academic achievement and significant academic achievement gaps between various subgroups of students at Crestview Middle School have been identified as a problem worthy of exploration. A review of the literature has revealed a strong link between the use of the formative assessment process and academic achievement (Alward, 2010; Templeton, 2011). A qualitative case study emerged as the research methodology of choice because a thorough understanding of the views of the teacher-participants at Crestview Middle School about the formative assessment process was needed in order to provide a useful thick, rich narrative that the teachers and administration at Crestview may use to improve student learning. The goal of this qualitative instrumental case study was to explore teacher perceptions of the process of formative assessment as they relate to the improvement in academic achievement.

Quantitative research provides valuable numeric data using deductive reasoning to test a hypothesis determined at the beginning of a study (Lodico et al., 2010). While a quantitative study to determine how well teachers use formative assessment to increase academic achievement could be done and would have some value, it could not produce the rich description of teacher perceptions of the process of formative assessment needed to understand the reasons for the variation in the effective use of the process. Such a study would not explain why the process of formative assessment is used well by some teachers and poorly by others. Qualitative research provides a valuable narrative using inductive reasoning to explore the possible explanations of a phenomenon (Lodico et al., 2010). The qualitative approach was chosen for this study because of the necessity of

exploring teacher perceptions about the process of formative assessment. This research did not have a preconceived hypothesis to be tested, but rather a need to deeply understand the phenomenon.

Case studies can offer important insights that true experiments cannot (Yin, 2014). A quantitative experiment shows causation between variables. The efficacy of specific formative assessment instruments are measured in terms of summative assessment results using quantitative experiments. The purpose of this study, however, was to gain a thorough understanding of the perspectives of the teacher participants regarding the process of formative assessment which cannot be quantified through the experimental method. The perspectives of teachers about the process of formative assessment are vital to an understanding of this phenomenon in its real-world context. This study sought not to know whether the process of formative assessment works, but rather to understand how it works within the boundaries of the chosen case from the perspectives of the teacher-participants.

There are several methodologies within the qualitative tradition. An ethnographic study is organized around the concept of culture and how a group constructs meaning (Glesne, 2011). Although the culture of Crestview Middle School influences teacher perceptions of the process of formative assessment, the focus of this study has been on perceptions of the phenomenon and not the culture of the school. The purpose of grounded theory research is to collect data, typically in the form of observations and interviews, to produce a theory about a phenomenon (Glesne, 2011). The intent of this study has not been to offer a theory about the process of formative assessment, but rather

to produce a thick rich description of the phenomenon. This case study is a thorough examination of teacher views of the process of formative assessment at Crestview Middle School.

The process of selecting a research method includes recognizing and responding to the background, attributes, and training of the researcher. As a student at Walden University and other institutions, I have had more extensive training in qualitative research and, specifically, in case study methodology. I possess the attributes of a successful case study researcher as outlined by Yin (2014). These include being able to effectively listen, ask questions, and adapt as well as demonstrating the ethical behavior needed to avoid allowing biases to influence my research. As a school administrator, I use these attributes on a daily basis.

Participants

The setting of this case study was Crestview Middle School, which is a rural middle school located in the mid-south-central region of the United States. Public data at the school indicate relatively low levels of student academic achievement in those subjects which are assessed through the state's core curriculum tests. The student population is a diverse mixture divided almost in thirds between African-Americans, Native-Americans, and European-Americans. The teachers at the school were all considered highly qualified to teach the subjects they teach by the department of education in the state. This status is based on being certified in the subject area by the state as well as demonstrating competency in the subject area, typically through certification testing. The school faces several challenges, including a high turn-over rate

among the faculty and administration, and a lack of proper funding. In spite of these challenges, improving the use of formative assessment may result in significant improvements in student learning. This study has been used to inform the development of a professional learning strategy with the potential of positively affecting student learning at Crestview and other schools.

The target population is the group with a common characteristic from which a sample is selected for a study (Creswell, 2012). The target population for this study is made up of teachers at Crestview Middle School. The teachers at Crestview teach various subjects to sixth, seventh, and eighth grade students. All teachers at Crestview use the formative assessment process as part of their practice.

Qualitative research such as this uses purposeful sampling in which researchers intentionally select participants who best inform the purpose of the study (Creswell, 2012). Participants in such studies are usually selected because they are willing and available to participate (Creswell, 2012). Purposeful sampling has been used to get key informants involved in this study as suggested by Lodico et al. (2010). The study sample is made up of 11 teachers who volunteered to be part of the study from across all grade levels and subjects at Crestview. The sample size is adequate in order to obtain the in-depth understanding needed to produce a thick, rich narrative that has been useful in suggesting strategies to improve student learning at Crestview Middle School. Lodico et al. (2010) suggested that proper sample size is dependent on the depth of understanding needed as well as a saturation of the data. The collection of data in three forms from the

11 participants has resulted in saturation of the data. Subsequent data collection is unlikely to contribute significantly to the findings of this study.

External validity, often called transferability in qualitative research, involves what Yin (2014) called analytic generalization. This method of enhancing external validity in case study research aims to generalize the findings of a case study to other concrete situations, and not just to like cases (Yin, 2014). This type of external validity is not the same as statistical generalization in quantitative research, in which proper sampling and controls make it possible to generalize results from the sample to the target population. Analytic generalization is based on being able to see similarities in theoretical concepts and principles (Yin 2014). The transferability of this study has been enhanced through the rigor and quality of the work.

I gained access to the participants by seeking written formal consent from the district and building administration for this study, and then written formal consent from individual teachers at Crestview to participate in the study. Informed consent forms followed Walden University's protocol and included (a) a description of the project, (b) background information, (c) procedures, (d) the voluntary nature of this study, (e) the risks and benefits of being in this study, (f) a privacy statement, and (g) information about how participants may ask questions about this study. The role of the researcher was that of an outside observer who is categorized as what Glesne (2011) called an "observer as participant," (p. 64) with the goal of being trusted by the participants. Trust was established through the length of time spent with the participants as well as the consistent demonstration of respect for the participants. Although I am an administrator

at another site in the district, I do not have supervisory authority over any of the study participants.

Measures for Ethical Protection of Participants

The insight and views of the teacher-participants is what this research has captured. Throughout the process of conducting this study, respect and appreciation was shown to the teacher-participants. Formal written consent of the administration, using forms approved by Walden University, was obtained prior to conducting the study. Walden University IRB approval was obtained prior to the collection of any data (Approval Number: 05-07-15-0315882, May 7, 2015). This process ensured that informed consent was obtained, participants were protected from harm, and that privacy and confidentiality were maintained as suggested by Yin (2014). Formal written informed consent was obtained from all study participants prior to the collection of data. This process involved informing the participants of what would have or might have happened to them during the study and that their participation is voluntary and they may withdraw from the study at any time as well as the fact that all data collected would be confidential. All data was coded to protect the identities of the participants and is being kept securely in a locked file cabinet at my residence for a period of five years after the publication of this study. The research report along with an executive summary (see Appendix B) is being provided to the participants and other school stakeholders.

During the planning for data collection, "what ifs" were considered. For example, a participant might have become upset or emotional during an interview. In order to be proactive about this possibility, I was nonjudgmental and friendly at all times and

stressed the confidential nature of the study. If a participant had become upset or emotional during an interview, I would have stopped or postponed the interview and offered my help as a compassionate person. Another example might be the observation of something inappropriate. Unless I had observed something actionable based on protecting the safety of students, I would not have reported or acted on what I observed.

Data Collection

Justification of Data Point Choices

Data collected were based on the purpose of the study which is to explore the value teachers place on the process of formative assessment as well as teachers' experiences with the formative assessment process. A process of alignment between the data points, the purpose of the study, and the research questions was done in order to make sure that the right data were collected. While most areas of inquiry were written to fit each of the three forms of data collection, a few lent themselves to either only observations or only interview and questionnaire prompts. All items were tied directly to the purpose, to at least one of the research questions, and to either participation with the process of formative assessment or the value perceived with the process of formative assessment.

Data Collection Instrument Creation

Each of the three data collection instruments were constructed by me and have been vetted by two colleagues who have advanced educational degrees. These two colleagues have experiences doing qualitative research and have had extensive experience with curriculum, instruction, and assessment (see Appendix C). The first

colleague's degrees include a Bachelor of Science in Education and a Master of Arts in Educational Leadership. She has twelve years' experience in education including serving as a Middle School Counselor, Special Education Director, and Elementary School Principal. The second colleague's degrees include a Bachelor of Science in Education, a Master's of Education, and an Educational Specialist. She has twelve and one-half years' experience in higher education and seven and one-half years' experience in secondary education.

Audit Trail

Any venture that attempts to explore a phenomenon is improved through the collection of multiple forms of data. The combining of the forms of data during the analysis phase has produced a richer description than would a study using only one form of data. The use of multiple forms of data also improved the validity of the study through the process of triangulation as suggested by Creswell (2012). An audit trail, including a data collection and analysis journal was used to improve validity and reliability as suggested by Merriam (2009). This audit trail file contains the documents collected while the study was in progress. The journal is a record of the steps taken during the collection and analysis of the data (see Appendix D).

Direct Observations

Observations are an important part of the procedure of gathering data about the views of teachers regarding the process of formative assessment because they provide the opportunity to learn what people may not be willing to say in interviews (Merriam, 2009). As suggested by Glesne (2011), observations included the setting, participants,

proxemics, events, and gestures. Detailed descriptive and analytic field notes of the observations that include both a narrative and visuals were taken as suggested by Glesne (2011). An observation protocol produced by me and vetted by two colleagues with advanced degrees in education was used as the format for the field notes (see Appendix E). The vetting process improved the observation protocol by adding a column for general notes. The protocol was not intended to limit the observations, but rather to focus them on the purpose of the study. As suggested by Glesne (2011), the field notes were expanded upon as soon after the observations were completed as possible. One observation of each teacher-participant was done for the duration of one fifty-minute class period.

An understanding of the strengths and weaknesses of collecting data using various methods was crucial in improving the validity of this study. Observations provided the opportunity to collect data about the associative actions in real time and to cover the case's context as suggested by Yin (2014). Insight was gained into the contexts, behaviors, and relationships associated with the case. Observations take time, are limited in scope, and may result in the participants acting differently because they are being observed (Yin, 2014). The teacher-participants in this study were informed of the confidential nature of the study and encouraged not to act differently during observations. The observations were aligned with the purpose of this study and were triangulated with the data collected using interviews and a questionnaire.

A respect for the culture of the community that makes up the study site was exercised as suggested by Glesne (2011). Observer bias, contamination, and the halo

effect were controlled for during the observations as suggested by Lodico et al. (2010). By identifying the likelihood of observer bias, a conscious effort was made by me to avoid allowing my preconceived ideas from influencing the processes of data collection and analysis. Contamination, or the effect of the researcher knowing the purpose of the study, was controlled for by maintaining an objective point-of-view and through an understanding that the case study methodology is an exploration of the unknown and not a confirmation of predicted outcomes. The halo effect, or relying on first impressions, was controlled for by understanding the possible false nature of first impressions in order to avoid their influence as suggested by Lodico et al. (2010). Observation records are being maintained by me following Walden University procedures as part of the audit trail. These records are being securely kept in a locked file cabinet at my residence for a period of five years after the publication of this study.

Direct observations were completed in the setting of the classroom of each of the 11 teacher-participants except for Participant 4 during active class periods in which students were engaged in learning activities. Participant 4 became unavailable for me to complete an observation as the school year ended and was not part of the summer school faculty. The recording of the observations included taking field notes and making drawings of classroom layouts using the observation protocol. No audio, video, or photographic data were collected during the observations because of the potential harm to students and the teacher-participants as suggested by Yin (2014). Although the observation protocol focused the observations, I observed what was happening in the broad sense as well. Notes were taken as suggested by Glesne (2011) about what I

thought and felt about what was happening in the room to produce descriptive and analytic field notes. During this process, objectivity and the avoidance of personal biases were maintained.

The field notes taken, using the observation protocol during the actual observations, were limited by the time period of the observations. It is important that these real time notes were carefully expanded soon after the observations. Both the real time notes and expanded notes have been included in the audit trail. All field notes were coded to protect the identities of the teacher-participants. All data collection materials and notes are being kept in a locked file for which only I have the key and stored in my residence for a period of five years after the publication of this study. In this qualitative case study, data analysis was an ongoing process and began during the process of data collection as suggested by Lodico et al. (2010). As the observations were completed, emerging associative ideas were noted.

Semi-Structured Interviews

Semi-structured interviews were the next data collection method in the sequence. According to Glesne (2011), they are ideally suited to case studies. The semi-structured interviews provided the flexibility needed to adapt with emerging data as the interviews progressed as suggested by Glesne (2011). It was important to ask questions from a variety of angles. The types of interview questions, as suggested by Glesne (2011), included behavioral, opinion, feeling, knowledge, sensory, and background. Presupposition questions were included to enhance the open-ended nature of the interview process as suggested by Glesne (2011). Leading questions were avoided.

The strengths and weaknesses of interviews were also considered and accounted for as an effort to enhance the credibility of this study. The interviews provided an opportunity to focus directly on the case study topics and provided insight that included explanations as suggested by Yin (2014). The interviews also, however, included inaccuracies due to poor recall or the interviewees telling me what was perceived to be what I wanted to hear. The interview questions in this study were carefully constructed and articulated to align with this study's purpose. Several of the open-ended interview questions (see Appendix F) were improved through the vetting process as well as the order in which the questions were asked. Interview data are being kept secure in a locked file cabinet for five years after the study is published and will then be destroyed. The identities of the participants were coded to ensure confidentiality. The teacher-participants in this study were made aware of its exploratory nature, encouraging them to be open with their responses.

Audio recordings of the face-to-face interviews were made with the permission of the 11 teacher-participants and transcribed verbatim by me soon after the interviews to improve validity and to facilitate coding as suggested by Merriam (2009). When asking the participants about the formative assessment tools they used, a brief list of these tools (see Appendix G) was presented to the participants as a way of initiating discourse as suggested during the vetting process of the interview questions by my two colleagues. Member checks were used to verify the accuracy of the interview data to enhance validity as suggested by Lodico et al. (2010). The coded verbatim interview transcripts were reviewed by 10 of the 11 participants for accuracy. Participant 6 had resigned her

position and moved prior to the member checks being performed. The participants were asked to make notes on the transcripts to clarify anything they felt needed clarification so that their ideas were accurately portrayed. Other than the correction of insignificant typographical errors, no discrepancies were noted.

The interviews were conducted as guided conversations as suggested by Yin (2014). The line of inquiry, aligned to the study's purpose, was enhanced through follow-up questions. All questions were posed in a non-threatening manner, avoiding "why" questions that may have created defensiveness in the participants as suggested by Yin (2014). The interviews were conducted at the study site in private locations, free from distractions for the most part; announcements and bells could be heard. If for some reason a participant had wanted to end an interview, I would have asked for permission to use the data collected up to the point and ended the interview. This did not happen. Interviews were completed, including all interview questions, with all participants. The interviews with the 11 teacher-participants lasted approximately one hour each.

Each interview followed specific steps to increase the quality of the data and to ensure the integrity of this study as suggested by Glesne (2011). Written informed consent was obtained prior to any data collection. Each participant was greeted to help build rapport. The process of the interview was explained to each participant. Permission to record the interviews was obtained from each participant. After starting the recording, oral informed consent to record each interview was obtained as well. The interview questions were asked, including follow-up questions. Each participant was given a chance to ask questions and thanked for his or her participation. After the

interviews, all materials were stored in a locked file cabinet when they were not being analyzed. As data were collected, the ongoing process of analysis added to the emerging ideas concerning the process of formative assessment.

Questionnaire

The final method of collecting data about the perceptions of teachers at the target school regarding the formative assessment process was the use of an open-ended questionnaire created by me and vetted by two colleagues (see Appendix H). The vetting process improved several of the items on the questionnaire as well as the order in which they were presented. The questionnaire was given to and returned by all 11 of the teacher-participants. The questionnaire was constructed to clarify data from the observations and interviews and to fill in missing gaps in the information. The responses were not designed to be quantified. Effort was made to write questions that were easily understood as suggested by Creswell (2012).

Questionnaires also have advantages and disadvantages which I needed to understand and act upon in order to improve the quality of this study. Questionnaires are quick ways of gathering data that, in this study, were used to clarify the data obtained from the observations and interviews as suggested by Glesne (2011). Questionnaires are limited by the truthfulness of respondents as well as their interpretation or misinterpretation of the questions (Lodico et al., 2010). When distributing the questionnaire to the participants, I emphasized the confidential nature of the study as well as the importance of the data being collected.

As with the other forms of data collection, a respect for the individual participants was exercised, demonstrating an understanding of the importance of the participants as well as their voluntary nature as suggested by Glesne (2011). The questionnaire was produced in print copy and delivered to each participant in coded form and retrieved by me in person as they were completed. Although data analysis began as data were collected, when all the forms of data were collected, the process of synthesis began. The completed questionnaires are being securely maintained by me as part of the audit trail in a locked file cabinet. The data is being stored in coded form for five years after the publication of the study and will then be destroyed.

Data Analysis

Qualitative data analysis involves looking at the data, forming categories, and combining data from various collection methods to yield a study's findings (Yin, 2014). This process should consider all the data collected as well as alternative explanations. In case study research, it is important that data not simply be stored waiting to be analyzed after it is all collected. Analysis should be an ongoing process as data are being collected (Yin, 2014). The overall analytic strategy that was used for this study is what Yin (2014) calls, "working your data from the ground up." (p. 136) A data matrix was constructed, considering the alignment to the purpose of this study, the research questions, and the various forms of data. This matrix provided organization for the analysis process. As data were examined and combined, patterns were noted. This inductive strategy fits well with the nature of this study which purported to discover the perspectives of the participants regarding the formative assessment process.

Data Coding

Data from all three sources was coded to make sense of the data in a hierarchical fashion using open coding followed by axial coding as suggested by Creswell (2012). Because the focus of this research was to gain an understanding of the perspectives of the teacher-participants regarding the process of formative assessment, coding for aspects of the perspectives of the teacher-participants guided the process of making sense of the data. Various elements of participant perspectives, including the value they place on the process of formative assessment, how they use the formative assessment process, and the barriers to the use of the formative assessment process they perceive to exist were identified and bracketed during the process of open coding as suggested by Merriam (2009). The elements were grouped together to identify themes during the process of axial coding as suggested by Merriam (2009). Data sets produced by each data collection method were aligned with the purpose of the study, the research questions, and with each other to produce the findings of the study. Coding of the data has created a storyline based on the purpose of the study.

Coding began with data collection and continued during the process of data analysis. The expanded field notes, interview transcripts, and questionnaires were analyzed line by line and emergent codes were assigned during open coding. While no true preset codes were established, likely codes based on the purpose of the study included (a) value of the formative assessment process, (b) participation in the formative assessment process, (c) barriers to the use of the formative assessment process, (d) feedback techniques, (e) questioning techniques, (f) differentiation, (g) formative

assessment used with students with special needs, and (h) direct student involvement in the formative assessment process. After the data were collected using the three methods, the process of coding continued comparing, contrasting, and combining the data. Open coding was followed with axial coding which analyzed the open coded data to produce themes from the data aligned from the three data collection methods. A coding table (see Appendix I) was constructed to organize the emergent ideas as themes and associative concepts. The themes that emerged from the combination of data collected through the three methods are the basis for the thick rich description that has been produced.

Evidence of Reliability and Validity

Reliability, which is sometimes referred to as dependability in qualitative research, has been enhanced by tracking the procedures used to collect and interpret the data as suggested by Lodico et al. (2010). To this end, a thorough explanation of the methods and steps of this study have been included in the audit trail which includes a data collection and analysis journal. This has provided the opportunity for consistent repeatability as suggested by Yin (2014). All raw study data have been compiled and arranged for easy access as part of a data matrix, adding to the reliability of this study as suggested by Yin (2014). A chain of evidence has been maintained as part of the audit trail in such a way that a reader of the study is able to follow the evidence through the steps of the study to the findings, increasing reliability even further as suggested by Yin (2014).

Validity, which is sometimes referred to as credibility in qualitative research, involves the accurate portrayal of the views, opinions, feelings, actions, and thoughts of

study participants (Lodico et al., 2010). Validity has been enhanced through triangulation of the multiple data sources, member checks, and peer debriefing. Triangulation involved the convergence of the data points from the observations, interviews, and the questionnaire in order to determine the consistency of the findings as suggested by Yin (2014). Member checks involved asking each teacher-participant to review the transcript of his or her interview for accuracy and asking five teacher-participants to review the findings to provide feedback in order to improve accuracy and avoid misinterpretations as suggested by Merriam (2009). Peer debriefing involved the participation of a colleague throughout the process of data collection, analysis, and the writing of the report. This colleague has examined non-confidential documents and writings and offered feedback through regular discussion as suggested by Lodico et al. (2010). This colleague is a school administrator with advanced degrees who has conducted research in educational settings.

Discrepant Data

The three forms of data used in this study, along with the interpretation of these forms in combination with each other, have created what Glesne (2011) referred to as more of a crystal than a triangle, as the term "triangulation" suggests, with multiple facets. Triangulation was used, as Yin (2014) suggested, to determine the consistency of the findings through the convergence of the three forms of data collected. The process of triangulation of the data showed a high degree of agreement between the three forms of data. However, there were some instances of potentially discrepant data that must be noted and explained. In general, the observations demonstrated less use of the formative

assessment process. This can be explained by the differences in scope of the observations compared to the interviews and questionnaire. The observations were limited to fifty-minute periods, while the interviews and questionnaire covered the teachers' perceptions of their entire practice. This discrepancy was extreme with Participant 10. While the participant's responses to the questions in both the interview and on the questionnaire demonstrated a good overall understanding of the how to check for understanding and engagement and make adjustments in real time, this was not demonstrated during the observation. This discrepancy did not, however, seriously influence the findings because it was noted during the process of triangulation.

Several participants talked and wrote about using various tools used in the formative assessment process such as KWL charts, think-pair-share, and agreement circles during the interviews and on the questionnaire. However, these particular tools were not seen in practice during the observations. This again can be explained by the difference in scope between the forms of data collection. There was a great deal of agreement between the interviews and questionnaire on every prompt. Participant 2 and Participant 11 were exceptions to the discrepancy noted between observations and the other forms of data collection. Both articulated how they check for understanding and made adjustments in real time and also demonstrated this at high levels in their practice during the observations.

Transferability

Although qualitative findings cannot be generalized in the same manner as quantitative experiments can, transferability can be demonstrated in varying degrees

according to Lodico et al. (2010). Attention given to validity and reliability, as well as a meticulous portrayal of the context in which the study takes place, provide readers with information needed to decide if the findings may apply to other contexts. Yin (2104) used the term analytic generalization to describe a method of improving external validity that applies to case studies. The transferability of the findings from this study to other contexts even beyond like cases at a conceptual level has been enhanced by doing a generalizing rather than particularizing analysis of the data as suggested by Yin (2014). The goal of analytic generalization is for the findings from this case study to be able to be applied to other contexts.

Findings

The purpose of this project study was to explore the perceptions teachers at Crestview Middle School have about the formative assessment process as well as their experiences with the process. The findings of this study demonstrate that the process of formative assessment is not uniformly being used effectively to improve student learning at Crestview. While the process of checking for understanding and making adjustments in real time to improve student learning was considered very important by the participants in the study, the use of this process in practice varied considerably. All of the participants described ways in which they gathered formative data, typically using observation and questioning. Many of the participants articulated generalities about using formative data to make adjustments. For example, Participant 1 in responding to how adjustments were made wrote, “Slow down, stop, reteach, change the way in which the lesson is being presented; encourage students to make suggestions on ways to

improve the lesson." Only a few of the participants expressed or demonstrated specific strategies for making adjustments in real time to keep students engaged and moving toward a learning target. An examination of the elements of how the formative assessment process was used by the participants in this study has informed the development of a professional learning strategy aimed at improving the use of the formative assessment process as a way of increasing academic achievement. The ultimate goal of this project is to narrow the gap between various subgroups while improving overall academic achievement.

Importance

When described as checking for understanding and making adjustments in real time in order to keep students engaged and moving toward a learning target, the participants in this study unanimously believed the formative assessment process was crucial to learning. Every participant responded with synonyms to "very," including "super," "really," and "huge". Participant 10 responded, "I cannot move on to the next lesson or even the next part of a lesson unless I know the kids understand what I first taught." Participant 11 responded, "If I don't correct things as we go, they will practice with mistakes and think that it's right." This unanimity provides strong evidence that, if given the opportunity to develop the right tools and training, the teachers at Crestview would experience a high degree of buy-in for a professional learning strategy focused on improving student learning by improving their ability to effectively use the process of formative assessment.

Misunderstanding the Process

This professional learning strategy is not simplistic and must be an ongoing part of the culture of Crestview or any other school which chooses to employ this strategy. Testing companies, recognizing the popularity of the concept of "formative assessment," have misused the term in order to sell pre-packaged interim assessments (Younglove, 2011). While interim assessment such as benchmarking has value, it is not "formative" as espoused in this study because it does not allow for adjustments to take place in real time with ongoing lessons. In referring to formative assessment, Participant 5 responded, "Okay at the beginning of the year I usually give an assessment from the previous year to see what they're coming to me knowing and then I make adjustments based on that. I give four benchmarks from the Renaissance on the computer to see where my students are." This is sound practice, but it is a different practice than effectively using the process of formative assessment to keep students engaged and moving toward the learning targets.

Learning Targets

An understanding by both teacher and student of what the learning targets are and why each is important is vital to the process of formative assessment. Making students aware of the learning targets (i.e. objectives, standards) was not widely observed during the collection of data for this study, although observations were limited to one class period for each teacher-participant. The two biggest exceptions to this lack of proper attention to informing students what they were expected to learn and why it is important were found in the technology learning experience provided by Participant 2 and the

music lesson conducted by Participant 11. In both of these instances, students were made aware of the learning targets and cooperatively worked with the instructors to move toward them. In responding to a prompt about making students aware of the learning targets, Participant 2 said, "Our standards are part of the PLTW (online learning platform)." This online curriculum was observed as an integral part of the routine in this class. Students began the observed lesson participating in online discussion using this system. Although one participant responded, "I really don't," to a prompt about making students aware of the learning targets, most responded that they either posted the targets or verbally told students what they were. Participant 4 responded "They always knew what we were working toward." Participant 1 responded, "I explain what we need to learn and how we use it in life," which addressed the importance of authenticity as well as the need for awareness. Participant 8 responded, "Students keep a journal." Although I did not see the use of these journals during my observation, this appeared to be a good technique for making students aware of the learning targets. The professional learning strategy provides teachers with useful tools to make students aware of learning targets and why each is important. An example of such a tool is the use of "I can" statements in which complicated standards are broken down to student friendly phrases which they can easily work toward accomplishment. The nature of this tool makes it possible to differentiate for various levels of students.

Differentiation

Providing the proper level of rigor to students with a variety of background knowledge and ability levels, often in the same classroom, is a major challenge for most

educators. While many of the participants articulated a desire to help all students achieve, several did not demonstrate or verbalize specific strategies for doing so. Several others did, such as Participant 2 who said, "I want all kids to exceed their expectations." My observation of Participant 2 demonstrated this very well. Students were all engaged and moving toward the goal of the project at-hand, but at different places along the learning progression. The teacher-participant worked with each student to provide what he termed as "hints" to keep them moving toward the learning target. Participant 8 showed an understanding of working with students with special needs by responding, "I let them do part of the problem and come back the next day to do more of it if I see they're not getting it." This breaking down of the complex is an effective technique when working with struggling students. Participant 9 responded in a typical manner by saying, "I get with the special education teacher and ask what modifications I need to make." The professional learning strategy that is the associative project of this study includes the direct involvement of special education teachers.

Student Involvement

Just as accomplishing difficult aspects of teaching, such as effective differentiation, are best accomplished through collaboration, learning must also be a collaborative venture in which the learner is an active participant. This study has been guided by the social constructivist framework which views learning as a voluntary activity that requires the involvement of students in all elements in order to maximize learning. This includes being directly involved in the formative assessment process. Several of the participants in this study recognized the importance of involving students.

Participant 1 responded, "I know students are engaged when they are talking with each other about the material." I witnessed this student-to-student discourse during my observation of Participant 1. The students' discourse about the writing assignment included peer review and editing of their papers in real time. To another prompt, Participant 1 replied, "Students are sometimes allowed to come up with their own questions for each other." This helps students relate their classroom activity to the learning targets and to help each other move toward them. Participant 2 also uses student-to-student discourse throughout the projects that students complete in his class. He replied to a prompt about student involvement by saying, "I use online discussion; I require them to reply to at least two other responses." This use of technology engages all students in the process of formative assessment when the prompts are about planning and working through the steps of a project. By providing a structure and allowing a great deal of student involvement, Participant 2 was able to create an atmosphere of discovery learning. This included the development of both reasoning skills and executive function; crucial elements of learning when viewed through the constructivist framework.

Questioning and Observation

Questioning and observation dominated the collection of formative data in the practice of the teachers observed for this study. The effectiveness of questioning and observation varied considerably among the participants. Participant 2 used questioning in a particularly effective manner both through the online platform and face-to-face. In responding to a prompt about questioning techniques, he said, "I engage students with questions that lead them to further experimentation." I observed this in action, noting

that he prompted thought rather than provided quick-fix answers during his frequent interactions with students. Participant 10 responded to a questioning prompt by saying, "I ask questions based on each level of Blooms," demonstrating her efforts to obtain formative data about higher order thinking. During my observations, about half of the participants used the traditional model of the teacher asking questions and calling on those with raised hands to answer. This strategy, though still widely used, limits the engagement of students. In talking about using a no-hands-up questioning strategy, Participant 7 said, "It causes them to be more attentive." All of the participants referred to both questioning and observation frequently when discussing checking for understanding. All of the participants except one engaged in both questioning and observation of students during my time observing them. During her music lesson, Participant 11 was observed intently listening to gather formative data. The professional learning strategy provides teachers with both verbal and written questioning and observation techniques that gather valuable formative data from all students.

Specialty Tools

Although the teacher-participants in this study had extensive experience with the questioning and observation of students, they typically had experience with only a few of the specialty tools designed for the purpose of collected formative data. Two of the participants were observed using individual dry-erase boards to effectively engage students and collect formative data. In a discussion of this tool, Participant 8 said, "I use the little boards; we do races and stuff like that." Participant 3 said, "I separate them into teams for a quiz competition, sometimes using the small dry-erase boards." Three of the

participants were observed using Internet-based games to engage students and collect formative data. The list of specialty tools discussed by the participants included exit tickets, think-pair-share, one-minute papers, KWL charts, team rubrics, online discussion, competitions, games, anticipation guides, individual white boards, agreement circles, and art. Although not seen in practice during the observations, the explanation by Participant 6 of how art projects can be designed to produce formative data demonstrated a creative and authentic way of collecting formative data. The effective use of specialty tools is a major focus of professional learning strategy.

Feedback

Questioning, observation, and specialty formative assessment tools are used to gather formative data. That data must then be analyzed and communicated to the learner so adjustments can be made. Feedback is the process of communicating with the learner about his progress toward the learning target. In its ideal form, this process creates a continual feedback loop that involves the interaction of the learner with a teacher, her fellow students, and within herself (Roskos & Neuman, 2012). Data is gathered and responded to in real time as the learner moves forward toward the learning target. Feedback is that part of the process in which the learner is made aware of the correctness of his actions up to a point in the learning progression. To some extent, feedback was given by all participants except one during my observations. Highly effective feedback loops were seen with Participant 11 who responded to a question about feedback by saying, "It's pretty easy when teaching a student to play music or sing. I have the advantage of hearing students' progress by merely walking around." Participant 2 also

created highly effective feedback loops with his interactions with students as they moved through the steps of the assigned project. Participant 3 explained how she used ungraded feedback by stating, "They also understood they needed to make corrections with the information I was providing." Participant 1 also used the technique of ungraded feedback. In responding to a prompt about the technique, she said, "Papers are often handed back ungraded with written comments to allow for student correction. Learning how to develop effective feedback loops is part of the professional learning strategy. After formative data is collected, analyzed, and communicated to the learner, the next step is for needed adjustments to be made to help the learner move more effectively toward the learning target.

Level of Adjustment

Formative data is only "formative" when it is used to make adjustments in order to move students toward learning targets. One might think that educators would only collect data in order to effectively use that data. It was typical during the observations to see very little adjustments being made. There were noted exceptions to this phenomenon including Participant 2 and Participant 11. While making these needed adjustments was seen as important by the all participants as voiced in the interviews and questionnaire, it simply was not seen at high levels during the observations. Part of this disconnect can be explained, as it was earlier, by the much narrower scope of time associated with the observations compared with the interviews and questionnaire. Participant 8 expressed this importance by saying, "You have to adjust if they don't understand; and if the way you are teaching isn't working, you need to find another way; where it gets it across to them."

Participant 5 also expressed the importance of making adjustments by saying, "Making adjustments is the key to teaching." Participant 2 took a unique approach in explaining the need for differentiation and refinement when making adjustments when he stated, "Adjustments can be both positive and negative. I could possibly damage the potential of a student by not allowing them to be challenged enough." Participant 11 explained the process of making adjustments in terms of a learning progression when she said, "It's not something that you 'get' or 'don't get.' The more you work to polish a piece of music, the better the performance." Adjustments include those changes made by the teacher and those made by the student being guided by the teacher. The professional learning strategy helps teachers learn to properly analyze formative data, make adjustments in their approaches, and help students make adjustments in order to move forward along learning progressions.

Knowledge versus Skills

It became apparent during the analysis of the data collected for this study that two teacher-participants stood out as using the entire formative assessment process more effectively than the others. The reason for this variation is that those two teachers were engaged in helping students develop skills while the majority of the others were disseminating information to students. While the process of formative assessment is a natural part of developing skills, is must be used more deliberately when acquiring knowledge. This was expressed very well by Participant 9 when he stated, "In athletics, you know exactly what you're teaching and if they're getting it or not. A lot of times when you're up there teaching, you don't really know if they're listening or not."

Participant 2 also described the difference by saying, "When completing a project, it is very important all students understand how to do each step." The professional learning strategy includes helping teachers learn how to "coach" students in the development of skills as well as the acquisition of knowledge.

Barriers

Whether the formative assessment process is used to develop skills or to acquire knowledge, there are barriers to its use that educators must overcome in order to consistently and effective use the formative assessment process. When asked about the barriers to the use of the process formative assessment, the teacher-participants had a variety of responses. Participant 6 said, "I think at times class managed." Participant 4 said, "Sometimes you move too fast in order to accomplish the goals and objectives." Participant 5 said, "Class sizes and different learning levels." Participant 6 said, "Prior knowledge may be necessary to understand harder concepts." Participant 7 said, "The stress of standardized tests." All of these can be seen as barriers to many different aspects of effective learning. During the observations, I noted a few additional barriers to the use of the effective use of the process of formative assessment. A few teachers had engaged in students in activities that did not require them to learn anything new. Learning and the formative assessment process are linked together. Without one, the other does not take place. Teachers who did not have positive productive relationships with their students were unable to properly engage them. These barriers are examined and teachers develop the tools needed to overcome them in the professional learning strategy.

Exit Ticket Initiative

Without proper collaboration and buy-in, teachers are unlikely to remain committed to an initiative. An initiative that required teachers to use a very commonly used formative assessment tool – exit tickets – had been started months before my data collection. This was initially a directive from the building principal that eventually involved some input from teachers according to a personal communication with the building principal. Though all teachers used the tool, many did not buy into its use as an effective way of improving student learning. This appeared to be a controversial topic during the interviews. The term "exit ticket" was used by the participants in the interviews twenty times. Eight of the eleven participants expressed an opinion about the effectiveness of exits tickets. While three expressed that exit tickets were effective, five expressed that were not. Participant 8 said, "I didn't like the exit tickets because I have to stop and sometimes we are not to that point." Participant 7 said, "I like the exit tickets because you basically get immediate response by just asking them a question at the end of the class period that deals with the task on-hand for that day. You know whether or not they got an understanding of it; and if they didn't, you can immediately the next day make changes." Understanding this phenomenon was necessary in the development of the professional learning strategy. This strategy is based on collaboration and uses the formative assessment process as an integral part of learning. Learners are central to the process which allows them to develop and practice formative assessment strategies and skills.

Synthesis

In presenting these findings, the intent has been to do so in as descriptive a manner as possible with substantial and direct evidence provided from the data collection instruments. In doing so, the data have been connected with the need for the professional learning strategy aimed at improving student learning through the improved deliberate use of the formative assessment process which is the project developed from the findings of this study. The elements of this professional learning strategy are both research-based and evidence-based. The methodology of this strategy is based on the social constructivist framework that has guided this study. The alignment of the various sections and elements of this project study strengthens the usefulness of the study in improving student learning by working to close the achievement gaps between various subgroups of students while improving overall academic achievement.

Conclusion

Section 2 of this study outlined the methodology, including the research design, the research tradition which the study follows, justification for the choice of design, the participants, measures used to protect the participants from harm, the three methods of data collection, data analysis and the findings. This study's research design is a qualitative case study that explores teacher perceptions about the process of formative assessment. This study follows the qualitative tradition of inductive reasoning to discover how teachers perceive the process of formative assessment as a part of their practice. The guiding question of this research, seeking to uncover these perceptions, guided the selection of the case study methodology rather than other methods that would

be unable to provide the thick rich narrative needed for a thorough understanding of the phenomenon. The participants in this study include 11 teachers from a rural middle school located in the south central region of the United States. Measures were taken to protect these participants from harm including obtaining informed consent and maintaining privacy and confidentiality. Data for this study were collected using observations, interviews, and a questionnaire. These data were analyzed to identify associative themes.

Section 3 describes the project developed from the findings of this study. This project is a professional learning strategy that incorporates the use of the formative assessment process to provide teachers with a collaborative structure to improve their practice. Elements of the project are outlined including: (a) the goals of the project, (b) the rationale for choosing this approach, (c) a review of the associative literature, (d) the implementation process, (e) the methods used to evaluate the project, and (f) the implications for social change.

Section 3: The Project

Introduction

The purpose of this study was to explore the value teachers at Crestview Middle School place on the process of formative assessment as well as their experiences with the formative assessment process. Student achievement data indicated a lack of consistent engagement in meaningful standards-based learning as well as an academic achievement gap between various subgroups of students. A review of the literature demonstrated a link between the proper use of the formative assessment process and student achievement. This link between student achievement data and the literature on the formative assessment process justified the need for an exploration of how the formative assessment process was used at Crestview.

This study is a qualitative case study that explored teacher perceptions about the formative assessment process and their experiences with the formative assessment process. Qualitative data were collected in the forms of interviews, observations, and a questionnaire. The research questions guided the development of the data collection instruments as well as data collection and analysis. The research questions focused the study on an exploration of how teachers at Crestview used formative assessment, how they felt about the formative assessment process, and the barriers they perceived to exist limiting their use of the formative assessment process. The findings of this study suggested a need for the development of a professional learning experience for teachers aimed at improving overall student learning while narrowing the academic achievement gaps by improving teachers' use of the formative assessment process.

Section 3 describes the professional learning experience developed from the findings of this study. The project goals and rationale are outlined. A review of the literature on professional learning communities (PLCs) is included. The choice of using PLCs as the structure for the professional learning experience is justified. A connection is made between social constructivism, the formative assessment process, and PLCs. The implementation of the project and the plan for the evaluation of the project is described. Finally, the implications of the project for enacting positive social change are proposed.

Description and Goals

The purpose of this project is to improve teachers' abilities to use the formative assessment process, thereby implementing a solution to the problem suggested by the findings of this study that were derived from the data collected. This professional learning experience uses the formative assessment process and is based on social constructivism. The strategy includes the establishment of PLCs as the collaborative structures within which learning takes place. As members of PLCs, teachers work together to develop unique approaches to improving their practice. Based on the analysis of data, the associative elements of their practice that teachers collectively work to improve include: (a) collecting formative data, (b) using formative data, and (c) involving students in the formative assessment process.

The formative assessment process is both the topic addressed by this professional learning experience and an embedded element of the learning process in which teachers are engaged. The formative assessment process involves the collection of formative data using a variety of methods and using that data in real time to improve student learning as

learning takes place. Ideally, formative assessment demonstrates to learners that success is within their reach and encourages them to stay engaged and to keep moving toward the learning targets (Gewertz, 2015). Teachers in this project experience the formative assessment process in an analytic manner as a learner, helping them to understand the importance of the process better and to improve their use of the process in such a way that student learning is improved. The teacher-participants develop strategies that work best for them by using a constructivist approach to learning.

Student academic achievement, as measured by summative data from state-mandated testing, is poor at Crestview Middle School. The school earned an overall "F" grade on the most recent state report as well as "F" grades in every subject area measured, according to reports from the department of education in the state. Data also indicate a relatively wide gap between the bottom and upper quartiles of students and between the three principal ethnic subgroups at the school. Qualitative data collected and analyzed for this study indicate that teachers at Crestview are not consistently using the formative assessment process to improve student learning.

This project is focused on improving teachers' use of the formative assessment process through an authentic professional learning experience. The overall goal of this project, which implements a professional learning experience for teachers aimed at improving their use of the formative assessment process, is to improve student learning. This overall goal is broken down into six goals.

Goal 1 of this project is to correct these misunderstandings. The first step in the proper use of the formative assessment process is to clearly define and communicate the

learning targets to students. Data collected at Crestview show a limited use of this practice.

Goal 2 of this project is to give teachers the tools necessary to productively communicate learning targets to students. Data indicate a wide differentiation in the proper use of the formative assessment at Crestview. The formative assessment process tends to be used better when students are acquiring skills than when students are acquiring content knowledge.

Goal 3 of this project is to improve the use of the formative assessment process in the acquisition of knowledge based on the successful use of the process in the acquisition of skills. Data collected demonstrate a low level of student involvement in the use of the formative assessment process at Crestview.

Goal 4 of this project is to help teachers create student-centered learning environments in which students track their own progress toward learning targets in tandem with the tracking done by teachers. Questioning, observing, and using specialty tools are the ways in which formative data are collected. The Crestview data show a need for improvement in the collection of formative data.

Goal 5 of this project is to improve the abilities of teachers to collect formative data. It is crucial that formative data be used in real time to inform needed adjustments in ongoing learning experiences. Data from Crestview indicate limited use of formative data to make adjustments in ongoing learning.

Goal 6 of this project is to improve the ability of teachers to make real time adjustments in learning experiences and provide feedback in a productive manner.

Rationale

This project, which uses a PLC structure to provide a professional learning experience for teachers to improve their abilities to use the formative assessment process in order to improve student learning, was developed considering an alignment of the philosophical foundation of this study with understandings gained from the literature review and the findings suggested by an analysis of the data collected at Crestview Middle School. The philosophical foundation of this study is social constructivism, which is a learner-centered view of learning. The literature review revealed the crucial nature of learner involvement in the process of formative assessment as well as the student-centered nature of the process. Data collected at Crestview indicate limited student involvement in the formative assessment process. By using a PLC structure, which is a learner-centered collaborative approach to learning, teachers authentically experience the formative assessment process in a learner-centered environment.

Traditional professional development in the educational field involves the presentation of new ideas, strategies, concepts, or policies by an expert who disseminates knowledge to the group with little participation by the group members. A constructivist approach transforms this traditional passive learning experience into an authentic active learning experience (Li & Gu, 2015). Within the collaborative structure of PLCs, this learner-centered method maximizes synergy (Juvova, Chudy, Neumeister, Plischke, & Kvintova, 2015). Synergy is the exponential increase in effectiveness caused by the involvement of multiple people in an improvement project (Juvova et al., 2015). Instructors using a constructivist approach act as facilitators who are catalytic in the

learning process rather than being presenters of information (Sharma, 2014). The facilitators of this professional learning experience provide the structure in which learning takes place and act as catalysts to keep learning moving forward.

This social interaction among facilitators and learners takes place in what Vygotsky called the Zone of Proximal Development (ZPD), where facilitators, and often other learners, provide the scaffolding or support needed to move learners toward the learning targets (Yoders, 2014). Because learners are constructing the knowledge and building the skills themselves, constructivism places more responsibility on the learners and tends to be more motivating than instructor-centered approaches (Juvova et al., 2015). At the same time, it complicates the role of the facilitator who must be able to differentiate interactions with various members of the learning cohort (Yoders, 2014). This combination of increased responsibilities on the part of learners and facilitators results in improved engagement and improved learning (Li & Guo, 2015). The learners in this professional learning experience are charged with the responsibility to use this experience to improve student learning through improving their use of the formative assessment process.

This professional learning experience for teachers incorporates many elements of social constructivism. Teachers are engaged in experimental, hands-on, and collaborative learning as suggested by Li (2015). After the PLC structure has been formed, this professional learning experience begins with an analysis of preexisting knowledge which Sharma (2014) explained as the basis for the construction of new knowledge. As suggested by Sharma (2014), misconceptions are addressed as learning progress and

discourse among learners is fostered throughout the process. Carefully designed questioning and effective feedback is used as suggested by Yoders (2014).

Analysis of the public data and the data collected at Crestview Middle School show that the process of formative assessment was not being used effectively as a crucial element of learning. This project offers a solution to this problem by providing a professional learning experience for teachers aimed at improving their abilities to use the formative assessment process. This professional learning experience was developed from an analysis of the data tied to the understandings from the literature review so that the elements of the professional learning experience address the specific needs of teachers. Teachers improve their skills at collecting formative data, using formative data, and involving students in the formative assessment process. The second literature review of this study provides substantial evidence that a PLC structure is ideal for this type of a professional learning experience for teachers.

Review of the Literature

This review of the literature about PLCs is tied to the problem identified by this study and the findings suggested by the analysis of data collected at Crestview Middle School. This approach uses a PLC structure to provide a professional learning experience for teachers to improve student learning by improving the use of the formative assessment process is justified. PLCs are groups of educators who work collaboratively to improve student learning (DuFour, 2015). To improve their ability to use formative assessment, teachers need to work collaboratively (Aubrecht, Esswein, Schmitt, & Creamer, 2015). Unlike presentations, which are limited to the dissemination of

information from a particular point-of-view, PLCs provide the opportunity for teachers to develop skills collaboratively and benefit from multiple points-of-view (Jao & McDougal, 2015). It is important to understand the elements of effective PLCs, associative leadership responsibilities, the connections to the findings of this study, and how a PLC structure works in providing a professional learning experience for teachers to improve their use of the process of formative assessment.

Collegiality

Collegiality is a crucial element of an effective PLC. Members must have a shared vision, shared values, and sense of community (Sims & Penny, 2015). They must have a collective responsibility for the goals of the group (Hanson & Hoyos, 2015). Their shared mission should begin with the development of group norms that include respecting the diversity of thought (Adams & Vescio, 2015). Cohesion is needed in order for honest critique to take place (Stewart, 2014). Members should hold themselves accountable for achieving the goals of the group (Hoaglund, Birkenfeld, & Box, 2014). Ideally, an effective PLC becomes a purposeful community through the development of a strong sense of collective efficacy (Leithwood, Harris, & Hopkins, 2008). Improving the use of the formative assessment process is a complicated and challenging venture that requires teachers to work together as colleagues with a shared sense of purpose. An effective PLC includes a collegial atmosphere of cooperation. The inconsistencies and variations in the use of the process of formative assessment noted in the findings of this study warrant the collective approach provided by the collegiality of an effective PLC.

Goal-Oriented

Another vital element of effective PLCs is the establishment of goals. PLCs must use a solution-oriented approach in which group members know what they are expected to accomplish (Datnow & Park, 2015). Although it may be necessary for a PLC to be charged with a specific task, the group needs a broad goal such as improving student learning from which narrower goals can be generated (Sims & Penny, 2015; Zrike & Connolly, 2015). Members need to leave meetings with actionable strategies (Zrike & Connolly, 2015). A good strategy used in developing team goals is to ensure each goal is specific, measureable, attainable, results-based, and time-bound (SMART) (Kind, 2014).

The problem identified by this study was based on student achievement data. The data-driven nature of effective PLCs fits well with the need for establishing goals for a professional learning experience that is aimed at improving student learning as measured by student achievement data (Sims & Penny, 2015). The findings of this study are in the form of qualitative data which are ideal measures to determine the efficacy of a professional learning experience requiring the development of skills.

Discourse

High quality discourse is another important element of an effective PLC. Unlike traditional professional development in which information is presented to passive participants, PLCs are based on discourse among learners (Zrike & Connolly, 2015). Healthy disagreement is a productive part of the discourse that takes place in a well-established collegial atmosphere (Datnow & Park, 2015). Conversation among members

needs to be reflective of practice (Sims & Penny, 2015). A means to facilitate such discourse is through peer observations (Hanson & Hoyos, 2015). The findings of this study are about teaching and learning practices. PLCs are designed to improve teaching and learning practices.

Collaborative Inquiry

Collaborative inquiry is an essential element of an effective PLC. PLCs are made up of individuals with varied experiences, skills, and knowledge. The inquiry process must begin with the sharing of previous knowledge (DuFour, 2015). Ideally, PLCs involve long-term inquiry-based learning to improve student learning (Jao & McDougall, 2015). PLCs must reflect what members find through inquiry to be best practices (DuFour, 2014). PLCs involve authentic research-based learning (Jones & Dexter, 2014). The findings of this study demonstrate a need for teachers to be engaged in collaborative inquiry to develop best practices related to the effective use of the formative assessment process. The PLC structure includes collaborative inquiry which makes it possible for teachers involved in the professional learning experience to tailor their practice to the unique situations in which they teach.

Leadership

PLCs cannot be effective without proper support from school leaders. Teachers must be provided with dedicated collaboration time that is considered "sacred" (Datnow & Park, 2015; DuFour, 2014). Leaders must support and uphold the principles of PLCs including equality, choice, voice, reflection, praxis, and reciprocity (Stewart, 2014). Facilitators must recognize that individual members have different needs and that

collaborative skills must be developed (Adams & Vescio, 2015; Hoaglund et al., 2014). Leaders must provide support for new teachers (Hoaglund et al., 2014). The most important element of leadership needed to foster successful PLCs is the establishment of trust (Thornton & Cherrington, 2014). Teachers need to know that their opinions and experience are valued and that they are trusted to make decisions and choices regarding their teaching practices (Jao & McDougall. 2015). With proper leadership, teachers value PLC time as an opportunity to collectively improve student learning (Jones & Dexter, 2014).

Analyses of the employment of PLCs in educational settings have resulted in a continual refinement and improvement of the process as an effective method of collaborative learning among educators. Wiliam (2016) used the term, "Teacher Learning Communities (TLCs)" to describe a refined model of PLCs that includes specific strategies for the development of professional learning experiences such as this project. While this project uses the term, "PLC," its development relies on specific strategies suggested by current literature. Owen's (2014) study of the employment of PLCs in three innovative schools identified pivotal characteristics of well-functioning PLCs. The key to building highly effective PLCs is nurturing leadership (Owen, 2014). Dedicated time must be set aside for the learning groups to function. The exclusion of members of the faculty such as athletic coaches must not occur. Proper funding must be provided for collaborative inquiry. Clear expectations must be voiced. This project uses this nurturing leadership model as suggested by Owen (2104).

Communicating Learning Targets to Students

A crucial element of effectively using the process of formative assessment is the communication of learning targets to students. Effective lessons begin with establishing anticipatory set which includes communicating the learning targets of the lesson to students so they can work to reach them. It is not possible for students to assess their progress toward learning targets unless they are made aware of the learning targets. It was common during the observations done as part of this study for anticipatory set, including the communication of learning targets to students, to not take place as a part of the lessons presented to students. This finding has informed the development of this project which includes the development strategies to effectively communicate learning targets to students.

In referring to the work of Madeline Hunter, Graham and West (2015) defined anticipatory set as, "setting the stage for what students are going to learn" (p. 325). Informing students of the learning targets is fundamental to establishing anticipatory set. In doing so, Graham and West (2015) emphasized the importance of using a "hook" to capture the attention of students, keeping them engaged from the very beginning of a lesson. Capturing students' attention at the beginning of a lesson can be dramatic or subtler. Examples include using video clips, comics, and props or stressing the authentic benefits of the lesson to students (Graham & West, 2015).

While the quality of the expression of learning targets varies, the majority of students view their awareness of learning targets as important (Brooks, Dobbins, Scott, Rawlinson, & Norman, 2014). It should be noted that poorly fashioned learning targets

may limit learning. This project will include the development of strategies for the construction of high quality learning targets that foster exploratory learning when appropriate. The most important finding of the study done by Brooks et al. (2014) for this project is that students do not always fully understand learning targets at the beginning of a lesson. This finding emphasizes that learning targets must be introduced as part of anticipatory set and continually examined throughout the progress of a lesson.

Self-Directed Learning

Making students aware of learning targets is the beginning of fostering self-directed learners. The social constructivist framework, upon which this study and project are built, necessitates the inclusion of students in the learning process, as well as the development of self-directed learners. Although learning has always been a voluntary activity involving self-direction, educators purposefully fostering self-directed learners can be seen as a disruptive force in the transition from the era of high-stakes testing to an era that serves the individual needs of students (Caravello, Jimenez, Kahl, Brachio, & Morote, 2015). In many learning activities such as the development of technological skills, students prefer directing their own learning (Caravello et al., 2015). It should be noted that Lee, Tsai, Chait, and Koht (2014) found that face-to-face instruction in the initial phase of learning new technology skills improves the ability of students to learn the new skills and stay focused on achieving specific learning goals. Students must have the capacity for self-directed learning in order to be successful in life (Caravello et al., 2015). A crucial part of self-directed learning is using the formative assessment process

to evaluate one's own progress toward learning targets in order to make adjustments in the approaches being taken to reach these targets.

While students tend to recognize that they control a great deal of their own learning, they also view their teachers as having a vital role in the learning process including providing motivation for them to progress toward learning targets (Douglass & Morris, 2014). As the facilitator of learning, it is the role of the teacher to create an environment in which students become self-directed learners (Saxon, 2013). In teaching students to be self-directed learners, educators must develop metacognitive skills in their students in order to make students aware of how they learn (Douglass & Morris, 2014). Self-directed learners are able to take a problem, frame it in such a way that it can be solved, and engage in a step-by-step approach to reaching the solution (Bullock, 2013). This project, as suggested by Slavit and McDuffie (2013), views teachers engaged in a professional learning experience as self-directed learners who self-identify their own learning needs and work to fulfill these needs. This professional learning experience involves teachers as self-directed learners learning, among other things, to foster self-directed learning in their students.

Learning by Doing

This project uses a collaborative approach to learning as well as a "learning by doing" format. Just as the importance self-directed learning has been stressed as part of recent educational trends, such as a growing emphasis on STEM (Science, Technology, Engineering, and Mathematics), so has "learning by doing." Both teachers and students believe in the benefits of engaging in authentic activities as a way to learn (Moye,

Dugger, & Stark-Weather, 2014). As with fostering self-directed learning, teachers under the pressure imposed by high-stakes testing are reluctant to embrace "learning by doing" even though they tend to view project-based learning as more meaningful than traditional transfer of knowledge models (Dole, Bloom, & Kowalske, 2016). This concern can be addressed by developing a results-based accountability system as suggested by Jamal, Essawi, and Tilchin (2014). Activities should be designed to focus students on the accomplishment of meaningful learning target and should include frequent self-assessment.

Summary

This second review of the literature focused on the genre of this project which is the use of PLCs as the structure for providing a professional learning experience for teachers to improve student learning by improving the use of the formative assessment process. Literature searches were made to develop an understanding of PLCs as well as collaborative professional learning in the education field. Saturation was reached as additional searches yielded little new information related to collaborative learning in the education field. The literature searches were made primarily online using EBSCO Host and a variety of databases including ERIC and Educational Research Complete. Search terms used included, professional learning communities, PLCs, collaborative inquiry, and collaborative learning. Most of the primary source articles used were peer-reviewed and were written within the past five years.

Implementation

Based on the analysis of data collected at Crestview Middle School and following the social constructivist tradition, this project is a professional learning experience for teachers aimed at improving student learning through the improvement of the use of the formative assessment process. A PLC structure is used to provide the collaborative inquiry and the collaborative strategy development needed for teachers to effectively accomplish the overall goal of improving student learning. Potential resources and existing supports are identified. Potential barriers are discussed along with strategies to overcome them. A proposal for implementation is outlined along with roles and responsibilities of those involved in the professional learning experience.

Potential Resources and Existing Supports

Crestview's schedule already includes one and one-half hours of professional development time each Friday afternoon. The use of this time varies from week to week, but typically includes faculty and committee meetings as well as some collaborative learning time for teachers. The availability of this time without making changes that typically can only be done annually supports the possibility of the implementation of this project at Crestview. Schools without such dedicated time need to make a commitment to improving student learning through a collaborative effort including setting significant time aside for project implementation. The principal and assistant principal at Crestview support the development of data-driven strategies aimed at improving student learning. This support helps facilitate the implementation of this project. Schools that lack such support need to develop such strategies in order to implement the project. As the

Crestview data show, a few of the participant teachers in the study demonstrate very effective use of the formative assessment process. These teachers are likely to become resources within the PLC structure for helping others improve their practice. It is likely that such expertise can be found at other schools as well. The teachers at Crestview have had experience with the collaborative structure of PLCs. This previous experience enhances the potential success of this project. Schools that do not have a PLC structure in place need to develop one as part of the implementation of this project.

Potential Barriers

Although weekly time is provided for professional development, it is not used exclusively for the collaborative learning of the teachers. Because of other school responsibilities such as coaching and bus driving, several of the teachers at Crestview rarely attend the Friday meetings. While it may not be possible to use all of the time allotted for collaborative learning, the limitations of time and participation would need to be solved in order for this project to be successful with all teachers. It may be possible to hold PLC meetings every other week and find a way to reschedule or cover the responsibilities of those who cannot attend the meetings. Other schools need to provide dedicated time for all members of the faculty to participate in this project. The complicated nature of the formative assessment process is another potential barrier. A commitment to long-term collaborative inquiry and collaborative strategy development by school leadership helps to overcome this obstacle to success.

Proposal for Implementation and Timetable

The first step in the implementation of this project is to gain the support of the school administration. An executive summary has been prepared to provide the participants, school leaders, and other stakeholders with information they can use to make a decision of whether or not to support the implementation of this project. The data-driven findings of this study provide ample evidence of the need to improve the use of the process of formative assessment as a way of improving overall student learning while narrowing academic achievement gaps. In proposing this project, it is important to request dedicated time for collaborative inquiry and strategy development and long-term support from school leaders. After obtaining support from the school leaders, the next step is to organize a PLC structure if one dos not already exist in the school.

Rather than structuring the PLCs based on subject-areas, this project is best structured as mixed subject-area PLCs. This makes it possible to include at least one teacher on every team who primarily develops skills in students such as coaches and music teachers. The teams of four to eight teachers are to meet with school leaders and the facilitator to converse about this project and to demonstrate the support of and trust in the faculty members who are collaborating to develop strategies to check for understanding and make adjustments in learning in real time in order to keep all students engaged and moving toward the learning targets. It needs to be made clear that the teachers have a great deal of autonomy in the development and implementation of strategies. It needs to be made clear that the administration maintains the dedicated time allotted for this project. A task of the first meeting of each group is to develop group

norms that include respecting the diversity of thought. Members, not facilitators or administrators, establish the norms for their meetings. A template designed by me is provided to help facilitate this process.

Before the PLC groups are be able to function and complete their tasks, the facilitator enables a whole-group discussion using the Project Presentation (see Appendix A). Each participant is to be given a handout of this presentation and a copy of the Formative Assessment Process Summary Chart. This discussion provides the participants with a working knowledge of the formative assessment process, knowledge of the PLC structure if needed, and assigns the group tasks. Misconceptions about the formative assessment process are addressed so the teachers can begin the process of collaborative inquiry with some foundational knowledge (Aubrecht et al., 2015). Based on their early discourse, teachers establish goals based on their analysis of their experiences with the formative assessment process (Patel & Laud, 2015). Each teacher is provided with a copy of the Formative Assessment Process Self-Evaluation Skills Rubric to track his or her own progress toward developing expert formative assessment skills as suggested by Kinne, Hasenbank, and Coffey (2014). This rubric, based on the goals of this project, serves as the guideline for the collaborative development of formative assessment skills. The claim-evidence-reasoning approach to demonstrating knowledge about a particular topic as suggested by Keeley (2015) is used by the teachers.

The teacher-participants are provided with some formative assessment tools and ideas which they can use to keep themselves moving toward the learning targets they establish for themselves and their progress toward developing expert formative

assessment skills as outlined in the rubric. The explanation of these tools and ideas also serves as examples of the proper use of the formative assessment process. The facilitator explains to the teachers that all formative assessment begins with determining the learning targets (Fisher & Frey, 2014). It is the movement toward the learning targets that formative assessment determines. The facilitator demonstrates the use of the online formative assessment tool, Poll Everywhere, by using it to inquiry about previous knowledge of the formative assessment process (Smith & Mader, 2015). A feedback loop which enables students to see how they are progressing is explained to the teachers by the facilitator (Cohen, 2014). The facilitator explains to the teachers the importance of frequently using authentic assessments (Eckstein, 2014). Finally, the facilitator explains to teachers that the formative assessment process must center on keeping students believing in themselves (Gewertz, 2015).

After gaining a working knowledge of the formative assessment process, the teams begin the processes of collaborative inquiry and collaborative development of strategies. Consistent support is provided by the facilitator and school administration, but the teams have the autonomy to develop strategies as professional educators. Demonstrations and analyses of the demonstrations of the use of the formative assessment process by the teachers are encouraged. The teams hold themselves accountable for making progress toward developing expert formative assessment skills. The proposed timeline for this project is to allow teachers a school semester to improve their skills. The evaluation of the efficacy of this project takes place during the semester following its implementation.

Project Evaluation

Although the teams hold themselves accountable during the process of the development of formative assessment skills, the school administrators use the district's teacher evaluation process to collect qualitative data related to the use of the formative assessment process. For Crestview, two of the 20 evaluation criteria used directly relate to the proper use of the formative assessment process. Teachers must demonstrate that they are checking to determine if students are progressing toward stated objectives and must demonstrate changing instruction based on their monitoring of student performance. The evaluative goals of this project are (a) an increase of 20% in the ratings of teacher performance on the two teacher evaluation indicators associated with the proper use of the formative assessment process and (b) an increase of 20% in all subject-area summative assessment averages mandated by the state. The teacher evaluation data and the state-mandated testing data were used to identify the problem which is the basis for this study. Using the same data sources as were used in identifying the study's associative problem after the implementation of this project is sound method of evaluating the efficacy of this project. Other schools can use a similar strategy to evaluate the efficacy of this project.

Implications Including Social Change

Local Community

This study is significant to Crestview Middle School because it provides a link between the poor academic performance of students and a professional learning experience with the potential to improve student academic performance. Although the

faculty of Crestview Middle School is made up of dedicated educators, students are performing far below the state averages in all subject areas as measured by the state-mandated assessments. In addition, a significant academic achieve gap exists between the various ethnic subgroups at the school. Data collected by this study indicate that students are often not engaged in meaningful standards-based learning and teachers are inconsistently checking for engagement and progress toward learning targets as well as inconsistently using formative data to make adjustments in the learning experiences they facilitate for students. By providing teachers at Crestview with a professional learning experience to improve their use of the formative assessment process, this project is aimed at improving overall student learning while narrowing the academic achievement gaps. This project has the potential for enacting positive social change by helping teachers provide an equitable education to all students.

Far-Reaching

While statistical generalizations of qualitative findings are not possible, analytic generalizations are possible (Yin, 2014). The link established by the literature review of this study between the proper use of the formative assessment process and improving student learning applies beyond Crestview Middle School. It is reasonable to postulate that improving the use of the formative assessment process at any school results in an improvement in student learning. For schools with poor overall student academic performance and significant academic achievement gaps, the analytic generalization of the findings of this study and the potential of this project in improving student learning would seem to be more likely than those that are dissimilar to Crestview. This project is

intended to provide an approach to addressing the individual learning needs of students and, thereby, narrow academic achievement gaps among various subgroups. It is for those at other schools to view the findings of this study and the potential of this project for improving student learning from the contexts of their schools to determine just how this study may be applied in those contexts to enact positive social change by providing an equitable education to all students

Conclusion

Section 3 described the project suggested by the data analysis of this study which is a professional learning experience aimed at improving overall student learning while narrowing the academic achievement gaps. This professional learning experience uses a PLC structure to promote the effective collaborative development of formative assessment strategies. The overall goal of this project, to improve student learning, is broken down into six sub-goals that form a roadmap for the teachers engaged in the professional learning experience. Social constructivism, the first literature review, and the analysis of the data collected at Crestview Middle School are tied together to justify the use of a PLC structure as the foundation for this project. The second literature review provides an understanding of the PLC process and connects its use to the findings of this study. The proposed implementation of this project is outlined. Finally, the implications of this project for the enactment of positive social change are suggested.

Section 4 concludes this study with reflections and conclusions. The strengths and limitations of this study are outlined. The associative scholarship is discussed. My personal development as a scholar practitioner and project developer is considered. The

potential positive impact on social change of the project is contemplated. Finally, the implications of this study for the field of education and future research are delineated.

Section 4: Reflections and Conclusions

Introduction

Section 4 begins by explaining the strengths of the project, which include a high degree of authenticity in that the use of the formative assessment process is embedded in the professional learning experience for teachers. This learning experience is aimed at improving student learning by improving teachers' abilities to use the formative assessment process. I discuss the limitations of the project, specifically, the complicated nature of the process of formative assessment. A discussion of my own development as a scholar-practitioner, which involved gaining respect for qualitative methodology and an improved sense of self-efficacy in research and project development is included. The focus of this study has been to improve overall student learning while narrowing academic achievement gaps. Offering an authentic tool to be used to improve teachers' abilities to effectively use the formative assessment process shows great promise in improving student learning and, thereby, accomplishing the goal of enacting positive social change.

Project Strengths

This project's strength centers around the strong link established between the proper use of the formative assessment process and improving student learning. This link suggests that the improvement in teachers' abilities to gather and use formative data to keep all students engaged and moving toward learning targets results in an improvement in student learning. The formative assessment process is authentically embedded in the professional learning experience. By its collaborative nature, the PLC structure fits very

well with social constructivism which is the philosophical foundation of this study. This project addresses the issue that data collected at Crestview Middle School provide strong evidence of inconsistent use of the formative assessment process.

Recommendations for Remediation of Limitations

The project's limitations center on the complicated nature of the process of formative assessment. In order to address all aspects of the formative assessment process, a significant amount of time must be devoted to collaborative inquiry and the collaborative development of formative assessment strategies. Each strategy developed must be evaluated in practice and improved upon to maximize its efficacy. All six goals of the project must be accomplished in intervals in order to develop expert formative assessment skills. This long-term process works best when school leaders are committed to providing consistent support and motivation for teachers. This problem could be addressed more quickly through a presentation model rather than using the PLC structure; however, this would lead to the loss of authenticity and would limit the engagement and commitment of participants in the project.

Scholarship

In conducting this study, I developed a better understanding of scholarship. I have learned to appreciate the value of scholarly inquiry in providing evidence for intellectual discourse. I have learned to view the inductive approach to qualitative research as a way to provide a detailed description of a phenomenon, and to consider alternative explanations as a way of seeking the truth about phenomena. I have also

gained a great deal of respect to the formative assessment process as a means to improve scholarly writing.

Project Development and Evaluation

In developing this project, I have honed my skills as a project developer. In conducting the literature reviews, I have learned to use an evidence-based approach. In maintaining an alignment of the various elements of the study throughout, I have learned to begin with the goals and to develop the details of a project from these goals. In being engaged in the formative assessment process with my committee, I have learned the importance being reflective and examining the strengths and weaknesses of a project as a way to improve the project. Finally, through the analytical process, I have learned the importance of leadership support in ensuring the success of a project.

Leadership and Change

In constructing this project study, I have improved my understanding of the importance of leadership in enacting meaningful change. In education, problems require solutions that most often require the commitment of people. Through strong relationships and mutual trust, people can remain committed to enacting even difficult changes in which they believe. Change within an organization should be based on a shared vision and shared values. I have learned that a collaborative approach to enacting change is crucial to the success of a change initiative.

Analysis of Self as Scholar

As a scholar, I have grown to enjoy the research process as well as the construction of scholarly ideas in papers such as this study. I have learned the

importance of consistent devotion to a venture through my struggle to stay committed to the completion of this study. I consider myself to be well-read in the field of education and enjoy engaging with other in discussions about a wide range of educational topics. I believe a scholar has an obligation to share knowledge with others to improve his field and that a scholar in the field of education has an obligation to use his knowledge to improve student learning.

Analysis of Self as Practitioner

The experience of conducting this project study has improved by skills as a practitioner. As a school administrator, I apply the knowledge and skills I have gained on a daily basis. My approach to instructional leadership involves providing teachers with the intellectual tools needed to improve their practice. Through the process of inquiry associated with conducting this study as well as the coursework at Walden, I have developed a significant base of knowledge from which I can draw solutions to dilemmas that I face and those faced by others to whom I can provide assistance. I am a better leader as a result of my Walden experience.

Analysis of Self as Project Developer

Developing this study has improved my sense of self-efficacy regarding the development of detailed solutions to problems. I am able to see solutions to complicated problems better. I now view project development as a step-by-step process that includes a great deal of relationship building. I have learned that the logistics of a project can be complicated. The goals of a project, however, can be accomplished by enlisting the cooperation of others in the process of project development. As a school leader, the

understanding of the high efficacy of collaborative effort gained from the process of conducting this study will serve me well.

The Project's Potential Impact on Social Change

The importance of this study to Crestview Middle School and beyond is that it identifies a serious problem, a major contributing factor, and a solution with a high likelihood of success. The professional learning experience suggested by the findings of this study using a PLC structure has a strong potential for improving student learning by improving teachers' abilities to use properly the formative assessment process. Positive social change involves the improvement in the wellbeing of society. The purpose of schooling is to prepare students to be successful in life. A poor quality education puts an individual at a disadvantage in life. Social injustice exists when society fails to educate properly entire groups of people. This project study aims to enact positive social change by improving overall learning, while narrowing the academic achievement that exists between the three principal ethnic groups at Crestview Middle School. This project has potential to be used successfully in setting other than Crestview.

Implications, Applications, and Directions for Future Research

The purpose of this study was to explore the use of the formative assessment process at Crestview Middle School. The strong link between the proper use of the formative assessment process and improving student learning was established. This demonstrates the importance of formative assessment in the overall process of learning. It has been shown that using PLCs, as social constructivist structures in which teachers can engage in collaborative efforts to improve student learning, is a better way to gain

professional knowledge and skills than traditional presentation type of professional development.

Future research about the formative assessment process ought to include conducting similar studies in different contexts to strengthen the transferability of this study's findings. Quantitative research could demonstrate the efficacy of various formative assessment tools. The most significant finding of this study was discovering the difference between the ways in which the formative assessment process is typically used when developing skills in students as compared with disseminating information to students. The interests of improving student learning would be well-served by focusing future research on this phenomenon. Learning of all kinds may be significantly enhanced with the use of what many see as coaching techniques which are defined in this study as the formative assessment process.

Conclusion

Section 4 included reflection on several aspects of this project study and the process of conducting it. Strengths of the project study such as the establishment of a strong link between the proper use of the formative assessment process and improving student learning were identified. Limitations of the study, such as the complicated nature of the formative assessment process were discussed. A self-analysis of scholarship, project development, and the leadership of change initiatives were included. The project study's potential impact on social change by improving student learning was discussed. Finally, the future implications of the study were outlined.

As a school administrator, I began the process of doing this study seeking to understand the disconnection between what appeared to be high quality instruction and student achievement on measures such as state-mandated testing. I wanted to know why students failed to learn in spite of the fact that teachers taught the objectives. What I found to be missing, in what otherwise appeared to be high quality instruction, was the proper use of the formative assessment process. Teachers must check for understanding and progress toward learning targets and make adjustments in real time in order to keep students engaged in meaningful learning and moving toward the established learning targets. The professional learning experience for teachers developed out of the findings of this study is an authentic tool that can be used to improve student learning by improving the abilities of teachers to properly use the formative assessment process. The ultimate goal of this project study has been to enact positive social change by improving overall student learning and narrowing academic achievement gaps among various groups of students.

References

Adams, A., & Vescio, V. (2015). Tailored to fit: Structure professional learning communities to meet individual needs. *Journal of Staff Development*, *36*(2), 26-28. Retrieved from www.learningforward.org

Alonzo, A. (2011). Learning progressions that support formative assessment practices. *Measurement: Interdisciplinary Research and Perspectives*, *9*(2-3), 124-129. doi: 10.1080/15366367.2011.599629

Andrade, H., Heffern, J., & Palma, M. (2014). Formative assessment in the visual arts. *Art Education*, *67*(1), 34-40. Retrieved from http://www.naea-reston.org/

Arghode, V. (2012). Qualitative and quantitative research: Paradigmatic differences. *Global Education Journal*, *2012*(4), 155-163. Retrieved from http://www.franklinpublishing.net

Aubrecht II, G. J., Esswein, J., Schmitt, B., & Creamer, J. (2015). Using common formative assessments (CFAs) as a means to quantify perceived student changes in IMPACTed teachers. *AURCO Journal*, *21*1-18. Retrieved from http://aurco.net/journal

Aylward, G. (2010). Visual formative assessments: The use of images to quickly assess and record student learning. *Science Scope*, *33*(6), 41-45. Retrieved from http://www.nsta.org

Babri, T., Kippers, V., Papinczak, T., Peterson, R., & Wilkinson, D. (2011). Students generating questions for their own written examinations. *Advances in Health Sciences Education*, *16*(5), 703-710. doi: 10.1007/s10459-009-9196-9

Bakula, N. (2010). The benefits of formative assessments for teaching and learning. *Science Scope*, *34*(1), 37-43. Retrieved from http://www.nsta.org

Beckett, D.& Volante, L., (2011). Formative assessment and the contemporary classroom: Synergies and tensions between research and practice. *Canadian Journal of Education*, *34*(2), 239-255. Retrieved from http://ojs.vre.upei.ca/index.php/cje-rce/article/view/407

Belcher, S. & Lowe, G. (2012). Direct instruction and music literacy: One approach to augmenting the diminishing? *Australian Journal of Music Education*, (1), 3-13. Retrieved from http://www.asme.edu.au/

Black, P., & Wiliam, D. (1998). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan*, *80*(2), 139-144, 146-148. Retrieved from http://pdk.sagepub.com/content/92/1/81

Boboc, M. & Vonderwell, S. (2013). Promoting formative assessment in online teaching and learning. *Techtrends: Linking Research and Practice to Improve Learning*, *57*(4), 22-27. doi:10.1007/s11528-013-0673-x

Bondi, J. & Wiles, J. (2011). *Curriculum development: A guide to practice.* Upper Saddle River, NJ: Pearson.

Briggs, D., Furtak, E., Ruiz-Primo, M., Shepard, L., & Yin, Y. (2012). Meta-analytic methodology and inferences about the efficacy of formative assessment. *Educational Measurement: Issues & Practice*, *31*(4), 13-17. doi:10.1111/j.1745-3992.2012.00251.x

Brookhart, S. (2011). Educational assessment knowledge and skills for teachers. *Educational Measurement: Issues and Practice*, *30*(1), 3-12. doi: 10.1111/j.1745-3992.2010.00195.x

Brooks, S., Dobbins, K., Scott, J. J., Rawlinson, M., & Norman, R. I. (2014). Learning about learning outcomes: the student perspective. *Teaching In Higher Education*, *19*(6), 721-733. doi:10.1080/13562517.2014.901964

Buck, G. & Trauth-Nare, A. (2011). Assessment "for" learning: Using formative assessment in problem- and project-based learning. *Science Teacher*, *78*(1), 34-39. Retrieved from http://www.nsta.org/publications/browse_ journals.aspx?action=issue&id=10.2505/3/tst11_078_01

Bullock, S. M. (2013). Using digital technologies to support self-directed learning for preservice teacher education. *Curriculum Journal*, *24*(1), 103-120. Doi: 10.1080/09585176.2012.744695

Bulunuz, N., Bulunuz, M., & Peker, H. (2014). Effects of formative assessment probes integrated in extracurricular hands-on science: Middle school students' understanding. *Journal of Baltic Science Education*, *13*(2), 243-258. Retrieved from http://www.jbse.webinfo.lt/journal.htm

Busby, R. S., Stork, T., & Smith, N. (2014). Proof in the pudding: A mix of integrative and interactive strategies in middle school literacy. *Journal of Social Studies Research*, 13-22. Retrieved from www.thejssr.com/

Caravello, M. J., Jiménez, J. R., Kahl, L. J., Brachio, B., & Morote, E. (2015). Self-directed learning: College students' technology preparedness change in the last 10 years. *Journal For Leadership and Instruction*, *14*(2), 18-25. Retrieved from http://jrl.sagepub.com/

Chang, J., Benamraoui, A., & Rieple, A. (2014). Learning-by-doing as an approach to teaching social entrepreneurship. *Innovations in Education and Teaching International*, *51*(5), 459-471. Retrieved from http://www.tandfonline.com/toc/riie20/

Chappuis, J. (2012). How am I doing? *Educational Leadership*, *70*(1), 36-40. Retrieved from ascd.org

Chappuis, J. (2014). Thoughtful assessment with the learner in mind. *Educational Leadership*, *71*(6), 20-26. Retrieved from ascd.org

Chen, P., Hernandez, A., & Dong, J. (2015). Impact of collaborative project-based learning on self-efficacy of urban minority students in engineering. *Journal of Urban Learning, Teaching, and Research*, *11*26-39. Retrieved from http://www.aera-ultr.org/journal.html

Chin, C., & Teou, L. (2010). Formative assessment: Using concept cartoon, pupils' drawings, and group discussions to tackle children's ideas about biological inheritance. *Journal of Biological Education (Society of Biology)*, *44*(3), 108-115. Retrieved from https://www.societyofbiology.org/education/jbe

Clark, I. (2012). Formative assessment: A systematic and artistic process of instruction for supporting school and lifelong learning. *Canadian Journal of Education*, *35*(2), 24-40. Retrieved from http://ojs.vre.upei.ca/index.php/cje-rce/article/view/983

Clarke, D. J., Clarke, D. M., & Sullivan, P. (2012). How do mathematics teachers decide what to teach? Curriculum authority and sources of information accessed by Australian teachers. *Australian Primary Mathematics Classroom*, *17*(3), 9-12. Retrieved from http://www.aamt.edu.au/Webshop/Entire-catalogue/Australian-Primary-Mathematics-Classroom

Cohen, M. T. (2014). Feedback as a means of formative assessment. *New Teacher Advocate*, *22*(2), 4-5. Retrieved from http://www.kdp.org/publications/nta

Conderman, G., & Hedin, L. (2012). Classroom assessments that inform instruction. *Kappa Delta Pi Record*, *48*(4), 162-168. doi: 10.1080/00228958.2012.733964

Cornelius, K. E. (2013). Formative assessment made easy. *Teaching Exceptional Children*, *45*(5), 14-21. doi: 10.1177/0040059914553204

Cornelius, K. E. (2014). Formative assessment made easy: Templates for collecting daily data in inclusive classrooms. *Teaching Exceptional Children*, *47*(2), 112-118. doi:10.1177/0040059914553204

Creghan, K., & Creghan, C. (2013). Assessing for achievement. *Science & Children*, *51*(3), 29-35. Retrieved from www.nsta.org

Creswell, J. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (Laureate custom ed.). Boston, MA: Pearson Education.

Crossouard, B., & Pryor, J. (2012). How theory matters: Formative assessment theory and practices and their different relations to education. *Studies in Philosophy and Education*, *31*(3), 251-263. doi: 10.1007/s11217-012-9296-5

Curtis, K., Derksen, A., & Roscoe (2013). Using presentation software to integrate formative assessment into science instruction. *Science Scope*, *36*(5), 48-57. Retrieved from http://www.nsta.org/

Danielson, K., Fluckiger, J., Pasco, R., & Vigil, Y. (2010). Formative feedback: Involving students as partners in assessment to enhance learning. *College Teaching*, *58*(4), 136-140. doi:10.1080/87567555.2010.484031

Datnow, A. & Park, B. (2015). Five good ways to talk about data. *Educational Leadership 73* (3), 7-15. Retrieved from www.ascd.org

Dede, C. (2011). Reconceptualizing technology integration to meet the necessity of transformation. *Journal of Curriculum & Instruction*, *5*(1), 4-16. doi:10.3776/joci.20yy.v5n1p4-16

Desoete, A., & De Weerdt, F. (2013). Can executive functions help to understand children with mathematical learning disorders and to improve instruction? *Learning Disabilities: A Contemporary Journal*, *11*(2), 27-39. Retrieved from http://www.ldworldwide.org/research/learning-disabilities-a-contemporary-journal

Dixon, F., Hardin, T., McConnell, J., & Yssel, N. (2014). Differentiated instruction, professional development, and teacher efficacy. *Journal for the Education of the Gifted*, *37*(2), 111-127. doi: 10.1177/0162353214529042

Doige, C. (2012). E-mail-based formative assessment: A chronicle of research-inspired practice. *Journal of College Science Teaching*, *41*(6), 32-39. Retrieved from http://www.nsta.org

Dole, S., Bloom, L., & Kowalske, K. (2016). Transforming pedagogy: Changing perspectives from teacher-centered to learner-centered. *Interdisciplinary Journal of Problem-Based Learning*, *10*(1). Retrieved from http://docs.lib.purdue.edu/ijpbl/

Dorn, S. (2010). The political dilemmas of formative assessment. *Exceptional Children*, *76*(3), 325-337. Retrieved from http://www.cec.sped.org

Doubet, K. (2012). Formative assessment jump-starts a middle grades differentiation initiative. *Middle School Journal*, *43*(3), 32-38. Retrieved from http://www.amle.org

Douglass, C., & Morris, S. R. (2014). Student perspectives on self-directed learning. *Journal of Scholarship of Teaching and Learning*, *14*(1), 13-25. doi: 10.14434/josotl.v14il.3202

Ducette, J., Schiller, J., Stull, J. & Varnum, S. (2011). The many faces of formative assessment. *International Journal of Teaching and Learning in Higher Education*, *23*(1), 30-39. Retrieved from http://www.isetl.org/ijtlhe/

Duckor, B. (2014). Formative assessment in seven good moves. *Educational Leadership, 71*(6), 28-32. Retrieved from ascd.org

DuFour, R. (2014). Harnessing the power of PLCs. *Educational Leadership*, *71*(8), 30-35. Retrieved from www.ascd.org

DuFour, R. (2015). How PLCs do data right. *Educational Leadership 73* (3), 22-26. Retrieved from www.ascd.org

Eckstein, J. (2014). The feedback loop and its influence on assessment design. *Techniques: Connecting Education & Careers*, *89*(6), 58-59. Retrieved from http://www.acteonline.org

Eker, C. (2014). The effect of teaching practice conducted by using metacognition strategies on students' reading comprehension skills. *International Online Journal of Educational Sciences*, *6*(2), 269-280. doi:10.15345/iojes.2014.02.002

Errey, R., & Wood, G. (2011). Lessons from a Student Engagement Pilot Study: Benefits for Students and Academics. *Australian Universities' Review*, *53*(1), 21-34. Retrieved from www.aur.org.au/

Fisher, D., & Frey, N. (2011). Feed up, feedback, and feed forward. *Science and Children*, *48*(9), 26-30. Retrieved from http://www.nsta.org

Fisher, D., & Frey, N. (2014). Formative assessment: Designing and implementing a viable system. *Reading Today*, *32*(1), 16-17. Retrieved from www.reading.org

Fletcher, J. (2013). Assessing rhetorically: Formative assessment. *California English*, *18*(4), 14-15. Retrieved from http://www.cateweb.org/california_english/ce_2013_may.htm

Fyfe, E. R., & Rittle-Johnson, B. (2016). Feedback both helps and hinders learning: The causal role of prior knowledge. *Journal of Educational Psychology*, *108*(1), 82-97. Retrieved from http://dx.doi.org/10.1037/edu0000053

Gavriel, J. (2013). Assessment for learning: a wider (classroom-researched) perspective is important for formative assessment and self-directed learning in general practice. *Education for Primary Care*, *24*(2), 93-96. Retrieved from http://www.radcliffehealth.com/journals/J02_Education_for_Primary_Care

Gewertz, C. (2015). Q&A formative-assessment misconceptions. *Education Week*, *35*(12), S4-S5. Retrieved from www.edweek.org/go/formativeQA

Glesne, C. (2011*). Becoming qualitative researchers* (4th ed.). Boston, MA: Pearson.

Grable, L., Overbay, A., Patterson, A., & Vasu, E. (2010). Constructivism and technology use: Findings from the impacting leadership project. *Educational Media International*, *47*(2), 103-120. doi:10.1080/09523987.2010.492675

Graham, L., & West, C. A. (2015). Want to make didactics more engaging: don't forget to use a hook!. *Education for Primary Care*, *26*(5), 325. doi:10.1080/14739879.2015.1079024

Grandgenett, N. (2012). Poll everywhere. *Mathematics & Computer Education*, *46*(1), 79-80. Retrieved from www.macejournal.org/

Gray, K., & Steer, D. N. (2014). Personal response systems and learning: It is the pedagogy that matters, not the technology. *Journal of College Science Teaching*, *43*(5), 80-88. Retrieved from www.nsta.org

Hanson, H., & Hoyos, C. (2015). The shift from "me" to "we": Schools with a coaching culture build individual and collective capacity. *Journal of Staff Development*, *36*(2), 42-45. Retrieved from www.learningforward.org

Hattie, J. (2012). *Visible learning for teachers*. New York, NY: Routledge.

Himmele, W., & Himmele, P. (2012). How to know what students know. *Educational Leadership*, *70*(1), 58-62. Retrieved from http://www.ascd.org

Hoaglund, A. E., Birkenfeld, K., & Box, J. A. (2014). Professional learning communities: Creating a foundation for collaboration skills in pre-service teachers. *Education*,*134*(4), 521-528. Retrieved from http://web.a.ebscohost.com.ezp.waldenulibrary.org

Jackson, L. (2009). Revisiting adult learning theory through the lens of an adult learner. *Adult Learning*, *20*(3/4), 20–22. Retrieved from http://www.aaace.org/mc/page.do?sitePageId=66286&orgId=aaace

Jamal, A., Essawi, M., & Tilchin, O. (2014). Accountability for project-based collaborative learning. *International Journal of Higher Education*, *3*(1), 127-135. doi: doi:10.5430/ijhe.v3n1p127

Jao, L., & McDougall, D. (2015). The collaborative teacher inquiry project: A purposeful professional development initiative. *Canadian Journal of Education*, *38*(1), 1-23. Retrieved from www.cje-rce.ca

Jenkins, J. (2010). A multi-faceted formative assessment approach: Better recognizing the learning needs of students. *Assessment & Evaluation in Higher Education*, *35*(5), 565-576. doi: 10.1080/02602930903243059

Jones, W. M., & Dexter, S. (2014). How teachers learn: The roles of formal, informal, and independent learning. *Educational Technology Research and Development*, *62*(3), 367-384. doi:10.1007/s11423-014-9337-6

Juvova, A., Chudy, S., Neumeister, P., Plischke, J., & Kvintova, J. (2015). Reflection of constructivist theories in current educational practice. *Universal Journal of Educational Research*, *3*(5), 345-349. Retrieved from http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1062318

Keeley, P. (2011). Formative assessment probes: With a purpose. *Science and Children*, *48*(9), 22-25. Retrieved from http://www.nsta.org/publications/browse_journals.aspx?action=issue&thetype=all&id=10.2505/3/sc11_048_09

Keeley, P. (2012). Birthday Candles: Visually Representing Ideas. *Science & Children*, *50*(3), 32-35. Retrieved from http://www.nsta.org

Keeley, P. (2015). Constructing Cl-Ev-R explanations to formative assessment probes. *Science & Children*, *53*(3), 26-28. Retrieved from http://www.nsta.org

Killion, J., & Roy, P. (2009). *Becoming a Learning School.* Oxford, OH: National Staff Development Council.

Kim, M., & Ryu, J. (2013). The development and implementation of a web-based formative peer assessment system for enhancing students' metacognitive awareness and performance in ill-structured tasks. *Educational Technology Research & Development*, *61*(4), 549-561. doi:10.1007/s11423-012-9266-1

Kind, J. (2014). United we learn: Team effort builds a path to equity and alignment. *Journal of Staff Development*, *35*(1), 46-50. Retrieved from www.learningforward.org

Kinne, L. J., Hasenbank, J. F., & Coffey, D. (2014). Are we there yet? Using rubrics to support progress toward proficiency and model formative assessment. *AILACTE Journal*, *11*(1), 109-128. Retrieved from http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1052581

Lee, K., Tsai, P., Chai, C. S., & Koh, J. L. (2014). Students' perceptions of self-directed learning and collaborative learning with and without technology. *Journal of Computer Assisted Learning*, *30*(5), 425-437. doi: 10.1111/jcal.12055

Leithwood, K., Harris, A., & Hopkins, D. (2008). Seven Strong Claims about Successful School Leadership. *School Leadership & Management*, *28*(1), 27-42.

Lewis, E., Baker, D., Watts, N. B., & Lang, M. (2014). A professional learning community activity for science teachers: How to incorporate discourse-rich instructional strategies into science lessons. *Science Educator*, *23*(1), 27-35. Retrieved from http://www.nsta.org/publications

Li, L., & Guo, R. (2015). A student-centered guest lecturing: A constructivism approach to promote student engagement. *Journal of Instructional Pedagogies*, *15*. Retrieved from http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1060070

Lodico, M., Spaulding, D., & Voegtle, K. (2010). *Methods in educational research: From theory to practice*. San Francisco, CA: John Wiley & Sons.

Love, N. (Ed.) (2009). *Using data to improve learning for all: A collaborative inquiry approach.* Thousand Oaks, CA: Corwin Press.

Madaus, G., & Russell, M. (2010). Paradoxes of high-stakes testing. *Journal of Education*, *190*(1/2), 21-30. Retrieved from http://www.bu.edu/journalofeducation/

Magana, S. & Marzano, R. (2014). Using polling technologies to close the feedback loop. *Educational Leadership, 71*(6), 82-83. Retrieved from ascd.org

Marshall, J. & Smart, J. (2013). Interactions between classroom discourse, teacher questioning, and student cognitive engagement in middle school science. *Journal of Science Teacher Education*, *24*(2), 249-267. doi: 10.1007/s10972-012-9297-9

Matlock, K. (2013). The reliability of DIBELS and its effective use as a response to intervention progress monitoring tool. *Journal of Educational Research & Policy Studies*,*13*(3), 110-129. Retrieved from http://normes.uark.edu/

Merriam, S. (2009). *Qualitative research: A guide to design and implementation.* San Francisco, CA: John Wiley and Sons.

Meyer, K. (2014). Making meaning in mathematics problem-solving using the reciprocal teaching approach. *Australian Journal of Language & Literacy*, *37*(2), 7-14. Retrieved from http://www.alea.edu.au

Moye, J., Dugger, W., & Starkweather, K. (2015). Learning by doing study: Analysis of second-year results. *Technology and Engineering Teacher*, *75*(1), 18-25. Retrieved from http://www.iteea.org/39191.aspx

Neuman, S. & Roskos, K. (2012). Formative assessment: Simply, no additives. *Reading Teacher*, *65*(8), 534-538.

Nolen, S. (2011). The role of educational systems in the link between formative assessment and motivation. *Theory into Practice*, *50*(4), 319-326. doi: 10.1002/TRTR.01079

Ostashewski, N., Moisey, S., & Reid, D. (2011). Applying Constructionist Principles to Online Teacher Professional Development. *International Review of Research in Open and Distance Learning*, *12*(6), 143-156. Retrieved from http://www.irrodl.org

Owen, S. (2014). Teacher professional learning communities: Going beyond contrived collegiality toward challenging debate and collegial learning and professional growth. *Australian Journal of Adult Learning*, *54*(2), 54-77. Retrieved from http://www.ala.asn.au

Patel, P., & Laud, L. E. (2015). Poetry feedback that feeds forward. *Middle School Journal*, *46*(4), 24-31. Retrieved from http://www.amle.org

Phelps, M. (2010). Real time teaching and learning. *Kappa Delta Pi Record*, *46*(3), 132-134. Retrieved from http://www.kdp.org/publications/archives/recordsp10.php

Rider-Bertrand, J. (2012). Writing to learn with STEM notebooks. *Children's Technology & Engineering*, *17*(1), 6-9. Retrieved from http://www.iteaconnect.org/

Risko, V. J., & Walker-Dalhouse, D. (2010). Making the most of assessments to inform instruction. *Reading Teacher*, *63*(5), 420-422. Retrieved from http://www.wiley.com.ezp.waldenulibrary.org/WileyCDA/

Sarid, A. (2012). Systematic thinking on dialogical education. *Educational Philosophy & Theory*, *44*(9), 926-941. doi: 10.1111/j.1469-5812.2011.00757x

Saxon, D. P. (2013). Student responsibility and self-directed learning: An interview with Christine McPhail. *Journal of Developmental Education*,*36*(3), 14-17. Retrieved from http://ncde.appstate.edu/publications/journal-developmental-education-jde

Scherer, M. (2014). The assessor's art. *Educational Leadership 71* (6), 7. Retrieved from ascd.org

Sharma, R. K. (2014). Constructivism - an approach to enhance participatory teaching learning. *Gyanodaya: The Journal of Progressive Education*,*7*(2), 12-17. doi:10.5958/2229-4422.2014.00003.6

Sims, R. L., & Penny, G. R. (2015). Examination of a failed professional learning community. *Journal of Education and Training Studies*, *3*(1), 39-45. Retrieved from www.redframe.com

Slavit, D., & Roth McDuffie, A. (2013). Self-directed teacher learning in collaborative contexts. *School Science and Mathematics*, *113*(2), 94-105. Retrieved from http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1949-8594

Smith, B., & Mader, J. (2015). Formative assessment with online tools. *Science Teacher*, *82*(4), 10. Retrieved from https://learningcenter.nsta.org

Splitter, L. (2009). Authenticity and constructivism in education. *Studies in Philosophy and Education*, *28*(2), 135-151. doi: 10.1007/s11217-008-9105-3

Stewart, C., & Owens, L. (2011). Behavioral characteristics of "favorite" coaches: Implications for coach education. *Physical Educator*, *68*(2), 90-97. Retrieved from http://www.sagamorepub.com

Stewart, C. (2014). Transforming professional development to professional learning. *Journal of Adult Education*, *43*(1), 28-33. Retrieved from http://aeq.sagepub.com

Templeton, N. R. (2011). Understanding social justice: Improving the academic achievement of African American students. *International Journal of Educational Leadership Preparation*, *6*(2), 1-8. Retrieved from http://www.editlib.org/j/ISSN-2155-9635/

The White House (n.d.). *Fact sheet: President Obama's promise zones initiative*. Retrieved from http://www.whitehouse.gov/the-press-office/2014/01/08/fact-sheet-president-obama-s-promise-zones-initiative.

Third International Conference on Assessment for Learning (TICCA) (2009, March). *Position paper on assessment for learning*. Dunedin, NZ. Retrieved from http://www.fairtest.org/position-paper-assessment-learning

Thornton, K., & Cherrington, S. (2014). Leadership in professional learning communities. *Australasian Journal of Early Childhood*, *39*(3), 94-102. Retrieved from http://www.earlychildhoodaustralia.org.au

Tomlinson, C. (2014). The bridge between today's lesson and tomorrow's. *Educational Leadership 71* (6), 10-14. Retrieved from ascd.org

Tweed, M., & Wilkinson, T. (2012). Diagnostic testing and educational assessment. *Clinical Teacher*, *9*(5), 299-303. doi: 10.1111/j.1743-498X.2012.00567.x

Waters, J. K. (2012). Resolving the formative assessment catch-22. *T H E Journal*, *39*(7), 8-14. Retrieved from http://www.thejournal.com/

White-Fredette, K. (2009). Why not philosophy? Problematizing the philosophy of mathematics in a time of curriculum reform. *Mathematics Educator*, *19*(2), 21-31. Retrieved from http://math.coe.uga.edu/Mesa/MESA.html

Wiggins, G. (2012). Seven keys to effective feedback. *Educational Leadership*, *70*(1), 10-16. Retrieved from ascd.org

Wiliam, D. (2011). *Embedded formative assessment*. Solution Tree Press: Bloomington, IN.

Wiliam, D. (2014). The right questions, the right way. *Educational Leadership 71* (6), 16-19. Retrieved from ascd.org

Wiliam, D. (2016). *Leadership for teacher learning*. West Palm Beach, FL: Learning Sciences International.

Yin, R. (2014). *Case study research: Design and method*. Thousand Oaks, CA: Sage Publications.

Yoders, S. (2014). Constructivism theory and use from 21st century perspective. *Journal of Applied Learning Technology*, *4*(3), 12-20. Retrieved from http://web.a.ebscohost.com.ezp.waldenulibrary.org

Younglove, B. (2011). Formative assessment: The key to accountability. *California English*, *17*(2), 21-23. Retrieved from http://www.cateweb.org

Zrike, S., & Connolly, C. (2015). Problem solvers: Teacher leader teams with content specialist to strengthen math instruction. *Journal of Staff Development*, *36*(1), 20-22. Retrieved from http://learningforward.org

Appendix A: Professional Learning Experience Project

Professional Learning Experience Timeline

Day 1	Clearing Up Misunderstandings Using Poll Everywhere
	Interactive Discussion: The Formative Assessment Process
	The Formative Assessment Process Self-Evaluation Tool
	Professional Learning Communities (PLC) Format
Day 2	Establishing PLC Norms
	PLC Tasks
	Communication of Learning Targets
	Effective Observation Techniques
	Effective Questioning Techniques
Day 3	Effective use of High-Tech Formative Assessment Tools
	Effective Use of Low-Tech Formative Assessment Tools
	Making Adjustments in Ongoing Learning Experiences
	Providing Effective Feedback
	Helping Students Become Self-Directed Learners
	Developing Trial Lessons
Day 4	Collaboratively Evaluating Newly Developed Strategies
	Presentation of Trial Lessons
	Revising Strategies

This professional learning experience for teachers is based on my study of middle school teachers and their efforts to engage students and move students along learning progressions to achieve learning targets. While the teachers at the study site recognized the importance of checking for understanding among their students while lessons were underway and making needed adjustments to keep students advancing toward learning targets, their use of the formative assessment process was often ineffective. My study used a social constructivist framework which involves a student-centered approach that includes the development of metacognitive skills. This professional learning experience also utilizes a student-centered approach. Qualitative data in my study were collected in multiple forms and analyzed to produce the findings which were used to develop this professional learning experience for teachers.

The purpose of this learning experience for teachers is to provide an authentic and meaningful collaborative course of study for teachers to improve their use of the formative assessment process. The overall goal of this learning experience for teachers is the improvement of student learning. To achieve this ultimate goal, the teacher participants in this learning experience improve their abilities to properly use the formative assessment process. In keeping with both authenticity and social constructivism, this learning experience is tailored to meet the needs of individual teachers. Learning outcomes for this experience include: (a) The teacher can effectively communicate learning targets. (b) The teacher can effectively collect formative data. (c) The teacher can effectively use formative data. (d) The teacher can effectively develop self-directed learners. The target audience for this learning experience is teachers of all

levels and subjects. The narrative below is a suggested timeline broken into four full days. This can, however, be altered to fit with various schedules. Following the suggested timeline is a template that can be used to develop norms among the Professional Learning Community (PLC) groups. The Power Point presentation includes detailed notes to be used by the facilitator to guide the learning experience. Finally, a system for the evaluation of the learning experience is provided.

During the first day of the professional learning experience, teachers learn about the formative assessment process. The facilitator reviews the Learning Outcomes as "I can" statements. Next, the facilitator uses *Poll Everywhere* to begin a discussion aimed at clearing up misunderstanding and defining the formative assessment process (approximately one hour). The facilitator then leads a detailed discussion about the formative assessment process using the Presentation Outline (approximately two hours). Using the Formative Assessment Process Chart, the facilitator leads a discussion summarizing the elements of the formative assessment process (approximately one hour). The participants are given copies of the Formative Assessment Process Self-Evaluation Skills Rubric and the facilitator explains the use of the rubric (approximately one hour). Finally, the facilitator explains how the training continues using a PLC structure (approximately one hour). If needed, PLC training is inserted in the process here. If an existing PLC structure is in place, the second day begins the process of developing effective formative assessment strategies to meet the individual needs of the teacher participants.

On the second day of the professional learning experience, the teacher participants are engaged in collaborative efforts to develop effective strategies to engage students in meaningful learning and to guide them along learning progressions. The facilitator ensures that the participant groups are organized in an effective manner. Next, the facilitator distributes the PLC Norms Template and provides an explanation of how the groups are to complete the template and use the norms they establish for themselves (approximately one hour). The facilitator then reviews the purposes of PLCs as they apply to the development of improved formative assessment strategies using the Presentation Outline (approximately one hour). The facilitator assigns the tasks to the groups as enumerated in the Presentation Outline and provides a detailed explanation (approximately one hour). The participants engage in collaborative inquiry, discussion, and strategy development to develop effective ways to communicate learning targets to students (approximately one hour). The participants engage in collaborative inquiry, discussion, and strategy development to develop effective observation techniques (approximately one hour). Finally, the participants engage in collaborative inquiry, discussion, and strategy development to develop effective questioning techniques (approximately one hour).

During the third day of the professional learning experience, the teachers continue to collaboratively develop strategies to effectively use the formative assessment process. The participants engage in collaborative inquiry, discussion, and strategy development to develop strategies to effectively use high-tech formative assessment specialty tools (approximately one hour). The participants then engage in collaborative inquiry,

discussion, and strategy development to develop strategies to effectively use low-tech formative assessment specialty tools (approximately one hour). Next, the participants engage in collaborative inquiry, discussion, and strategy development to develop effective strategies to make adjustments in ongoing learning experiences including altering the approach and providing feedback (approximately one hour). The participants engage in collaborative inquiry, discussion, and strategy development to develop strategies to effectively develop self-directed learners (approximately one hour). Finally, the participants develop trial lessons using the newly developed techniques using a jigsaw approach (approximately two hours).

On the fourth day of the professional learning experience, the teacher participants continue developing and testing strategies to improve student learning through their improved use of the formative assessment process. The participants then present their trial lessons within their PLC groups (approximately three hours). Members take notes for analysis. Finally, the participants analyze the effectiveness of the newly developed strategies, make needed improvements, and take the strategies back to their classrooms to put into practice (approximately three hours). The process developed by this professional learning experience to collaboratively develop effective formative assessment strategies may be used as an element of a school's continual efforts to improve student learning.

The evaluation of the effectiveness of this professional learning experience is done using three approaches. First, the teacher-participants use the Individual Self-Evaluation Rubric as a formative instrument as the training is ongoing. Second, an evaluation of the training is done by the teacher participants as a group using the final

slide in the presentation to guide a discussion about the degree to which they accomplished each of the goals of the training. Finally, an evaluation of the efficacy of the individual strategies developed is done by the teacher participants.

At the beginning of the training, the teacher-participants are given copies of the Individual Self-Evaluation Rubric in order to consider how well they develop the skills needed to properly use the formative assessment process as the training takes place. The goal of this process is for the teacher participants to move into the expert category on the four criteria used in the rubric. These include effectively communicating learning targets to students, effectively collecting formative data, effectively using formative data, and effectively developing self-directed learners. The teachers' perception of their own skill development is the basis for this data.

The second approach to the evaluation of this professional learning experience for teachers is for the facilitator to lead a discussion about the efficacy of the training using the final slide in the presentation. This discussion includes gaining feedback about the accomplishment of each of the goals of the training from the participants. It provides an opportunity for the participants to voice the degree to which they accomplished each goal and what they need to develop the needed skills better. This process establishes closure for the training directly connected to the anticipatory set established at the beginning of the training. It provides motivation for the teacher-participants to go forth and use the knowledge and skills they gain from the training.

The final approach to the evaluation of this professional learning experience is for teachers to evaluate the effectiveness of each of the formative assessment strategies they

collaboratively developed. This process begins with the analysis and revision of these strategies as they are developed by the teachers. A simple pre and post-test strategy is to be used evaluate the final effectiveness of these individual strategies. For a given lesson, a teacher evaluates student learning prior to and then after employing a new formative assessment strategy using the same testing instrument typically used for the given lesson. A comparison of the results provides efficacy data for each newly developed strategy. The data is then used to improve the strategies as needed.

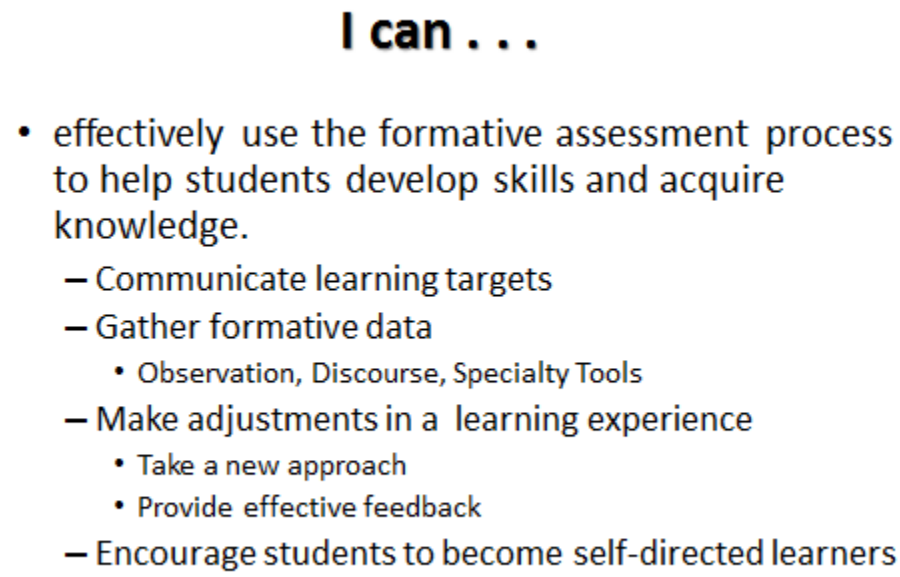
The Formative Assessment Process

Real-Time Checking for Understanding

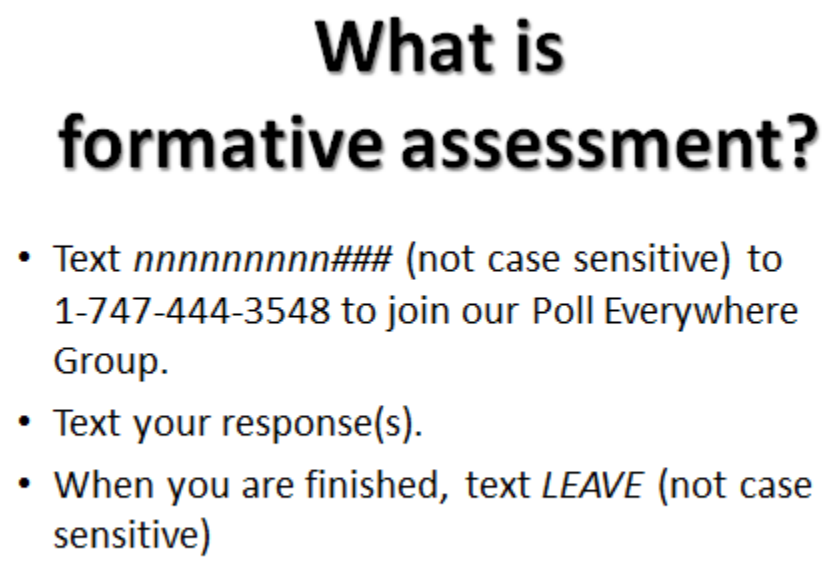
Notes: This professional learning experience is designed for teachers of all levels and subjects to improve student learning by improving their use of the formative assessment process. It is based on a qualitative case study that sought to understand how middle school teachers felt about the formative assessment process as well as their experiences with the process.

Phase One

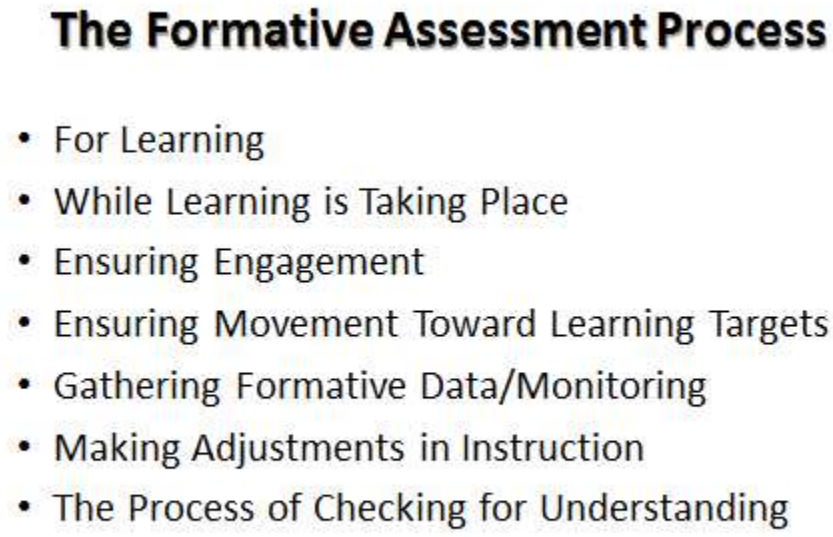
Learning about the Process



Notes: The goal of this professional learning experience is to give teachers the tools needed to effectively use the formative assessment process to improve student learning. This learning experience begins with an introduction to the formative assessment process led by a facilitator for all of the participants in the experience. During the second part of the experience, the participants are broken up into professional learning communities which will engage in collaborative inquiry, discourse, and design to develop and test actionable strategies to improve student learning through the use of the formative assessment process.



Notes: To activate an online poll, go to www.polleverywhere.com and follow the instructions. Use the participant responses to clear up misunderstandings and to lead into a working definition of the formative assessment process.

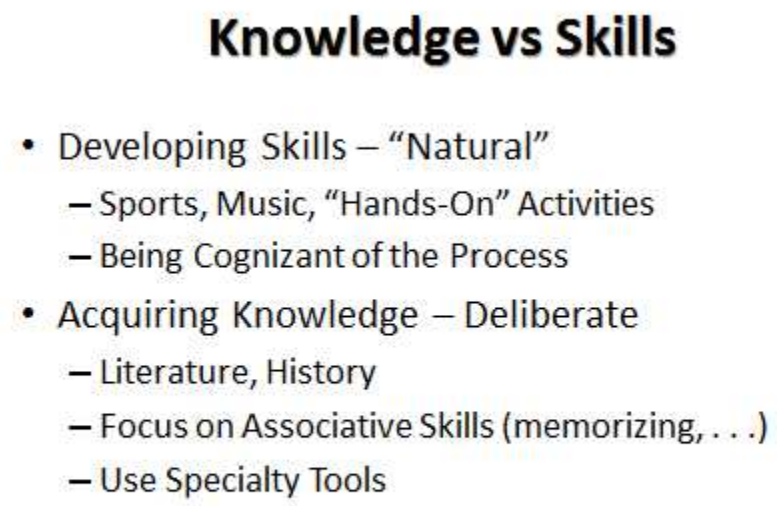


Notes: Formative assessment is assessment "for learning" rather than "of learning". The formative assessment process involves the collecting and using of data to improve student learning while learning is taking place. It ensures student engagement and that all students are moving toward the accomplishment of the learning targets. Data is gathered, analyzed, and used by teachers and students to making adjustments in a learning experience while that experience is underway.

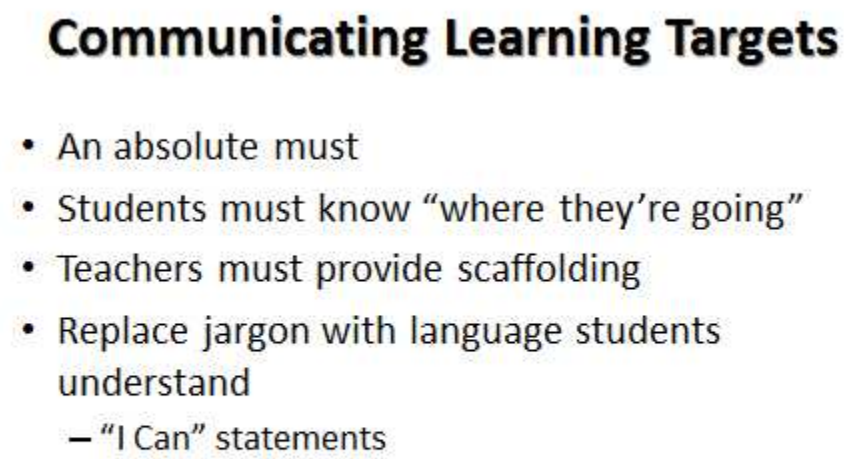
Student-Centered

- Direct Instruction
- Social Constructivism
- Metacognitive Skills
- Differentiation
- Feedback Loop

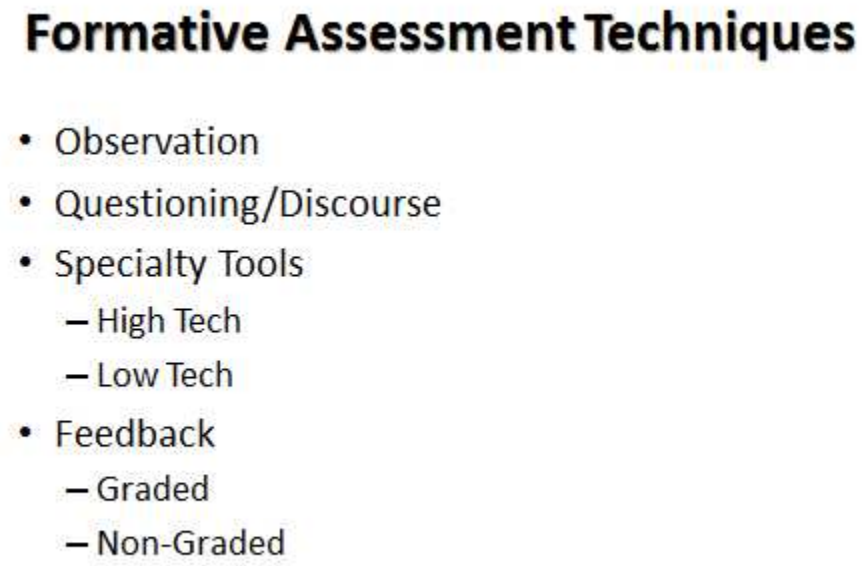
Notes: Although the process of formative assessment works well with direct instruction in which rote memory skills are developed through drill-and-quiz, it serves students far better when used as part of a student-centered approach to learning. Learning takes place in the mind of a student. The formative assessment process involves a reflective interaction that may be between a teacher and student, among peers, or within a self-directed learner. This student-centered approach develops metacognitive skills that improve the ability of students to learn. The formative assessment process gathers individual data and makes tailored adjustments to move each and every student toward the learning targets. The process takes the form of a feedback loop which uses real time data to guide each student to the accomplishment of the learning targets.



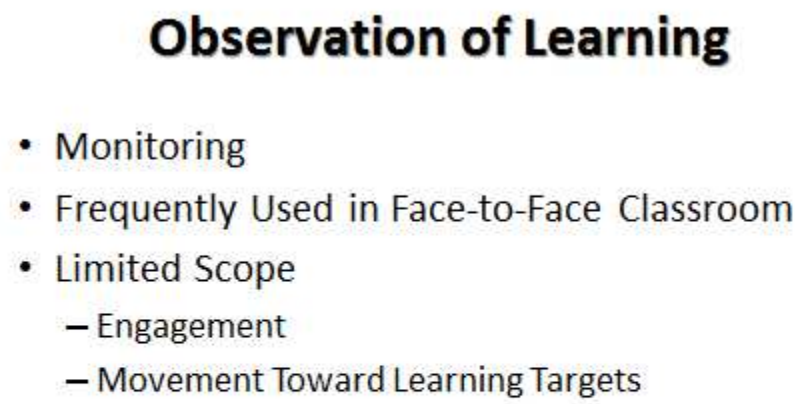
Notes: The study found that the formative assessment process was used more effectively when students were developing skills and less so when students were acquiring knowledge. To effectively use the formative assessment process to help students acquire knowledge, teachers must consider the associative skills in an effort to improve those skills and must use a deliberate strategy, often using formative assessment specialty tools, to check for engagement and progress toward the learning targets.



Notes: Communicating the learning targets to the students is vital to the formative assessment process. Both students and teachers must know, in a language they can understand, what they are expected to accomplish. Learning targets may be in the form of objectives or standards that are written in jargon which students may not understand. One popular method used to reword such jargon is to use "I can" statements which can be verified as part of a lesson's closure.



Notes: The formative assessment process includes gathering formative data and using this data in real time to adjust a learning experience so that learners continually move toward the learning targets. Formative data can be gathered through observation, discourse, and the use of specialty tools. Feedback aimed at advancing students toward the learning targets can take a variety of forms.

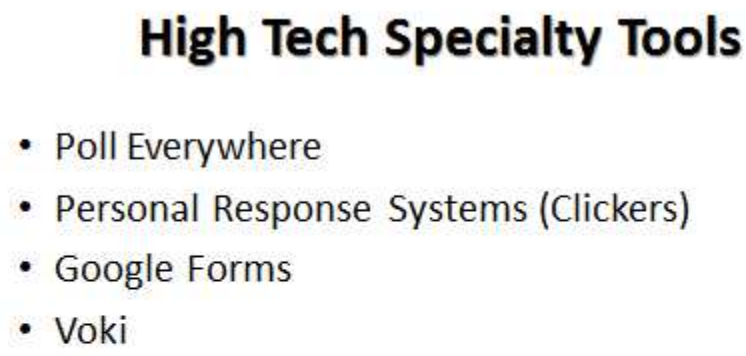


Notes: Teachers in face-to-face classrooms frequently monitor the activities of students. This process provides some usable formative data, but that data is of limited scope. The observation of students can be used to determine if students are engaged in a general manner in a learning experience. It cannot, however, provide detailed information about where a student is in relationship to the learning targets at-hand. It is a good starting point for gaining needed information, but it cannot be the only tool used to gather formative data.

Questioning/Discourse

- Formative vs Summative Questioning
- Focus on Learning Targets
- Essential Questions
- Different Levels
- Models
  - Standard Classroom Transaction
  - "No Hands Up"
- Probes/Open-Ended
- Formats

Notes: Discourse between teacher and students or among students can provide detailed formative data that can be used to move each and every student toward the learning targets. Formative questions are those that seek to find out where students are on a learning progression and focus on moving them toward the learning targets. A good technique to help a teacher use questioning to focus on the learning targets is to develop essential questions as part of lesson preparation and then connect other questions to these essential questions. Different levels of questions should be used as one way of providing scaffolding for students as they progress toward the accomplishment of the learning targets. The standard classroom transaction model, asking a question and calling on a student who raises his hand to answer the question, should be replaced with a strategy such as "no hands up" to engage all students rather than just volunteers. The standard classroom transaction model helps facilitate an academic achievement gap by not engaging all students. Probes or open-ended questions should be used to encourage deeper thinking about the topic at-hand as well as the development of reasoning and problem-solving skills. Questioning can be done orally, in writing, or online.

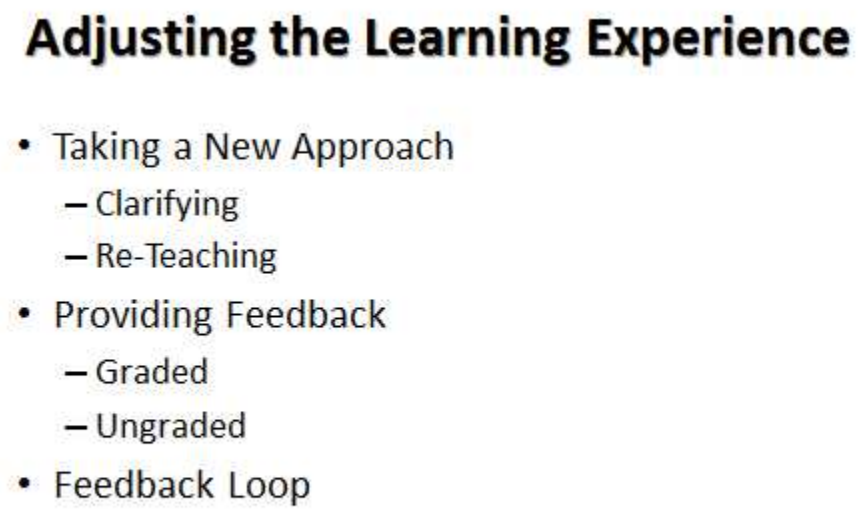


Notes: There are many tools designed to gather formative data using technology. Poll Everywhere allows students to respond to a prompt using their cell phones or other personal devices. Personal response systems provide students with a response device to respond to prompts designed by their teacher. Student surveys can be created using Google Forms. Voki can be used by students to create characters and presentations that demonstrate an understanding of the content being learned.

Low Tech Specialty Tools

- KWL Charts
- Think-Pair-Share
- RAFT Writing
- Individual Whiteboards

Notes: While technology tends to increase levels of student enthusiasm for a learning experience, many low-tech tools can also be used to gather formative data. KWL charts can add authenticity to the learning targets and track students' progress toward the learning targets. Think-pair-share can allow students to collaborate to deepen their knowledge prior to expressing what they have learned. RAFT writing assignments allow students to express the knowledge they have gained and the skills they have developed in an authentic manner. Students in the old one-room school houses often used individual slate boards to express answers to the prompts of their teachers. Individual whiteboards are used in the same way so that all students can respond to teachers' prompts.



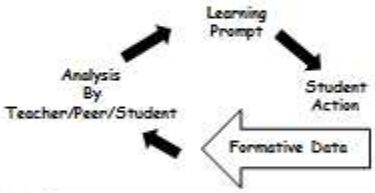
Notes: After formative data are collected, they must be analyzed and used to make adjustments in the learning experience to keep all students engaged and moving toward the learning targets. It may be necessary for the teacher to take a new approach with some or all of the students to engage all and help all move toward the learning targets. Frequently, formative data are used to provide feedback to students. This feedback must be actionable and based on the learning targets. Because students tend to focus on their grade when it is included rather than the suggestions for improvement, ungraded feedback is more effective at improving student learning. Ideally, a feedback loop should be established in which feedback is provided in increments to help students move closer and closer to the learning targets.

Notes: The ultimate goal of education is to create self-directed learners. Social constructivism views learning as a voluntary activity that requires the direct involvement of students in all aspects of the learning process. As students learn to gather and use formative data from their own learning experiences, they can advance their own learning and develop the metacognitive skills needed to be self-directed learners.

The Formative Assessment Process

Definition: The process of interaction between students, peers, and a teacher that involves gathering a variety of data to check for understanding and for progression toward a learning target and responding to that data by making adjustments in learning experiences in real-time.

Feedback Loop



Formative Data

Questioning
Observation
White Boards
Fist-to-Five
Exit Tickets
and . . .

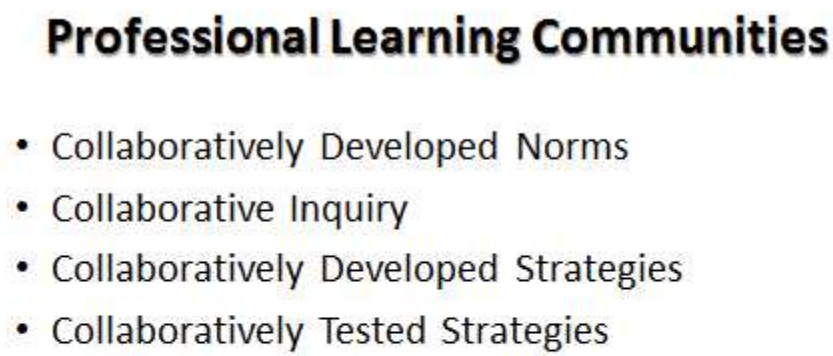
Interaction among students, peers, and teacher may take place in many different forms and through many different modes. The involvement of the learner in the process is crucial as it facilitates the development of metacognitive skills and self-guided learning.

Learning Target

Objective
Standard
Process
Skill
Content

Phase 2

Collaboratively Developing Strategies



Notes: If an existing PLC structure is in place at the school, detailed background and structural directions are not needed. The tasks can be simply assigned and the groups can begin working on them. It is necessary to monitor the groups and provide scaffolding to keep them moving toward the learning targets. In schools where no PLC structure exists, start by explaining how PLCs function. Divide the faculty into either subject-area groups or mixed groups of between four to eight members. Have each group collaboratively develop norms of operation. Assign the tasks and provide any needed scaffolding as the groups work to accomplish the tasks.

Tasks

- Develop – Test – Improve – Implement:
  - Ways to Communicate Learning Targets
  - Observation Techniques
  - Discourse/Questioning Techniques
  - Use of High-Tech Specialty Tools (1/member)
  - Use of Low-Tech Specialty Tools (1/member)
  - Making Adjustment in Learning Experiences
    - –Taking New Approaches
    - –Providing Feedback
  - Ways to Develop Self-Directed Learners

Notes: Each PLC group will be charged with this list of tasks. They will collaboratively develop each, test each in a classroom setting, collaboratively evaluate the effectiveness of each so that each can be improved, and then put each into practice.

Can I . . .

- effectively use the formative assessment process to help students develop skills and acquire knowledge?
  - Communicate learning targets
  - Gather formative data
    - Observation, Discourse, Specialty Tools
  - Make adjustments in a learning experience
    - Take a new approach
    - Provide effective feedback
  - Encourage students to become self-directed learners

Notes: Use this slide as an evaluation guide to determine how well the teachers accomplished the learning targets.

Formative Assessment Self-Evaluation Rubric

Outcomes	Beginner	Mid-Level	Expert
The teacher can effectively communicate learning targets.	Students are aware of the learning targets.	Students are consistently made aware of the learning targets.	Students clearly understand the learning targets and they base their activity on the accomplishment of the learning targets.
The teacher can effectively collect formative data.	The teacher uses basic observation and questioning to gage whether or not students are engaged.	The teacher uses high quality observation, questioning, and specialty tools to gage whether or not students are engaged and generally moving toward the learning targets.	The teacher uses high quality observation, questioning, and specialty tools to gage whether or not students are engaged and moving toward the specific learning targets.
The teacher can effectively use formative data.	Students are inconsistently guided toward the learning targets.	Students are consistently guided toward the learning targets.	Lessons are differentiated and students are provided scaffolding to consistently move toward the learning targets.
The teacher can effectively develop self-directed learners.	Learning is mostly directed by the teacher.	Students take an active role in their own learning.	Students take an active role in their own learning including gathering and using formative data to improve their acquisition of knowledge and development of skills.

Appendix B – Executive Summary

This executive summary has been prepared for the participants and other stakeholders at the study site as well as those educators who wish to gain an understanding of the study and the associative project. This study was completed as part of a doctoral program at Walden University. Approval to conduct this study, including the collection of data at Crestview, was granted by the Internal Review Board (IRB) at Walden University on May 7, 2015 – Approval Number: 05-07-15-0315882. This study offers insight into how the formative assessment process is perceived and used by teachers. The associative project offers schools an authentic tool, based on the findings of this study, which can be used to improve student learning by improving teachers' abilities to effectively use the formative assessment process to keep students engaged in meaningful learning and moving toward learning targets.

The purpose of this study was to investigate teachers' perceptions of the formative assessment process as well as their experience with the process. The site of this study is a rural middle school in the South-Central part of the United States. According to a report from the department of the education in the state, the study site earned below state averages on all academic measures and was labeled as an "F" School. The current literature about the formative assessment process was extensively researched as part of this study. This literature shows a strong connection between student learning and the proper use of the formative assessment process (Scherer, 2014; Wiliam, 2014). Research questions focused this qualitative study on investigating how teachers at the study site used the process of formative assessment, how these teachers felt about the formative

assessment process, and what barriers the teachers perceived to exist that hampered their effective use of the formative assessment process.

The findings of this study, based on the data collected at the study site, provide detailed answers to these research questions. These data were collected in the form of interviews, observations, and a questionnaire. Overall, the study found a great deal of variation in the effective use of the formative assessment process among the teachers at the study site. The participants uniformly expressed a belief in the importance of checking for understanding in real time and making adjustments in ongoing learning based on these real time checks. Many of the participants viewed formative assessment as benchmark testing rather than as a process embedded in ongoing learning to keep students engaged and moving toward learning targets.

Communicating learning targets to students is a crucial part of the formative assessment process. Only a few of the participants were observed informing students of the learning targets (goals, objectives, standards). Most of the participants recognized the importance of students being involved in monitoring their own learning progress. All of the participants used questioning and observation to gather formative data, data that is used to make adjustments in ongoing learning experiences. All of the participants had some experience with various specialty tools used to gather formative data.

Only a few of the participants were observed providing feedback and making adjustments to the learning experiences in which students were engaged beyond bring their attention back to the tasks at-hand. The most useful finding from this study was that the use of the process of formative assessment varied significantly from tasks that

developed skills and tasks that disseminated knowledge. When students were developing skills, such as improving a vocal performance, the formative assessment process is a natural element. A feedback loop is established in which the teacher gathers formative data, provides feedback to improve the skill, collects more formative data, provides more feedback, and so on. In order for the formative assessment to be used effectively in the process of disseminating information, a deliberate approach must be taken and the associative skills must be considered.

This study was limited to a qualitative investigation of one study site. Similar qualitative studies at other sites focused on teacher-perceptions of the formative assessment process would add to an understanding of the phenomenon. Quantitative studies determining the efficacy of various formative assessment tools would assist teachers in selected such tools. The project that developed out of this study to improve the use of the formative assessment process requires a serious commitment of time in order for a school to successfully improve student learning by improving teachers' abilities to use the formative assessment process.

The project based on the finding of this study is a professional learning experience for teachers focused on the improved use of the formative assessment process. This project requires an overall facilitator and a professional learning community (PLC) structure. During phase one of the learning experience, the facilitator presents information about the formative assessment process and assigns the tasks to be collaboratively accomplished by groups of teachers. During phase two, teachers work in groups to collaboratively research aspects of the formative assessment process, develop

formative assessment strategies, test these strategies, improve these strategies, and put these strategies into practice.

Appendix C: Vetting Request Letter

March 23, 2015

Dear Colleague,

Please review the following data collection instruments for my proposed study entitled, the Role of Real Time Checking for Understanding in the Middle School Classroom, and provide detailed feedback regarding the clarity of the items and the alignment to the purpose of the study and the research questions. Please write on, highlight, underline, and circle the documents as needed to provide this feedback.

Definition of the Formative Assessment Process: The process of checking for engagement and understanding and making adjustments in instruction while lessons are in-progress in order to guide students toward the achievement of the learning target(s).

Purpose of the Study: To explore the value teachers place on the formative assessment process and their experiences with the formative assessment process. The research questions focus on how teachers participate in and feel about the process of formative assessment (as defined above).

Research Questions:
How do classroom teachers at Crestview Middle School (pseudonym) participate in and feel about the process of formative assessment?

1. How do the teacher-participants describe the process of formative assessment as part of their practice?
2. How do the teacher-participants feel about the process of formative assessment as part of their practice?
3. How do perceived barriers affect the use of the process of formative assessment in the practice of the teacher-participants?
4. How is differentiation in the use of the formative assessment process by subject area observed at Crestview?

Thank you for your help,
Earl Dalke

Appendix D – Audit Trail Journal Excerpt

- Copies of vetting process documents in Audit Trail file.
- Copies of approved data collection instruments in Audit Trail file.
- Walden IRB Approval – May 7, 2015 – Approval Number: 05-07-15-0315882 (Libby Munson)
- May 8, 2015 – Attended faculty meeting at research site and explained the purpose of the study and, in detail, what participants will be asked to do; emphasized the voluntary nature of participation.
- May 8, 2015 – Emailed consent forms to the potential participants.
- Week of May 11 – 15, 2015 – Received responses from 11 participants who agreed to be part of the study.
- Week of May 11 – 15, 2015 – Constructed the confidential list of participants; included printouts of emailed consent forms; deleted electronic copy; filed paper copy in locked file cabinet to be stored for five years after publication of the study; electronic copies of email responses kept in my Walden email account.
- Week of May 11 – 15, 2015 – Collected qualitative data in the form of (1) observations, (2) oral interviews, and (3) follow-up questionnaires. Interviews were audio recorded. Completed observation protocol documents and follow-up questionnaires are kept in the Audit Trail file. Observations of all participants except Participant 4 were completed. Participant 4 was not available for observation (school ended for the year). Interviews were completed with all participants. Follow-up questionnaires were received from all participants.

Appendix E: Observation Protocol

Observation Protocol/Field Notes Instrument

Participant Number:_____ Date:_____

Focus Parameter – Description/Notes/Drawing	General Notes and Reflections
Setting/Proxemics ↓	
Barriers to the Process of Formative Assessment ↓	
Checking for Engagement ↓	
Checking for Understanding ↓	
Adjustments in Instruction Based on Formative Data ↓	
Interaction Among Teacher and Students ↓	
Formative Assessment Tools Used ↓	
Feedback Techniques ↓	
Questioning Techniques ↓	
Working with Students with Special Needs ↓	
Self-Directed Learning ↓	
Student Access to Learning Targets ↓	
Interaction Among Students ↓	

Appendix F: Interview Questions

1. How does checking for understanding and engagement among your students and making adjustments in instruction as a lesson progresses fit into your instructional strategies?
2. How important do you feel it is for you to check for understanding and engagement among your students as lessons progress and make adjustments in real time to keep each student progressing toward the learning target at-hand?
3. What are the barriers to frequently checking for understanding and making adjustments in real time?
4. How do you know whether or not your students are engaged in a particular learning experience and are progressing toward the learning target while a learning experience is in progress?
5. What do you do when you discover that a student is not engaged in the learning experience at-hand or is not progressing toward the learning target while a learning experience is in progress?
6. From the list of tools used to determine student engagement and understanding, which ones have you employed? In your opinion, how well did each work?
7. What other tools have you used to determine student engagement and understanding? In your opinion, how well did each work?
8. How is feedback used in your classroom? In what ways do students give each other feedback in your class?
9. How do you conduct question-and-answer sessions with your students?

10. How do you use the process of checking for understanding and making adjustments in real time to differentiate instruction for students, including those with special needs?
11. How do you inform your students about the learning targets (goals, objectives, standards) of a learning experience in which they are engaged?
12. How do you foster self-directed learning in your students?
13. In what ways do you encourage your students to help each other learn?

Appendix G: List of Formative Assessment Tools

Agreement Circles

Anecdotal Seating Charts

Anticipation Guide

Chalkboard Splash

Exit Ticket/Slip

Fist-to-Five

Frayer Diagram

Google Forms

KWL Chart

Muddiest Point Paper

No Hands up Questioning

One Minute Paper

Online Discussion

Personal Response Systems (Clickers)

RAFT (Role, Audience, Format, Topic)

Socratic Questioning

Think-Pair-Share

Three-Color Quiz

Ungraded Feedback

VFA (Visual Formative Assessment)

Voki

Appendix H: Follow-Up Questionnaire

Participant Number:_____ Date:_____

Dear Study Participant,

Definition of the Formative Assessment Process: The process of checking for engagement and understanding and making adjustments in instruction while lessons are in-progress in order to guide students toward the achievement of the learning target(s).

Thank you again for agreeing to be a participant in this study. Please respond to the following questions. I will collect the completed questionnaire in the enclosed envelope tomorrow.

1. When planning your instructional strategies, how do you include the process of checking for understanding and engagement and making adjustments in instruction as lessons progress?
2. How important is checking for understanding as lessons progress? Explain.
3. How important is it to make adjustments in instruction as lessons progress? Explain.
4. How do the other demands of your practice get in the way of checking for understanding and making adjustments to ongoing lessons?
5. How do you measure the degree to which your students are engaged in meaningful learning?
6. How do you measure the degree to which your students understand what they are in the process of learning?
7. How do you make adjustments in ongoing lessons when you discover that students are not progressing as you would like them to?

8. What techniques do you use to check for understanding during ongoing lessons?
9. How do students receive feedback on their work in your classroom?
10. How do you use various questioning techniques with your students?
11. How do you use checking for understanding and making adjustments in ongoing lessons to help individual struggling students such as those with special needs?
12. How do you let your students know about what they need to learn?

Appendix I: Coding Table

Table 1

Data Themes and Associative Concepts Regarding the Formative Assessment Process

Themes	Associative Concepts
Importance	Fosters Progress, Prevents Mistakes, Integral Part of Lessons, Enhances Engagement
Misunderstanding the Process	Confusion with Interim Assessment
Learning Targets	Authentic, Modes, Practice
Differentiation	Expectations, Co-Teaching, Accommodations
Student Involvement	Student-to-Student Discourse, Technology, Discovery Learning, Cooperative Learning, Team Efforts, Student Choice
Questioning and Observation	Dominate, Modes, Levels
Specialty Tools	Variety, Limited Use, Games
Feedback	Loops, Outcomes-Based, Promotes Adjustments
Level of Adjustment	Variation, Re-Teaching, Strategies
Knowledge versus Skills	Natural, Deliberate
Barriers	Time, Class Size, Student Levels, Testing, Disruptions, Relationships, Curriculum
Exit Ticket Initiative	Incomplete