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High School Teachers' Perspectives on Formative Assessment in the Virtual Learning Environment

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Walden University

College of Education and Human Sciences

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Tiffany McBean

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Dr. Glenn Penny, Committee Chairperson, Education Faculty
Dr. Michelle McCraney, Committee Member, Education Faculty
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Walden University
2023

Abstract

High School Teachers' Perspectives on Formative Assessment in the Virtual Learning Environment

by

Tiffany McBean

MSc, Nova Southeastern University, 2008

BA, University of the West Indies, Mona, 1997

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education

Walden University

July 2023

Abstract

Formative assessment in the virtual learning environment is a beneficial complement to teacher pedagogy and student learning. But there is little research on high school teachers' perspectives on the use of formative assessment in the virtual learning environment. The purpose of this basic qualitative study was to address this research gap. The conceptual framework was Black and Wiliam's theory of formative assessment. Two research questions guided the study. The first addressed high school teachers' perspectives on formative assessments in the virtual learning environment. The second addressed how teachers used formative assessment in the virtual learning environment. Semistructured interviews were conducted with 11 participants who taught a content area course at the high school level for more than 1 year and used formative assessment in the virtual learning environment. Data were coded to identify emergent themes. Regarding teachers' perspectives, the themes were that teachers perceived formative assessment as beneficial for student learning; it helped teachers determine consequent instructional strategies; it was an effective monitoring tool. Regarding teachers' use, the themes were teachers used formative assessment to build students' agency and engagement. The findings indicated that formative assessment benefited both teachers and students, supported planned instruction, and promoted students' agency through teacher support and feedback. This study promotes social change by providing best practice and instructional design for teachers and schools transitioning to the virtual learning environment.

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Dedication

I dedicate this dissertation to the myriad of people who inspire me to give my best in every situation I face. To my husband, whose unwavering support made the doctoral journey less daunting. To my sons, Phillip, and Joseph, who inspire me every day to seek the highest good for students who attend public schools. To my mother, whose footsteps I follow in paving the way for children to become citizens who can globally advance the welfare of others. To the Drs. of Education who came before me and offered support during this daunting season; to Dr. Rohan Jowallah who listened to my fears and helped me put my thoughts into perspective; to Dr. Linton Atkinson who support my ideas for social change in education. We have much work to do, and I am honored to work alongside you to bring positive change to the field of education. To Dr. Vilma Clarke who read my discussion chapters and helped me clarify the message. To Dr. Richard Penny who guided my process and encouraged me to keep going with the phrase "Onward, I'm cheering for you." To the Drs. who will come after me, keep the vision of why you are doing a doctorate alive. As my friend, Dr. Kesslyn says, "It's a degree of persistence." Persist.

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I would like to thank my academic chair, Dr. Richard Penny, who helped me find my scholarly voice and encouraged me to push onward. I would also like to thank Dr. Michelle McCraney for providing me with the support I needed during the dissertation process. In addition, I would like to thank Dr. Charlotte Redden for the invaluable guidance and support as a university reviewer.

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Chapter 1: Introduction to the Study

There are several benefits for teachers to use formative assessment during instruction. The main advantage of formative assessment is that high school teachers use the data from formative assessment to reveal the extent to which students understand academic content (Sanders & Lokey-Vega, 2020). When teachers are aware of students' skills and knowledge levels, they can better provide instruction that meets the students' needs. This means teachers are able to monitor students' performance actively and adjust their instruction in response to data (Krishnan et al., 2021). Further, incorporating formative assessments during instruction increases students' engagement in the virtual classroom (Raes et al., 2020). When students in the virtual learning environment are engaged in the lesson, they can deepen their academic content knowledge (Holmes, 2018).

This study addressed high school teachers' perspectives on formative assessments and their use of formative assessment in the virtual learning environment. The findings from this study may help district administrators and school leaders understand the experiences of content area teachers who provide instruction in the online environment. Further, results from the study may assist policymakers with assessing the future needs of teachers and students, which may lead to student engagement and achievement.

Background

Even though there are potential benefits to using formative assessments, high school teachers rarely use formative assessments during instruction in the virtual learning environment (Lyon et al., 2019). People's perspectives drive their behavior (Andersson &

Palm, 2017; Bonner et al., 2018; Krishnan et al., 2021), and high school teachers' belief about instructional practice affects their use of formative assessment in the virtual learning environment (Krishnan et al., 2021). High school teachers who did not find formative assessments useful did not use formative assessment strategies (Lamberg et al., 2020). In addition, high school teachers who had challenges with class size and lack of time allotted to formative assessment tasks chose not to use formative assessment strategies (Alt, 2018). Despite these findings, the benefits of using formative assessment are the ability for teachers to monitor progress and provide feedback, increase students' practice, and encourage students' engagement.

Formative assessment is a beneficial complement to teacher pedagogy and student learning. For instance, formative assessments help teachers monitor students' progress to determine students' understanding, and students use the activities provided to correct misconceptions and deepen their understanding of academic content. High school teachers use formative assessment to identify what students know, monitor students' progress, and provide students with feedback (An & Mindrila, 2020; Krishnan et al., 2021; Raes et al., 2020). Through formative assessment, students can also participate in educational games and forced response question items to show what they understand (An & Mindrila, 2020; Darling-Aduana, 2021; Krishnan et al., 2021). As students interact with content, high school teachers use formative assessments to help students increase practice and engagement. High school teachers use formative assessment to encourage students' engagement (Holmes, 2018; Raes et al., 2020). The formative assessment tools increase student engagement with content and their peers. In short, high school teachers

engage students when they collect data from the formative assessment, personalize the learning experience, and determine the pacing of the lesson (An & Mindrila, 2020; Krishnan et al., 2021).

Although formative assessment activities help students show their knowledge and deepen their understanding of content, formative assessment in the virtual learning environment requires only low-level thinking skills. The typical online lesson included questions that were low level, such as true or false or multiple-choice, and required students to recite and demonstrate knowledge (Darling-Aduana, 2021; Krishnan et al., 2021). Students' practice in the virtual learning environment constitutes forced responses and sometimes falls on the low level of Bloom's taxonomy. Further, teachers cannot visually observe student behaviors or organize physical peer engagement in the virtual learning environment. However, launching assessments increases student engagement in the virtual learning environment (Raes et al., 2020). Teachers used interactive tools such as Kahoot, Quizlet, polling, and the chatbox or whiteboard for formative assessment in the virtual learning environment (Sanders & Lokey-Vega, 2020). By providing opportunities to increase practice, teachers allow students to cognitively access content and increase engagement in the virtual learning environment.

Teachers use formative assessment in bricks-and-mortar classrooms to diagnose students' strengths and weaknesses, identify what students have learned, and drive instruction (Bergeron, 2020), but there is a lack of research of high school teachers' perspectives and the use of formative assessment in the virtual learning environment. There is a lack of studies investigating the use of assessments in the virtual learning

environment (Raes et al., 2020). Further research is needed to understand how teachers enact assessment practices (DeLuca et al., 2018). This study is necessary to uncover teachers' perspectives on formative assessment and how high school teachers use formative assessment strategies in the virtual learning environment so that policymakers and school district leaders may be able to assess the future needs of teachers and students.

Problem Statement

Formative assessments can determine students' understanding of content (Raes et al., 2020). In fact, formative assessment is used to identify students' misconceptions to increase knowledge gains and is a more effective way of increasing learning than a summative assessment (Chen et al., 2019; Enders et al., 2021). However, some teachers only provide formative feedback after a summative assessment (Zlabkova et al., 2021). Additionally, although researchers have illustrated how formative assessment tools are used in a virtual college environment (Amasha et al., 2018), there is a gap in the literature about high school teachers' perspectives on formative assessment and how they use assessment in the virtual environment. Therefore, there was a need to conduct a study that on this under-researched topic (Darling-Aduana, 2021). Addressing the gap in the literature helped provide insight into how teachers in the high school population use assessments and their perspectives on formative assessment.

Purpose of the Study

The purpose of this qualitative study was to explore high school teachers' perspectives on formative assessment as well as their use of this assessment in the virtual learning environment. The study contributes to the field of education by providing

insights into how high school teachers perceive formative assessments in the virtual learning environment and how they use them. This study provides insight into the strategies and tools that meet the academic needs of students during virtual instruction (see An & Mindrila, 2020), which can help school leaders and administrators better understand high school teachers' perspectives and predict the future needs of teachers and students. An increasing number of high school teachers have recently transitioned to a virtual environment. As a result, high school teachers may benefit from policymakers and district leaders understanding how they use formative assessment in the virtual learning environment.

Research Questions

I developed the following research questions to help guide the study and frame the interview questions so that I could gather information to satisfy the purpose of the study.

1. What are high school teachers' perspectives on formative assessment in the virtual learning environment?
2. How do high school teachers use formative assessment in the virtual learning environment?

Conceptual Framework

I used Black and Wiliam's (2009) theory of formative assessment as the conceptual framework. The theorists created a framework to examine the use of formative assessments and guide teacher–learner interactions that address what students have learned so that teachers can adjust instruction based on evidence. In short, formative

assessment is concerned with creating opportunities to regulate the learning processes. During formative assessments, the teacher collects evidence about student understanding and interprets this data to make subsequent changes in instruction. There are five strategies for formative assessments: clarifying the learning objectives, creating learning tasks that provide evidence of student understanding, offering feedback that guides learners through understanding the content, empowering students to provide peer support, and empowering students to monitor their own learning (Black & Wiliam, 2009).

The formative assessment theory creates a framework for how teachers provide feedback at the strategic and tactical levels (Black & Wiliam, 2009). The strategic level is guided by the teacher's pedagogy, while the tactical level is concerned with formulating the detail of the feedback response. The study focused on high school teachers' perspectives on formative assessment and their use of formative assessment in the virtual learning environment. Teachers' use of formative assessment is integral to teaching and learning, as it involves teachers setting learning goals, creating lesson activities, gathering data about students' understanding, making decisions based on the findings, and creating opportunities for students to learn from themselves and their peers (Black & Wiliam, 2009; Cisterna & Gotwals, 2018). Therefore, the study was based on the constructs from Black and Wiliam's (2009) theory of formative assessment.

Nature of the Study

This study was a basic qualitative investigation including an analysis of the interview responses from 11 high school teachers who teach a content area subject in virtual classes and use formative assessment in instruction. The sample was selected from

high school teachers responding to the Walden Participant Pool and social media platforms. Participants were also recruited using snowball sampling. The data analysis methods that helped answer the research questions were identifying a priori codes from literature, identifying open codes from participants' words, and organizing codes into categories. Open coding was used in the first cycle to break down and document information from the participants (see Saldaña, 2015). Pattern coding was used in the second cycle to categorize the ideas, identify themes, and synthesize the information (see Saldaña, 2015).

Definitions

Assessment as learning: Activities that lead students to monitor and direct their learning (Black & Wiliam, 2018).

Assessment of learning: The use of assessment to determine the students that have achieved the intended learning outcome (Black & Wiliam, 2018).

Feedback: A coherent frame of deductions that provides a response to data collected from assessment (Jensen et al., 2021).

Formative assessment: The term used to define teachers' active monitoring and subsequent adjustment of instruction based on the evaluations of the students' performance or response (Krishnan et al., 2021).

Peer feedback: The process of peers making and sharing judgments based on the task's criteria (Carless & Boud, 2018).

Self-assessment: The act of formally or informally assessing personal progress and making metacognitive connections while reaching learning goals (Lyon et al., 2019).

Summative assessment: Is an assessment to determine the learners' learning performance after completing an activity (Chen et al., 2019).

Virtual learning environment: The virtual learning environment is a digital platform for teaching and learning. It includes a design space where educators and distance learners can interact, communicate, and collaborate through a learning management system (Hilli, 2020).

Assumptions

The study was based on the four assumptions. First, I assumed that high school teachers are better able to identify students' misconceptions when they use formative assessment. According to the literature, formative assessment strategies allow teachers to gather data about students' understanding and misconceptions to make instructional decisions based on the findings (see Cisterna & Gotwals, 2018; Lyon et al., 2019). Second, I assumed that high school teachers would provide unbiased and reliable information in their interviews (see Shenton, 2004). The third assumption was that I would reach data saturation from the responses in the semistructured interview. It was necessary to reach saturation when there is no new information to ensure sufficient data to ensure further validity (see Burkholder et al., 2016; Guest et al., 2006). Finally, I assumed that I accurately assessed teachers' perspectives on formative assessment in the virtual learning environment through careful coding and subjectiveness (see Ravitch & Carl, 2015). The assumptions were necessary because they provided confidence in the findings and ensured trustworthiness and validity.

Scope and Delimitations

The specific aspect of the research problem addressed in this basic qualitative study is that there is little study related to high school teachers' perspectives on formative assessment and their use of formative assessment in the virtual learning environment. I selected this focus because more parents and students choose virtual learning platforms for the high school experience rather than the traditional brick-and-mortar classroom. Therefore, the purpose of the study was to explore high school teachers' perspectives and the use of formative assessments in the virtual learning environment. The population targeted for the study were high school teachers who use formative assessment in instruction and provide instruction in the virtual learning environment.

The boundaries of the study were high school teachers currently supporting students in the virtual learning environment and using formative assessment in instruction. Another boundary was the theoretical framework of formative assessment. Therefore, assessments related to teachers' self-efficacy was not investigated, even if it surfaced in the semistructured interview. Instead, the constructs relating to Black and Wiliam's (2009) theory of formative assessment were included.

Limitations

Limitations may lead to findings that are not generalizable. Possible limitations could have included methodological limitations, data analysis techniques, and challenges with participants. There could have also been limitations from using qualitative methodology. It was possible that the data could not have been generalizable because of purposive sampling since I recruited only teachers who used formative assessment. In

addition, I selected 11 teachers who responded to social media posts, the Walden participant pool, as well as participants recruited using snowball sampling. The sample size of 11 is small; however, there were no specific rules about sample size for qualitative research (see Ravitch & Carl, 2015). In fact, the sample size is less important in qualitative research, with the goal being to understand participants' complex experiences (Ravitch & Carl, 2015).

There could have been challenges with data analysis techniques. However, I listened to the audio of the semistructured interviews multiple times and coded the data, looking for patterns. I used first order and second order coding techniques to determine the similarities and themes. To mitigate limitations with first and second order data analysis, I used a reflective field journal to keep a memo of my thoughts during the research process. I carefully exercised vigilance over my position and subjectiveness (see Ravitch & Carl, 2015).

Significance

The study is significant because it addresses an under-researched issue in the virtual learning environment: teachers' perspectives on using formative assessments in the virtual learning environment. High school teachers' perspectives affect their use of formative assessments in instructional practice (Correia & Harrison, 2020; Krishnan et al., 2021; Maier, 2021). The information about teacher perspectives provides insight into formative assessment as one of the strategies and tools teachers used to meet students' academic needs. By understanding teachers' perspectives, district leaders and school site administrators may be able to examine the future needs of students and investigate

strategies that may lead to student gain. In turn, students may be better prepared to compete in a global market when they are competent in their expertise. Using assessments in the virtual learning environment helps increase student engagement (Holmes, 2018). The strategies used during formative assessments, such as learning tasks created to assess student understanding and building capacity in students to support each other, help students build their expertise. Students learn the necessary skills of collaborating with others while they deepen their knowledge in the content area (see Cowie et al., 2018; Hilli, 2020; Johnson et al., 2019).

Overall, the study adds to the scholarly conversation about formative assessment, and the findings provide insight to policymakers and school district leaders about the unique needs of the virtual learning environment. For example, when leaders, school administrators, and classroom teachers understand students' needs, the stakeholders can design lessons and customize instruction that addresses students' needs. The study may contribute to social change because leaders could better implement strategies to meet teachers' needs, identify students' needs in the virtual learning environment, and inform instructional design. The result might be an effective instructional design that leads to effective teaching and learning.

Summary

The purpose of this basic qualitative study was to explore high school teachers' perspectives and the use of formative assessments in the virtual learning environment. Black and Wiliam's (2009) theory of formative assessment was the conceptual framework that guided the study. The nature of the study was a basic qualitative

investigation and includes an analysis of the data collected from 11 high school teachers who teach content area subjects in the virtual learning environment. The study provides insight into the strategy of formative assessment. The study may prompt social change as leaders could better implement strategies to meet teachers' needs, identify students' needs in the virtual learning environment, and inform instructional design. Chapter 2 presents a review of the literature as it relates to the issue of formative assessment.

Chapter 2: Literature Review

Assessments create opportunities to evaluate the quality of a student's skill or knowledge. Classroom assessments can be closed responses, such as multiple choice and matching, or open responses, like essays, debates, or portfolios (Fuller, 2017; Ogange et al., 2018; Weiser et al., 2018). Overall, assessments can either be summative or formative (Beard, 2017; Chen et al., 2019; Cotton, 2017). A summative assessment refers to the activity at the end of the lesson to assess the learners' learning performance (Chen et al., 2019). It is also known as the assessment of learning (Houston & Thompson, 2017). However, formative assessments are continuous and allow the teacher to monitor the students' progress and level of understanding (Cotton, 2017). It is also an assessment of learning (Black & Wiliam, 2018).

Different paradigms have shaped classroom assessments over the years (see DeLuca et al., 2018), but there is little research related to high school teachers' perspectives on formative assessments and how they use formative assessments in the virtual learning environment. Summative assessments are based on the paradigm of social efficiency and hinged on the behaviorist theory, whereas the social constructivist paradigm informs formative assessments. Formative assessment is an approach to pedagogy that influences the practice of teaching and learning (Zlabkova et al., 2021), where teachers monitor instruction and make adjustments based on data from students' responses to the task (Krishnan et al., 2021). Academic interests have recently been steered toward an understanding of formative assessment. The purpose of the dissertation

was to explore high school teachers' perspectives and the use of formative assessments in the virtual learning environment.

Literature Search Strategy

I searched for relevant literature using education databases such as Education Source, EBSCO, Taylor and Francis, ERIC, SAGE Journals, and ScienceDirect. I only used peer-reviewed, scholarly journals published since 2018. The search terms were *formative assessment*, *high school*, or *secondary education*, *learning assessment*, *teacher perspectives*, and *online learning* OR *e-learning* OR *distance learning* OR *virtual learning*. Finally, I used a dissertation search to find a conceptual or theoretical framework from the Walden Library. Again, I used *formative assessment*, *high school*, or *secondary education* as the search terms. I set the publication date to the last 2 years and got 11 results.

Conceptual Framework

The conceptual framework was Black and Wiliam's (2009) theory of formative assessment, which explains that for teaching to be effective, teachers must adapt instruction based on evidence. In their earliest work, Black and Wiliam (1998) stated that the actions of raising the standard of teaching and learning had not met the desired end because of inadequate direct teacher support and because there is no clear understanding of what occurs during the process of instruction. The authors explained that there is a false expectation that policymakers can input educational resources, policies, and stakeholders with the hope of getting knowledgeable, competent students and satisfied teachers without fully understanding what happens inside the black box (Black &

Wiliam, 1998). Black et al. (2004) found that by incorporating formative assessment strategies, the effect size for improvement on the national school leaving examination increased. The formative assessment strategy includes the five constructs of clarifying the learning intention, facilitating the learning tasks, providing feedback, building capacity in students to support each other, and empowering students to take control of their learning (Black & Wiliam, 2009). The findings confirm the benefits of using formative assessment during instruction, such as an increase in students' scores.

Over time, Black and Wiliam (2009) used the theory to explain the instructional strategies that take place during teaching and learning. For instance, when referring to clarifying the learning intention, the authors demonstrated that teachers provide students with the lesson objective and the indicators for success. The authors further explained that the instructional strategy for facilitating the learning tasks involved teachers deliberately planning dialogue that included questioning. In explaining the construct of teachers providing feedback, Black and Wiliam stated that one of the strategies could be to use comments rather than a numerical grade when marking. The last two constructs of building capacity in students to support each other and taking ownership of learning involve teachers using peer assessment and self-assessment, respectively.

Finally, the theory deepens pre-service teachers' instructional staff and school leaders' understanding of what happens during instructional interaction when teachers clarify the learning goal, create opportunities for students to show what they know, and develop the skill of being independent learners. The formative assessment theory is best suited for the study because it focuses on teachers' actions to help students cognitively

process content. The theory proposes that when students cognitively process content with support from teachers using the construct, students' scores increase (see Black & Wiliam, 2009).

Literature Review Related to Key Concepts

Previous Research in Formative Assessment

The formative assessment theory has been applied in recent research. For example, Lamberg et al. (2020) conducted an exploratory qualitative study and found that the use of formative assessment increased after consistent year-long professional development. However, high school teachers most frequently use summative assessments rather than formative assessments (Cotton, 2017; Lyon et al., 2019). Although teachers understand the benefit of formative assessment, some struggle with using the strategies (Gotch et al., 2021). Teachers' main difficulty with formative assessments has been large class sizes and lack of time, causing teachers to default to teacher-centered assessments (Alt, 2018). But professional development, coupled with teachers' perspectives about formative assessment, can improve use and self-efficacy (Lamberg et al., 2020; Zlabkova et al., 2021). When the school district provides teacher education, teachers' use of formative assessments increases (Alt, 2018; Barnes et al., 2017; Krishnan et al., 2021). Teachers' teachers' belief about instructional practice and the purpose of formative assessment affects how much high school teachers use formative assessment (Alt, 2018; Barnes et al., 2017; Krishnan et al., 2021).

Nature of Formative Assessments

Formative assessment provides opportunities for teachers to assess what students know and do not know when students express their understanding of the academic goal (Wylie & Lyon, 2020). Formative assessment is an ongoing process that includes teachers' feedback and students' self-regulating their learning as they collaborate with peers (Wylie & Lyon, 2020). By its very nature, formative assessment has implications for feedback, self-regulated learning, and peer-assisted learning (Andersson & Palm, 2017). The situation with feedback, self-regulated learning, and peer-assisted learning occurs during the ongoing and planned interactions between students and teachers.

Types of Formative Assessments

The goal of formative assessment is to collect data about student learning through formal and informal methods. Formal assessment methods include quizzes, while informal methods involve conversations between peers and teachers (Van der Kleij, 2019). Quizzes are characterized as closed-ended and open-ended test items. Quizzes that use closed response items, such as true or false, and multiple choice usually promote shallow learning and low-level thinking skills (Chen et al., 2021; Darling-Aduana, 2021; Enders et al., 2021). Conversely, open-ended quizzes have short responses or essays, filling the blank, discussion forums, portfolios, and reflection assignments (Ogange et al., 2018).

Purpose of Formative Assessments

Formative assessment is an integral part of teaching and learning. The purpose of formative assessment is to help students and teachers interact with academic content so

that the former can illustrate understanding, present their knowledge of the content, or show the level of their skill, and for the latter to adjust instruction based on evidence (Cisterna & Gotwals, 2018; Wylie & Lyon, 2020). What distinguishes formative assessment from any other assessment is that it requires data to be collected to modify instruction (Brink & Bartz, 2017; Krishnan et al., 2021; Yan et al., 2021). With the foregoing, the rationale for selecting the constructs of formative assessment for the closer study is that it specifies the best pedagogical practices for students to learn and self-correct misconceptions.

Formative Assessment and the Effect on Student Achievement

Formative assessment is part of best practice in pedagogy and improves student achievement. Formative assessment is beneficial for evaluating student learning and adjusting instruction (Brink & Bartz, 2017). Students enhance their skills and knowledge when they respond to feedback and when teachers modify instruction based on data (Cisterna & Gotwals, 2018; Fuller, 2017; Johnson et al., 2019; Maier, 2021; Yan et al., 2021). Consequently, students show academic gains when teachers use feedback in formative assessment strategies. Furthermore, when students receive feedback, they recognize in what areas they are proficient or need improvement (Dalby & Swan, 2019; Enders et al., 2021; Van der Kleij, 2019). What was not known is how students accept feedback in the virtual learning environment, and a study on teachers' use of formative assessment in the virtual learning environment may present information.

Effect of Feedback in Formative Assessment

Feedback is not a one-sided entity, and students have a role to play in accepting and processing feedback. Students are not passive bystanders during the feedback process (Lyon et al., 2019). To self-monitor, students must understand the learning criteria, be proficient in self-reflection and seek feedback (Yan & Brown, 2017). However, sometimes students are not able to accept feedback. Feedback will be ineffective if students cannot process it correctly, especially when feedback is negative. For instance, students may have difficulty managing the emotional results of feedback. To experience the benefit of feedback, students need to manage the affective results because ego and emotional responses inhibit uptake (Bibbens, 2018; Carless & Boud, 2018).

Effect of Peer Assessment in Formative Assessment

Peer support comes in a variety of forms and requires that students understand the learning objectives. Peer assessment is the role students play as they support each other's learning, including suggestions to peers about how fellow students can reach the learning goal (Andersson & Palm, 2017). Students who have received peer support have performed better on follow-up assessments than students who did not receive peer support (Egelandsdal & Krumsvik, 2017; Sanchez et al., 2017). The findings from a qualitative study suggested that some high school students became more active members of the learning community when teachers created opportunities for peer assessment Zlabkova et al. (2021). Nevertheless, researchers have found there were low implementation rates for both self-assessment and peer assessment (Lyon et al., 2019).

Effect of Self-assessment in Formative Assessment

In addition to accepting feedback, students also increase learning when they self-assess. In a qualitative study done in higher education, Yan, and Brown (2017) found that faculty required students to check their work against a rubric and then revise their work based on the rubric. Self-assessment involves students understanding the learning goal and using metacognitive skills to assess the attainment of the goal (Lyon et al., 2019). Students who frequently assessed their work showed increased performance (Yan et al., 2021; Zamora et al., 2018). However, more research was needed to determine how high school students think on a metacognitive level and assess learning.

Effect of Students Taking Ownership of Learning

Another construct in the formative assessment theory discusses students empowered to take ownership of learning. There are varied benefits when students take ownership of learning, such as the students' increased ability to build knowledge of the content and strengthen self-efficacy (Carless & Boud, 2018; Maier, 2021; Nicol, 2020; Zlabkova et al., 2021). High school students interact with their thoughts about the content when they take ownership of learning and self-assess after each assignment (Yan et al., 2021) and accept feedback to make value judgments or corrections when they take ownership of learning (Carless & Boud, 2018; Lyon et al., 2019). Overall, students show improvement in learning when they self-reflect after feedback.

Teachers' Perspectives on Formative Assessment in the Bricks-and-Mortar Classroom

High school teachers have internal self-efficacy tools that determine how they use formative assessment strategies during instruction. Researchers found that teachers did not implement formative assessment strategies if they believed they lacked self-efficacy with using the strategies or did not believe the strategy was valuable (Andersson & Palm, 2017; Gotch et al., 2021). In addition, teachers' perspectives on formative assessment led them to prioritize certain content sections for instruction (Correia & Harrison, 2020; Krishnan et al., 2021).

Teachers' Use of Formative Assessment in the Bricks-and-Mortar Classroom

High school teachers clarify the learning goal and create opportunities for students to show what they know. Formative assessment is setting learning goals, gathering data from evidence, and making instructional decisions based on the findings (Cisterna & Gotwals, 2018). Frames of noticing are one of the lenses used in the bricks-and-mortar classroom for teachers to identify students' knowledge and misconceptions (Cowie et al., 2018). Frames of noticing are lenses teachers use to determine to what extent students understand the concepts (Cowie et al., 2018). The three frames of noticing are an understanding of the curriculum, an understanding and connectedness to the culture of the classroom, and opportunities for students to collaborate (Cowie et al., 2018). Researchers found that teachers combine the three frames of noticing using rubrics to strengthen their capacity to support students and ensure that achievement increases (Beck et al., 2018; Correia & Harrison, 2020; Cowie et al., 2018).

Formative assessments can be used as checkpoints when teachers collect data to make instructional decisions. The data could be collected by formal means or informally, such as from learning tasks of student conversation (English & English, 2019; Fuller, 2017; Hansen, 2020). Whether the data are collected by formal or informal means, formative assessment in the bricks-and-mortar classroom is the principal way that students demonstrate to what extent they understand the learning goal (Andersson & Palm, 2017). In addition, the strategy allows teachers to help students correct misconceptions so that they achieve their learning goals (Andersson & Palm, 2017; Boesdorfer & Daugherty, 2020).

There is growing data on the phenomenon of formative assessment in the traditional, brick-and-mortar classroom. However, in some instances, summative assessments or teacher-centered assessments are used more often in the traditional bricks-and-mortar classroom than formative assessments (Alt, 2018; DeLuca et al., 2018; Grob et al., 2017). Researchers also found that some teachers in the bricks-and-mortar classroom bypass using formative assessments to support learning (Brink & Bartz, 2017). However, there is far less information on formative assessments in the virtual learning environment.

The Unique Needs of the Virtual Learning Environment

The online learning management system is sometimes viewed as a negative aspect of the virtual learning experience. For example, some students explained a lack of community in the virtual learning environment (Blaine, 2019). In addition, there is sometimes an absence of affective connections needed for student engagement and

learning in the virtual learning environment (Blaine, 2019; Sanders & Lokey-Vega, 2020).

Technology can be used to address the issue of affective connections. For example, avatars and online platforms such as Zoom, Rumii, and Mozilla Hubs helped engage university students in the virtual learning environment (An & Mindrila, 2020). However, researchers found that in some high school settings, teachers used adaptive software, google forms, and chatboxes to personalize the online experience (Sanders & Lokey-Vega, 2020).

Formative Assessment in the Virtual Learning Environment

Since 2020, more and more parents are opting to place high school students in a virtual learning environment rather than the traditional bricks-and-mortar classroom. A learning management system is a platform for instruction and learning in the virtual learning environment. The instructional platform contains closed-ended and open-ended activities that allow students to work at their own pace (Barana et al., 2019). The learning management system is also beneficial to teachers. For instance, a qualitative study found that the analytics on the learning management system provided high school teachers with data from students' scores and offered computer-generated adjustments to instruction (Dalby & Swan, 2019). Learning management systems can track students' work and support students' achievement in the virtual learning environment (Ogange et al., 2018). Also, online gamified tools such as Kahoot, Quizlet, and polling provided high school teachers with real-time students' responses to formative assessments (Chen et al., 2021; Sanders & Lokey-Vega, 2020).

The indication is that formative assessment benefits students' progress and improves understanding. Researchers found that high school students' success increases when they build the capacity to interact with content and feedback (Jensen et al., 2021). High school teachers who worked in the virtual learning environment supported students' achievement by launching assessments to help students understand the content (Barana et al., 2019; Raes et al., 2020; Van der Kleij, 2019). However, online quizzes support, are usually multiple-choice and promote shallow learning (Chen et al., 2021; Darling-Aduana, 2021; Enders et al., 2021; Ogange et al., 2018).

Applying the Formative Assessment Theory to The Virtual Learning Environment

This section presents the literature regarding how the formative assessment theory is illustrated in the virtual learning environment. The formative assessment strategy includes providing instructional steps and discourse with students to share learning progress and adjusting instruction based on evidence (Lamberg et al., 2020; Yan et al., 2021). In addition, the approach for formative assessment involves the students' capacity to use the feedback tools in the virtual learning environment (Jensen et al., 2021).

Clarifying the Learning Intention

The formative assessment strategy helps students understand the expectations of the learning goal. Formative assessment is the teachers' active monitoring and subsequent adjustment of instruction based on the evaluations of the students' performance or response (Krishnan et al., 2021). A clear indication of the strategy is when the design of the online activities provides students with an explanation of the objectives (Van der

Kleij, 2019). Formative assessment reveals how students understand the academic content (Sanders & Lokey-Vega, 2020).

Use of Feedback

Feedback is an essential component of formative assessment. The feedback strategy supports some students' knowledge and skills acquisition (Jensen et al., 2021; Van der Kleij, 2019). In addition, feedback allows students to take responsibility for learning and engages students to feel like a part of the learning community (Zlabkova et al., 2021). However, despite the positive attribute of improving students' learning outcomes and helping students identify misconceptions to make corrections, providing rich feedback was labor-intensive (Cisterna & Gotwals, 2018; Jensen et al., 2021).

The issue of labor-intensive feedback lessens when the computer generates the feedback. The computer-generated feedback can either be reward-based or self-referenced (Maier, 2021). The reward-based feedback is a computer-generated response that shows student scores from the assessment. Conversely, self-referenced feedback is a computer-generated message that uses the accuracy of students' responses to provide recommendations on follow-up assignments (Maier, 2021).

Students also benefit from computer-generated feedback in that self-referenced feedback strengthens students' self-efficacy, and reward-based feedback alerts students on the sections of content that require further academic support (Maier, 2021). In other words, the messages from self-referenced feedback help students with a learning progression, while the reward-based informs students on whether they pass the

assessment (Maier, 2021). The latter model for feedback empowers students to take ownership of learning.

Empowering Students to Take Ownership of Learning

A fundamental construct of formative assessment is when students are empowered to take ownership of learning (Sanchez et al., 2017; Yan & Brown, 2017). Ownership of learning occurs when students use the opportunities to interact with their thoughts (Yan et al., 2021). For a case in point, researchers found that students who frequently self-assessed in their diary after each homework assignment showed increased performance (Yan et al., 2021; Zamora et al., 2018).

Students improve learning when teachers create an environment conducive for students to reflect. To explain, the academic benefits of taking ownership include students' increased ability to work on weaknesses, build knowledge of the content and strengthen self-efficacy (Carless & Boud, 2018; Maier, 2021; Nicol, 2020; Zlabkova et al., 2021). In addition, students learn to accept feedback and make value judgments when they take ownership of learning (Carless & Boud, 2018; Lyon et al., 2019). There is a need to explore how teachers help students take ownership.

Formative assessment strategies can lead to students taking ownership of learning through self-assessment. For instance, when students self-assess, they metacognitively process the learning goals, the intended competencies, and personal progress (Lyon et al., 2019). Specifically, some students use rubrics to connect what they know and what they need to know (Bibbens, 2018; Sanchez et al., 2017; Yan & Brown, 2017). Unfortunately,

there is very little literature about how high school teachers use a digital platform to encourage students to self-assess.

Empowering Students to use Peer Support

Students use peer support when they collaborate and receive peer feedback from each other. Collaboration and peer support allowed some students to become engaged members of the learning community (Zlabkova et al., 2021). Formative assessment also allowed for peers to support each other using the peer grading strategy. Peer grading was found to increase scholarship in some students (Sanchez et al., 2017; Zlabkova et al., 2021). In addition, peer grading was found to help students improve on subsequent tests (Sanchez et al., 2017). However, the findings of a qualitative study state that there were low implementation rates for self-assessment and peer assessment (Lyon et al., 2019).

Adjusting Instruction

Pedagogical adjustment is a critical component of formative assessment. The formative assessment strategy of adjusting pedagogy occurs when instruction is changed based on evidence (Bibbens, 2018; Krishnan et al., 2021; Wylie & Lyon, 2020; Yan et al., 2021). In other words, evidence gathered from questioning and collaboration is used to drive future instruction (Bibbens, 2018; Johnson et al., 2019; Lyon et al., 2019). The benefit of adjusting instruction is that teachers present consequent content that meets students' specific needs. In addition, some students experience academic gains under changing instruction.

Technology can be used to make instructional decisions from data. For example, a qualitative study suggested that a digital platform assessed class performance data to

make instruction decisions (Dalby & Swan, 2019). The benefits of formative assessment on the digital platform are that it provides instant feedback from multiple-choice assessments to gather data and determine students' needs (Karaoglan-Yilmaz et al., 2020). However, there is a need to explore how high school teachers make decisions using formative assessment in the virtual learning environment.

Both summative and formative assessments can be used to provide evidence of students' knowledge. A summative assessment is used to determine students' understanding of the concept after completing an activity (Chen et al., 2019). However, formative assessments are done during a lesson or unit to inform instructional decisions based on students' needs (Cisterna & Gotwals, 2018). Formative assessment strategies have the most substantial positive effect on learning (Yan et al., 2021). However, there have been low implementation rates (Lyon et al., 2019).

Synthesis of the Literature as it Relates to the Research Questions

Formative assessment strategies can be used to meet students' needs and increase students' academic performance. Related literature can be used to assess formative assessment strategies that can be used in instruction. Formative assessment strategies are used to gather data to adjust instruction to increase students' success (English & English, 2019; Fuller, 2017; Hansen, 2020).

In addition, technology tools are helpful for presenting formative assessments. For example, learning management systems can provide formative assessments to students (Barana et al., 2019). For instance, the learning management system can host gamified

quiz tools such as Kahoot, Quizlet, and polling for formative assessment in the virtual learning environment (Chen et al., 2021; Sanders & Lokey-Vega, 2020).

Summary and Conclusions

To summarize, five constructs in the theory of formative assessment provide information about what occurs during instruction (Black & Wiliam, 2009). First, the literature review examines the tools and strategies of formative assessment. The chapter further presents information on how students participate in formative assessment by accepting feedback, participating in peer assessment, self-assessment, and taking ownership of learning.

What is known in the literature is that there are varied benefits to using formative assessment strategies. Benefits include increased student engagement and teachers adjusting instruction based on the evaluations (Brink & Bartz, 2017; Holmes, 2018; Johnson et al., 2019; Krishnan et al., 2021; Raes et al., 2020; Sanders & Lokey-Vega, 2020; Wylie & Lyon, 2020). The literature highlights formative assessment strategies in the bricks-and-mortar classroom and the virtual learning environment. The proposed study is needed to explore high school teachers' perspectives on formative assessment and how they use it in the virtual learning environment (see Raes et al., 2020). The procedures and methods for the study are described in Chapter 3.

Chapter 3: Research Method

The purpose of this basic qualitative study was to explore high school teachers' perspectives on the use of formative assessments in the virtual learning environment. The participants were high school teachers with more than 1 year of experience teaching a content area subject in the virtual learning environment and used formative assessment in instruction. I gathered data using semistructured interviews with 11 participants who met the inclusion criteria and was selected from high school teachers who respond to the flyer on social media and from the Walden Participant Pool. A semistructured interview protocol guided the interview. The open-ended questions provided an opportunity for interviewees to explain their perspectives on formative assessment and how they use formative assessment in the virtual learning environment. Semistructured interviews help researchers understand the participants' experiences (Ravitch & Carl, 2015). In this chapter, I discuss the research design and rationale, my role as the researcher, the methodology of how the data were collected and analyzed, and ethical issues.

Research Design and Rationale

In qualitative research, the objective is to gain insight into the views and perceptions of participants about the circumstances connected to the phenomenon being studied (Merriam & Tisdell, 2015). The phenomenon of this study is high school teachers' use and perspectives on formative assessment in the virtual learning environment. Formative assessment is the term used to define teachers' active monitoring and subsequent adjustment of instruction based on the evaluations of the students' performance or response (Krishnan et al., 2021).

The basic approach was effective in this study because the approach is generic and not guided by a set of philosophical assumptions (See Kahlke, 2014). Generic studies are conducted to understand how people construct their worlds and what meaning they attribute to their experiences (Kahlke, 2014; Merriam & Tisdell, 2015). It would not be possible to gain this insight with a quantitative approach. Therefore, a basic qualitative study was most appropriate to explore the perspectives on high school teachers who teach a content area subject in the virtual learning environment and use formative assessment. The rationale for choosing this tradition was that it is descriptive and interpretive. Researchers can use this approach to understand how people make meaning of their experiences (Kahlke, 2014; Merriam & Tisdell, 2015). This approach helped answer the two research questions:

- RQ 1: What are high school teachers' perspectives on formative assessment in the virtual learning environment?
- RQ 2: How do high school teachers use formative assessment in the virtual learning environment?

Role of the Researcher

In my role as a professional, I am a high school English teacher. My role in my job is to create objectives, content, and learning experiences for high school teachers to use in the traditional bricks-and-mortar classrooms. I also conduct professional development for high school teachers and understand that assessments can be used to drive instruction. But I did not have a supervisory or instructor relationship with any of

the participants in the study. My role in the research study was to be an unbiased observer and analyze data scientifically and systematically.

There is a risk of bias in qualitative research. However, I practiced reflexivity during the interview process to avoid research biases. Reflexivity involves periodically using self-reflection to help identify potential preferences (Ravitch & Carl, 2015). In addition, I used a reflective journal to document my thoughts during the research and data collection process (see Ravitch & Carl, 2015). Finally, I maintained an open mind by consistently keeping a memo of my thoughts during the research process.

In addition to being cognizant of researcher bias, I also considered positionality to be mindful of personal and professional relationships with participants (see Ravitch & Carl, 2015). I conduct professional development for high school teachers, so I used descriptive validity to reduce bias and gave an accurate account of the meanings that participants attribute to their experiences (see Kahlke, 2014).

Methodology

The population that was studied was high school teachers who taught a content area subject in a virtual learning environment and use formative assessment. The teachers worked in the virtual learning environment for more than 1 year. I used purposive sampling to identify the population for the study. The participants provided rich data on the studied phenomenon (see Palinkas et al., 2015). Additionally, adding transparency to the subjective investigation helped minimize bias by giving an account of the findings.

Participation Selection Logic

The participants were selected from high school teachers who responded to the social media post and the Walden Participant Pool. I choose 11 high school teachers who taught a content area subject and used formative assessment in the virtual learning environment. I provided participants with a recruitment and informed consent email with the consent information to confirm their willingness to participate. Teachers replied with "I consent" if they met the criteria. I assessed if they meet the requirements by asking demographic questions at the start of the interview. A $25 Starbucks gift card was offered to the participants at the end of the interview. Only two participants wanted a Starbucks gift card. Six participants preferred an Amazon card, and two participants declined the gift card.

There is a relationship between saturation and sample size. I selected 11 participants who met certain criteria for the basic qualitative study (see Groenewald, 2004; Guest et al., 2006; Ravitch & Carl, 2015; Van Manen, 1990). The rationale for selecting this number is to achieve a saturation level as I explored the participants' experiences. When the information started repeating across participants, the data was saturated (Ravitch & Carl, 2015). Although I intended to conduct semistructured interviews with 12 participants, I reached saturation at 11 participants.

Instrumentation

I used the interview protocol of open-ended questions as one of the data collection instruments. The interview protocol (see Appendix) has 10 researcher-created questions. My peers, at Walden, reviewed the interview questions and an expert panel of my

committee members (see Zamanzadeh et al., 2015). The interview protocol was an effective instrument for collecting data because it provided an in-depth exploration of a topic through asking questions, listening, and recording answers (see Rubin & Rubin, 2012). Furthermore, the interview protocol was effective because it allowed extended engagement between the interviewer and the participant to do evaluative research (see Shaw, 1999).

I used a systematic approach to collecting data. As a researcher, I am also a data collection instrument (see Creswell et al., 2007; Yin, 2015). I created and saved transcripts using otter.ai. Kahlke (2014) explained that it takes a descriptive and interpretive approach to understand how people construct meaning from their experiences. I used a matrix to organize critical sections of the transcript, a priori and open codes, categories, and themes. In addition, I used the following table to align the interview question with the research questions and the framework. Table 1 shows the interview protocol aligned with the research question and the theory of formative assessment.

Table 1

Alignment of Interview Questions to Research Questions and Formative Assessment Theory Elements Presented by Black and Wiliam (2009)

Interview Questions	Research Question	Theory of Formative Assessment
1. What subjects do you teach online, and how long have you been teaching?	N/A	
2. What is your perspective on formative assessment in instruction?	RQ 1: What are high school teachers' perspectives on formative assessments in the virtual learning environment?	

Interview Questions	Research Question	Theory of Formative Assessment
3. What are the most critical elements that affect the use of formative assessment in the virtual learning environment?	RQ 1: What are high school teachers' perspectives on formative assessments in the virtual learning environment?	
4. What skills are important for teachers to use formative assessment in the virtual learning environment?	RQ 1: What are high school teachers' perspectives on formative assessments in the virtual learning environment?	
5. Please explain the formative assessment strategies you routinely use in the virtual learning environment.	RQ 2: How do high school teachers use formative assessment in the virtual learning environment?	Assessing participants' replies for one or more of the five constructs of formative assessment
6. How do you check to see if students understand the content?	RQ 2: How do high school teachers use formative assessment in the virtual learning environment?	Teachers monitor for students' understanding.
7. What do you do when students do not understand the content?	RQ 2: How do high school teachers use formative assessment in the virtual learning environment?	Teachers clarify the learning intention. Teachers adjust instruction.
8. Tell me about a time you provided feedback to your students in the virtual classroom.	RQ 2: How do high school teachers use formative assessment in the virtual learning environment	Teachers provide feedback.
9. How do you help students respond to feedback	RQ 2: How do high school teachers use formative assessment in the virtual learning environment?	Teachers empower students to take ownership of learning.
10. What are the advantages of formative assessment?	RQ 1: What are high school teachers' perspectives on formative assessments in the virtual learning environment?	
11. What are the disadvantages of formative assessment?	RQ 1: What are high school teachers' perspectives on formative assessments in the virtual learning environment?	

The data collection instruments for the study were sufficient to answer the research questions. In addition, the interview protocol and my analytical skills to assess qualitative data helped answer the research questions as I examined high school teachers' perspectives and use of formative assessment in the virtual learning environment. I confirmed the validity of the interview protocol by having the protocol peer-reviewed by

my colleagues at Walden and by an expert panel consisting of my committee members. In addition, I established content validity when I conducted semistructured interviews with other participants, such as my coworkers and committee members. They agreed that the questions were straightforward to understand (see Zamanzadeh et al., 2015).

Recruitment

Social media was valuable for contacting participants. The participants in the study were high school teachers who taught a content area subject and used formative assessment in the virtual learning environment. I used purposive sampling to identify individuals who could provide data to inform an understanding of the problem and area of study (see Creswell et al., 2007). I created a flyer and prepared the informed consent email to recruit participants from social media and the Walden participant pool.

The flyer had my name, email address, phone number, and requirements for participation. After posting a copy of the flyer to my private social media pages, I used email contact to schedule time to conduct semistructured interviews with participants who responded to the email and met the criteria. I began interviewing participants who responded with "I consent." I posted the flyer many times until I had enough data to reach saturation. I also used the snowballing technique, asking participants to share my contact information with eligible participants. When meeting with participants, I briefly introduced the checklist of what makes participants eligible for the study and provided a confidentiality statement. The semistructured interview was approximately 20 to 30 minutes.

I reached the saturation level after conducting 11 interviews where no new information was developed. I followed up on weekly recruitment by posting to social media to allow more participants to respond to the flyer. The process continued until I reached saturation. All interviews were based on individual availability (Burkholder et al., 2016). Finally, I thanked the participants after each interview and offered a $25 Starbucks gift card. The gift card was sent by email.

Data Collection

After receiving Walden University IRB approval (approval number 08-11-22-1016202), I began the data collection process. The procedures for data collection involve using semistructured interviews to interact with the participants. The interview protocol (see Appendix) contains open-ended questions related to the research questions with probing follow-up questions used to draw from the participant's experiences (Burkholder et al., 2016). In addition, the semistructured technique allowed participants to share their perspectives on formative assessments in the virtual learning environment (see Burkholder et al., 2016).

The participants connected using a live link from a computer, phone, or tablet. I used video conferencing because my participants did not live in my geographic location, and a lack of research funding prevented an in-person interview (Archibald et al., 2019; Gray et al., 2020). The interaction was kept confidential using a Zoom password and saved on my personal computer (see Gray et al., 2020).

The semistructured interviews lasted 20 to 30 minutes and ended when I asked all the questions crafted in the protocol. At the end of the interview, I thanked the participant

for their time and explained that I would reach out later to share the findings and conduct member checking via Zoom to gain their feedback and suggestions. I continued data collection each week until I had interviewed all participants and conducted debriefing procedures to explain how participants would exit the study, including reiterating what would be done with the study. I requested a follow-up meeting to share the findings. The follow up Zoom meeting for member checking lasted, on average, 15 - 32 minutes.

During the data collection and transcription process, I recorded qualitative data on the digital recorder feature on Zoom and the voice memo app on my tablet. Following the recording, I saved it to a .mp3 file, then used otter.ai to create an initial transcript. When no additional relevant information emerged after conducting 11 interviews, it was understood that saturation had been reached. When there is no new information, there will be no further need to collect additional data (see Burkholder et al., 2016). I used a reflective field journal to keep a memo of my thoughts during the data collection process.

Data Analysis Plan

The data analysis plan involved using typological analysis, namely the inductive data analysis method. The inductive approach to data analysis reflects how people construct meaning from their experiences (Kahlke, 2014; Thorne, 2016). In addition, the inductive approach includes setting aside any preconceived notion to reduce bias (Kostere & Kostere, 2021). The first step in the inductive approach of the data analysis plan was to transcribe qualitative data from the semistructured interview.

I analyzed the qualitative data from each participant individually before moving on to the following interview and transcript to identify emerging themes (see Kostere &

Kostere, 2021). During inductive analysis, my goal was to engage fully in the data from each participant and to analyze the raw data into a summary (Kostere & Kostere, 2021; Thomas, 2006). In the first cycle, I coded the transcribed data and identified a priori codes from literature, and open codes from participants words (see Ravitch & Carl, 2015). In the second cycle of the data analysis process, I combined and organized the codes to develop categories and then themes (see Kostere & Kostere, 2021; Ravitch & Carl, 2015; Saldaña, 2015). I used a reflective field journal to keep a memo of my thoughts during the coding process.

Issues of Trustworthiness

The issue of trustworthiness ensures that the study is credible, reasonable, legitimate, and essential to all involved. The strategy used in this study is internal validity, dependability, confirmability, and ethical procedures. Moreover, reflected on my experiences to identify any bias that may impede the interview outcome of the study.

Credibility

Internal validity ensures credibility. I established internal validity by providing that the data collection instruments were sufficient, valid, and trustworthy. The interview was transcribed correctly, and data triangulation was used to avoid bias. In addition, I minimized researcher bias by conducting line-by-line coding using the participants' wording during data analysis (see Kostere & Kostere, 2021). Another way to establish internal validity is to include appropriate participants in the study.

I used purposive sampling to secure appropriate participants. The participants should understand the phenomenon thoroughly to provide reliable information for

formative assessment (see Shenton, 2004). The purposive sampling technique can meet the needs of gathering information from a select group (Teddlie & Yu, 2007). The participants were high school teachers who used formative assessment and have taught a content area subject in the virtual learning environment for more than one year.

Transferability

Researchers have the duty of presenting the study's findings using the words of participants, secondary resources, and other significant emerging themes to demonstrate the significance of their findings (see Saldaña, 2015). Research findings have transferability when they are generalized and applied in a broader context. In addition, a data set that reveals results when looking at participant words is said to be transferable.

Dependability

Another strategy that increases the possibility of trustworthiness is for there to be an accurate analysis of the findings. I am a human instrument for data collection, so I was critical of my internal dialogue account and kept a reflective journal (see Nowell et al., 2017). In addition, I used reflexivity and strict adherence to interview protocols (see Ravitch & Carl, 2015). As I hand-coded and analyzed, the reflexivity journal helped me be vigilant over my position and subjectiveness (Ravitch & Carl, 2015). In addition, I used member checking to discover if I have an accurate understanding of complex qualitative data (see Ravitch & Carl, 2015; Yin, 2015). Finally, the components of the data analysis tool were aligned with the research problem, purpose, and methodology; therefore, there is an assurance that the study reveals what it is intended to seek.

Confirmability

I used a template to keep detailed notes about the themes I created while documenting the first and second-order coding analysis. Confirmability is the ability to trace and understand the researcher's interpretation of the data (see Nowell et al., 2017). I journaled my thoughts on the template I used for data analysis. I kept an open mind while writing a memo of my thoughts and ideas during coding.

Ethical Procedures

It was vital to protect the rights of human subjects. Therefore, I obtained approval from the Walden University Institutional Review Board before collecting data. Once permission was granted, I placed my flyer, with the details of the requirements for participation, on my social media platforms and the website for the Walden participant pool. Each participant who responded got a recruitment and informed consent email. The email detailed the qualifications for participating. After that, participants responded to the email with "I consent" to show they consent to be part of the study. Next, I set a date and time to interview via Zoom. During the semistructured interview, I was relational and ethical and let the participants know what would be done with the data (Ravitch & Carl, 2015). Data is stored on a flash drive for five years, remain confidential, and be stored at my residence.

Summary

Chapter 3 explained the methodological design of the study and the rationale for conducting the qualitative inquiry. The purpose of the basic qualitative study was to explore high school teachers' perspectives on formative assessments in the virtual

learning environment using two research questions to guide the study. The research questions are, what are high school teachers' perspectives on formative assessments in the virtual learning environment, and how do high school teachers use formative assessments in the virtual learning environment. The rationale for choosing the basic qualitative tradition was that it is an interpretive approach that researchers can use to understand how people make meaning of their experiences (see Kahlke, 2014; see Merriam & Tisdell, 2015).

At first, I used semistructured interviews to gather data from 11 high school teachers. The semistructured interviews allowed participants to explain their perspectives on formative assessment in the virtual learning environment and to share openly and meaningfully (see Ravitch & Carl, 2015; Rubin & Rubin, 2012). I used an interview protocol with sufficient open-ended questions to guide the semistructured interview.

The participants were selected using purposive sampling, and I did not have a personal or professional relationship with the participants. Further, I provided participants with recruitment and informed consent email to confirm their willingness to participate, and they could exit the study at any time. I also provided the participants with the purpose of the interview and told them what would be done with the data (see Ravitch & Carl, 2015). All interviews were based on the participant's availability, and I conducted interviews until I reached saturation (Burkholder et al., 2016). I also offered a Starbucks $25 gift card to thank participants.

Lastly, I analyzed the data using typological analysis, namely the inductive data analysis method. I coded the transcribed data, identified a priori codes from literature,

and open codes from participants' words (see Ravitch & Carl, 2015). Then, I combined, clustered, and renamed the codes to create categories and themes (see Kostere & Kostere, 2021; see Ravitch & Carl, 2015; see Saldaña, 2015). Finally, I ensured trustworthiness using strategies that established internal validity, dependability, confirmability, and ethics. The findings from this study provide information on how theory is used in practice in the virtual learning environment.

Chapter 4: Results

The purpose of this qualitative study was to explore high school teachers' perspectives on the use of formative assessment in the virtual learning environment. I interviewed 11 teachers who had taught a content area course at the high school level for more than 1 year in the virtual learning environment. By exploring high school teachers' perspectives and use of formative assessment in the virtual learning environment, leaders can better implement strategies to meet teachers' needs, identify students' needs in the virtual learning environment, and inform instructional design.

Chapter 4 comprises the following sections: setting, demographics, data collection, data analysis, evidence of trustworthiness, and the results of the study. In this chapter, I provide information about the participants, the research design, and the findings about high school teachers' perspectives on formative assessment and their use of formative assessment strategies. First, I examine the setting and include the demographics. Next, I present the process of data collection and analysis. Finally, I examine the findings, organize the qualitative data into themes and provide a summary.

Setting

The participants were high school teachers who use formative assessment—monitoring and adjustment of instruction (Krishnan et al., 2021)—in the virtual learning environment. Each participant taught content area for more than 1 year in the virtual learning environment for a high school in the United States of America. No personal or organizational conditions influenced participants' experience at the time of the study.

Demographics

There were 11 participants in the research study. The criteria were that participants should teach a content area subject in a high school, should teach in the virtual learning environment for more than 1 year, and should use formative assessment in instruction. I used purposeful sampling to select participants who met the criteria for the study. Their experiences ranged from 2 to 16 years. The participants taught English, math, reading, History, and science in the virtual learning environment. Table 2 shows the participants' demographics.

Table 2

Participant Demographics

Participant	Role	Years in Virtual Learning Environment	Subjects Taught
P1	Teacher	2	English V Honors
P2	Teacher	2.5	English and math
P3	Teacher	2	math and science
P4	Teacher	3	math and science
P5	Teacher	2	reading
P6	Teacher	2	math and English
P7	Teacher	3	English
P8	Teacher	11	social studies
P9	Teacher	3.5	English
P10	Teacher	6	math
P11	Teacher	14	science

All participants worked in a virtual learning environment at a high school in the United States. One participant stated that teaching is a second career, with the first being a psychologist. I gathered data for the qualitative study using Zoom conferences and

recorded the semistructured interview using the digital recording feature on Zoom and the voice memo app on my tablet.

Data Collection

Qualitative data were collected from 11 high school teachers using a semistructured interview protocol. Before I started to collect data, I received IRB approval. Once permission was granted, I posted a flyer to social media with the details of the requirements for participation. The flyer was also placed on the website of the Walden participant pool.

I emailed a recruitment and informed consent form to individuals who responded to the posts. I scheduled appointments with those who replied to the email with "I consent." Then I sent a Zoom web-conferencing link with private password to participants who provided their available time to meet Data collection started on September 4, 2022, and ended on October 11, 2022.

The semistructured interviews were conducted via Zoom and lasted approximately 30 minutes. I used an interview protocol to guide the semistructured interview. The protocol can be found in the appendix. I recorded the data from the semistructured interview on the digital recorder feature on Zoom as well as the voice memo app on my tablet. Both recording apps are password protected to maintain confidentiality.

I saved the recording from the Zoom and voice memo applications as an mp3 in a file folder on my personal computer. The data were secured using a Zoom password on a password-protected computer. After saving as an mp3, I used otter.ai to create an initial

transcript which will be held for at least 5 years, as the university requires. There were no deviations in data collection from the plan presented in Chapter 3, and I encountered no unusual circumstances in data collection.

Data Analysis

I used typological analysis, namely the inductive data analysis method. The inductive approach to data analysis reflects how people construct meaning from their experiences (Kahlke, 2014; Thorne, 2016). In addition, the inductive approach includes setting aside any preconceived notion to reduce bias (Kostere & Kostere, 2021). The first step in the inductive approach of the data analysis plan was to transcribe qualitative data from the semistructured interview. I analyzed the qualitative data from each participant individually before moving on to the following interview and transcript to identify emerging themes (see Kostere & Kostere, 2021).

During inductive analysis, my goal was to engage fully in the data from each participant and to analyze the raw data into a summary (Kostere & Kostere, 2021; Thomas, 2006). In the first cycle, I coded the transcribed data, identified a priori codes from literature and open codes from participants' words (See Ravitch & Carl, 2015). In the second cycle of the data analysis process, I combined and organized the codes to develop categories and then themes (see Kostere & Kostere, 2021; Ravitch & Carl, 2015; see Saldaña, 2015). I used a reflective field journal to keep a memo of my thoughts during the coding process. Table 3 presents the a priori and open codes, and Table 4 presents the a priori and open codes organized into categories.

Table 3

A Priori and Open Codes

A Priori Codes	Open Codes
Adjust instruction	Breakout rooms
Discussions	Conversation
Empower students	Corrective feedback
Feedback	Data-informed instruction
Formative assessment	Discussion-based assessment
Guide learners	Emails
Instruction	Essential
Monitor for understanding	Evaluative
Peer support	Formulaic feedback
Quizzes	Generalized feedback
Student engagement	Google classroom
Take ownership of learning	Grow
Understand content	Important
	Kahoot
	Kaltura
	Live lessons
	Loomio
	Master content
	Necessary
	Phone calls
	Questioning
	Specific feedback
	Track progress
	Tutoring
	Vital

Table 4

A Priori and Open Codes in Categories

A Priori Codes	Open Codes	Categories
Formative assessment	Grow	Learning objectives
Understand content	Important	
	Master content	
Adjust instruction	Data-informed instruction	Informs instruction
	Essential	
Monitor for understanding	Conversation	Monitoring
	Necessary	
	Questioning	
	Vital	
Empower students	Track progress	Empowering to take ownership
Peer support		
Student engagement		
Take ownership of learning		

A Priori Codes	Open Codes	Categories
Discussions	Discussion-based assessment	Instructional strategies and tools
Instruction	Live lessons	
Quizzes	Phone calls	
	Tutoring	
	Breakout rooms	
	Google Classroom	
	Kahoot	
	Kaltura	
	Loomio	
Feedback	Corrective feedback	Types of feedback
Guide learners	Emails	
	Evaluative	
	Formulaic feedback	
	Generalized feedback	
	Specific feedback	

Description of Codes, Categories, and Themes

I identified six themes during data analysis. The first and second theme indicate that high school teachers perceive that formative assessment is beneficial for helping students meet the learning objectives, and data from formative assessment informs instruction. The third theme illustrates high school teachers perceive formative assessment to be an effective monitoring tool to identify evidence of students' understanding. The fourth and fifth themes indicate that high school teachers use formative assessment strategies to empower students to take ownership of learning, using formative assessments such as discussion-based assessments and academic games to clarify content in live lessons, phone conferencing and tutoring. The sixth theme explains that high school teachers use the formative assessment construct of feedback such as specific feedback, corrective feedback, generalized feedback, or formulaic feedback to guide students in the virtual learning environment. I found no discrepant cases in the

study. Table 5 shows how the codes were mapped to categories, how the categories led to themes, and how the themes aligned to the research questions.

Table 5

Overview of a Priori and Open Codes Organized Into Categories, Emergent Themes and Aligned to Research Questions

Research Question	A Priori Codes	Open Codes	Categories	Themes
RQ 1	Formative assessment Understand content	Grow Important Master content	Learning objectives	Theme 1: High school teachers perceive formative assessment as beneficial for helping students understand and helping teachers disseminate the learning objectives.
RQ 1	Adjust instruction	Data-informed instruction Essential	Informs instruction	Theme 2: High school teachers perceive data from formative assessment informs instruction to help them determine consequent instructional strategies.
RQ 1	Monitor for understanding	Conversation Necessary Questioning Vital	Monitoring	Theme 3: High school teachers perceive formative assessment as an effective monitoring tool to identify evidence of students' understanding and engagement.
RQ 2	Empower students Peer support Student engagement Take ownership of learning	Track progress	Empowering to take ownership	Theme 4: Some high school teachers use formative assessment strategies to empower students to take ownership of learning.
RQ 2	Discussions Instruction Quizzes	Discussion-based assessment Live lessons Phone calls Tutoring Breakout rooms Google Classroom Kahoot Kaltura Loomio	Instructional strategies and tools	Theme 5: High school teachers use formative assessment such as discussion-based assessments and academic games to clarify content in live lessons, phone conferencing, and tutoring.
RQ 2	Feedback Guide learners	Corrective feedback Emails Evaluative	Types of feedback	Theme 6: High school teachers use the component of specific, corrective,

Research Question	A Priori Codes	Open Codes	Categories	Themes
		Formulaic feedback Generalized feedback Specific feedback		generalized, or formulaic feedback to guide students in understanding academic content in the virtual learning environment.

Evidence of Trustworthiness

The trustworthiness of this qualitative study ensures credibility, transferability, dependability, and confirmability. The evidence of trustworthiness can be determined from knowing that participants thoroughly understood the phenomenon of formative assessment to provide reliable information, that findings are aligned to literature, and that I kept a reflective journal to monitor internal dialogue (see Nowell et al., 2017; see Saldaña, 2015; see Shenton, 2004). I listened to the participants and considered their spoken words without interjecting my own views to avoid assumptions (see Merriam & Tisdell, 2015).

Credibility

To ensure credibility, I used the Zoom platform to record the semistructured interviews, transcribed the conversation using otter.ai, and reviewed the transcription for errors. After the interview I used line-by-line coding using the participants' wording during data analysis (see Kostere & Kostere, 2021). I used purposive sampling to secure participants, and all were appropriate for the study.

Further, I established credibility through member checking. I emailed a one-page summary of the findings to each participant to review (see Rubin & Rubin, 2012). Then, I conducted follow up interviews with a sample of the participants. Follow up interviews

were held on Zoom and lasted about 20 minutes. The participants confirmed the findings were correct and presented additional information not provided in the semistructured interview.

Transferability

I ensured transferability by using the words of the participants, and significant emerging themes to present the findings. Research findings are also said to be transferable when they are generalized and applied to a broader context. I presented the study's findings using the words of participants, secondary resources, and other significant emerging themes to demonstrate the significance of their findings (see Saldaña, 2015).

Dependability

To increase the possibility of trustworthiness I checked for accuracy of the findings. Being a human instrument for data collection, it was critical for me to take account of my internal dialogue and keep a reflective journal (see Nowell et al., 2017). In addition, I used reflexivity and strict adherence to interview protocols (see Ravitch & Carl, 2015). As I hand-coded and analyzed, the reflexivity journal helped me be vigilant over my position and subjectiveness (Ravitch & Carl, 2015). Finally, I reviewed for the components of the data analysis tool to ensure it aligned with the research problem, purpose, and methodology; therefore, there is an assurance that the study reveals what it is intended to seek.

Confirmability

As I probed participants in the semistructured interview, participants had open conversation about their perspectives and use of formative assessment in the virtual learning environment. I used a template and kept detailed notes about the themes I created while documenting the first and second-order coding analysis. Confirmability is the ability to trace and understand the researcher's interpretation of the data (see Nowell et al., 2017). I kept an open mind while writing a memo of my thoughts and ideas during coding. I also reviewed participants' response to the one-page summary to check for accuracy. Further, I created an Excel sheet and a matrix to cross check emerging themes.

Results

In this section, I present the findings of the study aligned with the research questions. I used a semistructured interview to create opportunity for open conversation about high school teachers' perspectives and use of formative assessment in the virtual learning environment. Six themes emerged from the study.

Research Question 1

There are three themes related to RQ 1:

- High school teachers perceive that formative assessment is beneficial for helping students understand, and teachers disseminate the learning objectives.
- High school teachers perceive that data from formative assessment informs instruction to help them determine consequent instructional strategies.

- High school teachers perceive formative assessment to be an effective monitoring tool to identify evidence of students' understanding and engagement.

Theme 1: High School Teachers Perceive Formative Assessment as Beneficial for Helping Students Understand and Helping Teachers Disseminate the Learning Objectives

High school teachers perceived formative assessment as beneficial to both students and teachers because formative assessment help students understand the learning objectives and help teachers disseminate the learning objectives. Theme 1 created a basis for understanding high school teachers' perspectives on formative assessment in the virtual learning environment. With regard to the first research question, participants noted formative assessment was beneficial to both students and teachers. For instance, Participant 2 expressed formative assessment was beneficial to both students' academic growth and for teachers' support in disseminating content that meets the objectives of the lesson. Participant 2 stated,

> Formative assessments are supposed to help students grow to help them understand a topic; identify target areas for instruction; should be done regularly and based on objectives; Assess what is taught and prepare students. So, about formative assessments, they are supposed to help students grow to help them understand a topic, and we should be able to, like, know, their strengths and weaknesses to identify the target areas for instruction. We get to assess what is

> taught and help students get prepared for exams because there's going to be a state assessment, and formative assessments get me to know their weak areas.

Participant 2 showed the mutual benefit where both teachers and students disseminate and receive instruction, respectively. Based on the excerpt, the participant explained that students get the opportunity to prepare for state assessment, and teachers become aware of in what areas of instruction students need more support.

Similarly, Participant 3 also shared their perspective on the bidimensional component of formative assessment. Participant 3 explained students are able to "think critically" when they interact with content during formative assessment, and teachers can readily identify what students know and do not know. The participant believed formative assessment had a mutual purpose, meeting the needs of both students and teachers:

> The formative assessment helps students think critically and helps teachers clarifying the learning objectives exactly for what you want them to understand, is important. It's like getting the main points because at times, it's really hard for students to get content the way you want them to get it. You have to be very intentional.

There was a slight variation in the report from Participant 1 who highlighted the benefits of formative assessment as it related only to students. In focusing on students, Participant 1 explained that formative assessments allowed students to interact in a deeper way and master academic content. The participant explained formative assessment is the intermediate activity between teaching and testing. Participant 1 stated:

> Formative assessment is critical, I think it's important that students have an opportunity to take the risk of trying out new information before they are expected to show mastery of it. You really can't skip from just learning to testing. You have to do that midway step, you know. Students absolutely have to have a chance to process the information to try out the information, work with the information, and then they can work towards that mastery level. Students need that opportunity to be sure that they're forming their skills, and formative assessments provide that.

Conversely, Participants 4, 7, 8, 10, and 11, discussed the benefits of formative assessments as they related to teachers. The five participants explained the effect of formative assessment on teachers' support. Participants 4 and 7 described formative assessment as an evaluative measure to help teachers present the learning objectives. Participant 4 stated, "I think formative assessments are quite important in getting to know matters pertaining to student's performance. Likewise, Participant 7 echoed the perspective by saying, "Formative assessment, to me, is an evaluative measure of students' learning, and how much they understand the concepts." Participant 10 also said, "[Formative assessment] lets me know what the students understand so I can reemphasize what they're missing." Similarly, Participant 11 stated, "Formative assessment actually lets me know where the student is struggling. So, I look at these reports that are run and how many students are struggling in this area."

Participant 8 described formative assessment as beneficial to teachers for supporting academic gains by helping students understand the learning objectives. The

participant explained students in the virtual learning environment can resubmit their responses and receive guidance based on the standard or learning objectives. Students can submit several times until they show mastery. For instance, Participant 8 stated,

> Since we're in this environment, they have that opportunity to resubmit several times to master content. So, every time they submit an assignment, I automatically have to give feedback. So, I always give feedback based off making sure that they hit the standards of that particular lesson. And if I see any need for correction, or what they can go back and do to correct since we're in this environment that they can resubmit assignments as many times. So, they have that opportunity to master that content.

Similarly, Participant 4 believed the frequent check in from formative assessment increased students understanding of the learning goal. The participant stated formative assessment provided open lines of communication between the student and teacher in the virtual learning environment. Teachers assess student's knowledge through communication. The participant stated:

> By encouraging frequent check in strategies, ensuring that you are having a communication with your students, and making sure that you are in like, it's not a student who is reminding you that they did an assignment, it should be initiated by the teacher. I think formative assessment are quite important in terms of getting to know matters pertaining to student's performance.

The pattern continued with Participant 6, who explained formative assessment "can be given more regularly when students do not understand the concept." The

participant believed the benefit of formative assessment was to give students practice with the concept. The participant disseminated the information in the formative assessment and gave students time to practice their weaknesses often. Participant 6 stated:

> We're dealing with this month decimals. And remember, in terms of multiplication of large numbers, that was really a challenge to many students. So, you have to keep in to give assessments from time to time. This time now, I had to concentrate a lot more hours on these concepts, compared to other topics. And I also had to listen to what the students find really challenging and help them where I can.

In addition, Participant 10 agreed with formative assessment providing opportunity for teachers to offer support to students in the virtual learning environment with understanding the learning goal. The participant was able to identify students' misconceptions with content and offer guidance in the areas where more support is needed. The teacher assessed the evidence from formative assessment and explained what section of the module students should review to show academic gains:

> If [students are] not properly showing the steps and doing the problem, then I can't see where they're messing up and I can see where they need help in. So that kind of gives me a better understanding on well, did they understand this topic are the concepts for the for the modules, because of the mistakes they make. So, if they make the mistake, then I know that they're missing something from the

> module and the topics that we'd have to go back and kind of review more of, or I'd have to let them know to go back and kind of look over a topic or concept.

The participants communicate with students to assess their understanding of the learning goal. However, there was a difference between the information provided by Participant 3 and the views of Participants 4, 7, 8, 10, and 11. Participant 3 presented a different perspective with clarifying learning objectives by illustrating the challenges with disseminating content. For instance, Participant 3 explained the difficulty of providing support in a timely manner. The participant also explained some students have minimal success with using technology in the virtual learning environment. Participant 3 summarized the perspective in the following way:

> Let me say like, it's the timing. And also, maybe if students have their own challenges, they need to address them and also, in terms of the feedback should be relayed as quick as possible. Many teachers don't get to do that, especially if they're new. I remember when I was really new to this, I really go back into, like, so many of my objectives will lag behind, but it's something you can really learn.

A pattern emerged from the data regarding the bidimensional aspect of formative assessment with helping students grow academically and helping teachers identify to what extent students understand the learning. Another commonality that participants explained with formative assessment is the academic gain students experience when they interact with content to understand the learning objectives. Variances were observed when participants explained the challenges with disseminating content using formative assessment because of time constraints and issues students have with technology. A

second variation when participants highlighted the benefits of formative assessment as it related only to students. Overall, participants believed formative assessment was evaluative and allowed teachers to help students understand the learning objectives.

Theme 2: High School Teachers Perceive Data from Formative Assessment Informs Instruction to Help Them Determine Consequent Instructional Strategies

High school teachers perceive data from formative assessment informs instruction to help them determine consequent instructional strategies. Theme 2 directly related to RQ 1, which explored perspectives high school teachers held of formative assessment in the virtual learning environment. When asked about their perspectives on formative assessment, participants expressed it provided data that informed their instruction to determine what adjustments to make in the lesson and the instructional interventions that would meet students' needs. Nine participants found that formative assessment provides teachers with data that inform their instruction to adjust instructional strategy.

A pattern emerged regarding participants making instructional decisions based on evidence from formative assessment. For instance, Participant 4 explained being concerned about student performance and using data to determine instructional strategies that can improve student performance. The participant stated,

> I think my perspective is that formative assessments are quite important in terms of getting to know matters pertaining to student's performance, and also getting your students' progress. That means I get to know what they are doing well, or not. What is the problem; What can be done to like, improve on their performance.

Participant 7 also provided a similar perspective and stated that teachers make decisions based on the presented data to decide what steps to take to meet students' needs. Participant 7 said, "I have to be able to capture the information of whatever is going on in that environment and respond appropriately." In addition, Participant 9 explained gauging instruction based on evidence from formative assessment and stated, "It's like a check-in, and it also helps me, as a teacher, to gauge my instruction to the students who aren't getting it. Then I know I need to try another technique." The responses from both Participants 7 and 9 reiterate teachers' perspective that formative assessment provides evidence that determines how they adjust instruction.

There were variations in participant's technique for instructional strategies. For instance, Participant 6 stated that when considering techniques for adjusting instruction, "I identify what students don't understand in a specific issue and make an instructional decision on whether to have students practice in mixed ability groups or [re]teach the core skills." Participant 2 had a similar technique with placing students in mixed ability groups. However, Participant 2 included empowering students to support each other. Participant 2 stated the following about providing instruction based on evidence from formative assessment:

> In terms of an assignment that I gave in Geometry and the students didn't do very well. I grouped the students into around six; so, there was a balance where some students were not so good at one thing and others would be good at it. So, there was some bit of balance. The students were able to learn from each other quite well.

Like Participant 2, Participant 11 confirmed creating small group meetings to deliver instruction based on evidence. However, there was a slight variation because Participant 11 used the technique of teacher-led instruction in the small group to teach the core skills and did not require that students support each other. Participant 11 stated,

> Formative assessment actually lets me know, again, where the student is struggling. So, I take that particular area, I'm looking at with these reports that are run, I'm looking at how many students are struggling in this area. Because again, that tells me if I need to teach the whole class, you know, teach it in a different manner, if I need to, again, provide resources and additional support, and then again, if I need to, then maybe it's a smaller group that actually needs you know, help in a particular area. Then I would schedule small group meetings.

Similarly, Participant 10 also expressed the same perspective of a teacher-led model and reported reteaching content after using formative assessment. The participant explained the perspective in the following way:

> I feel like it lets me know that the students understand the topics, if they did well, if they didn't do well, then that means okay, they need to go back and redo that module. And then or I need to go back and kind of reemphasize what they're missing.

Participant 10 also used a different technique, empowering students to take ownership of their learning. The participant required students to review a module independently with the teachers' guidance. The following excerpt illustrated how

Participant 10 guided students to the content that they should check on their own, independent of a teacher:

> So, when we're using formative assessment then I can see where they're messing up and I can see where they need help. So that kind of gives me a better understanding of did they understand this topic are the concepts for the modules, because of the mistakes they make. So, if they make the mistake, then I know that they're missing something from the module and the topics that we'd have to go back and kind of review more of, or I'd have to let them know that, you know, they need to go back and kind of look over a topic or concept.

Differently from providing instruction and guidance, participants also offered interventions based on data from formative assessment. For instance, Participants 5, 6, and 11 made instructional interventions based on the data. Participant 5 said,

> We're talking about formative assessment; so, there are breakout sessions quite a bit. I mixed the students depending on what's needed. I can also differentiate pull small groups and do more interventions, when I'm constantly using those formative assessment tools

Along the same lines, Participant 5 said, "So having enough space and time to chunk the lesson is vital. You need to give yourself space and time to make sure that you are able to provide those interventions." Participant 6 explained the intervention in the following way:

> I have to reach out to them one-on-one, mainly by talking to their parents and finding out what I can do. In our one-on-one meeting, it's basically on the table to

> the two of us or even the specific students who are having challenges. I would call and organize some time. Sometimes I intervene during the lesson through the online platform just [me and the student] away from the rest of the students in a breakout room.

Participant 11 also provided instructional interventions based on evidence from formative assessment. Participant 11 stated providing notes on a topic when students do not understand the content:

> So, I would tell them, Okay, I'm going to be going over, for instance, completing the square for quadratics because many students had difficulty understanding that concept. So, I would let them know what day and time I plan on doing that lesson, and then I would have more notes for them to look at and do examples and show them the steps that they would have to go through [worksheets] for the for that lesson.

Five participants explained that it was time-consuming adjusting instruction based on evidence. For instance, when probed for additional information, Participant 5 stated the following:

> Time is never on a teacher's side. You want to be able to intervene after using the formative assessments. However, there is not always enough time. Sometimes time gets in the way. So having enough space and time to chunk the lesson is vital. You need to give yourself space and time to make sure that you are able to provide those interventions.

Participants alluded to the length of time it took to provide informed instruction based on evidence. For instance, Participants 2, 3, 7, and 11 all mentioned the length of time it takes to create follow-up lessons based on the evidence they receive from formative assessment. Participants 2 and 7 both confirmed planning, based on evidence, is "time consuming, and it takes a long time to plan."

Participant 3 had a varying perspective about time. The participant explained that follow-up lessons required collaboration with other teachers, and that collaboration was time-consuming. Participant 3 explained,

> In my first year I was lagging behind with pacing. I had to learn from other teachers. So now basically what I have to do is to learn about formative assessment very fast, and to be patient to also learn. I have to ask other teachers who have experience on it so planning interventions takes a long time.

Participant 11 explained it was time-consuming to find the resources for intervening when students do not understand the concept. The participant stated, "It takes time looking for these resources and support if students need tutoring. Resources like extra worksheets."

A review of the qualitative data shows high school teachers believe they can make instructional decisions and provide interventions based on evidence from formative assessment. Theme 2 established that high school teachers perceive formative assessment as a tool that helps determine consequent instruction. In addition, evidence from formative assessment enables teachers to determine when intervention, such as worksheets and conversations with students or parents, is needed. Participants also

explained the disadvantage of adjusting instruction and providing evidence-based interventions was time-consuming.

Theme 3: High School Teachers Perceive Formative Assessment as an Effective Monitoring Tool to Identify Evidence of Students' Understanding and Engagement

Nine participants believed that formative assessment was a monitoring tool for identifying students' understanding of content, regarding students' progress, and student engagement. Participants believed that formative assessment was effective and necessary for the three identified monitoring components. Six participants described formative assessment as a monitoring tool, and seven participants stated formative assessment supported student engagement.

A pattern emerged from the data with participants' perspectives on formative assessment as a monitoring tool. Participants can identify the extent to which students understand academic content. Participant 11 said, "I think it's overall a great opportunity or method to use in order to assess students learning very quickly, as well as their progress and comprehension." For monitoring, Participant 7 asked questions to helps students identify what they know and do not understand:

> I will have them verbalize, what they don't understand. Once they have identified what they don't understand, we start there. I have to be able to gather the information and capture, you know, the tone or whatever's going on in that environment, and then respond appropriately.

In addition, Participant 7 also spoke of incorporating formative assessment as a "diagnostic assessment to see what students know before integrating the concept."

Likewise, Participant 4 offered similar insights related to monitoring. Participant 4 said, "I think having that conversation with the student can also give you some more answers."

The following excerpt from Participant 4 showed that the teacher monitored to identify what students understood from the lesson:

> I think my perspective is that formative assessments are quite important in terms of getting to know matters pertaining to student's performance, and also getting your students' progress. And getting to know what they are doing well, or not. I get to know what the problem is, and what can be done to improve on their performance.

Participant 1 expressed being intentional about monitoring students' understanding in the virtual learning environment. For instance, Participant 1 stated that monitoring requires "creating questions that help them to then take that second look and revise." When probed, Participant 1 revealed students' response to formative assessment provides teachers with information regarding what they know and do not know. Participant 1 stated the following:

> In the virtual classroom we have to be able to look at the content and determine what potentially students can have difficulty with, then check in to see. We call it monitoring, you know; Marzano and all that, which is formative. I will teach the lesson with a combination of strategies, and a combination of my own form of assessments that I built in, working on what I think students may need extra support on.

Similarly, Participant 9 confirmed the perspective that formative assessment help teachers "check in to monitor the student's learning." Like Participants 1, 4, and 7, Participant 9 also used conversation to monitor what students know and do not know. When probed, Participant 9 said,

> And in my oral exams, when we're talking, and they ask questions, or they say something, but don't say correctly, I can give feedback in that way. Like, for instance, I just got off the phone with a discussion-based assessment with the young man who, who gave a wrong answer. I had to give feedback and help him break down where he went wrong, so that he can understand and, make his changes and correction.

Likewise, Participant 2 recognized that formative assessment enables teachers to monitor to "identify students' strengths and weaknesses." Participant 2 also used conversations to monitor for students' understanding:

> So, you have to keep in to give assessments from time to time. This time now, I had to concentrate a lot more hours on this topic, compared to other topics. And I also had to listen to what the students find really challenging and help them where I can. I encourage them to respond. That's how I'll know that that student understands the comment.

There was a variance in the qualitative data from Participants 10 and 11. Whereas five participants monitored for understanding, in contrast, Participants 10 and 11 monitored for academic integrity. Sometimes Participant 10 monitored for understanding and stated, "I feel like it lets me know that the students understand the topics. I get to see

if they did well or if they didn't do well. Then they need to go back and redo that module." However, the excerpt below showed Participant 10 monitored for plagiarism:

> Usually, I give a talk of morals. How, you know, you've got to live with yourself if you're cheating. The talk had worked with some students, for some it doesn't. But sometimes you can, as an ELA teacher, I can see when my students plagiarize something, or they copied something else. And that's a conversation that I do have with them I have with their parents, you know, so it just takes a keener eye, as an instructor to see where my students are not being honest.

Participant 11 stated the following about monitoring for plagiarism:

> So, it's not that part that I grade as plagiarism. Because if they have the steps and they're doing the problem, I can't say that they copied because that's how you solve the problem. It's the explanation that they have for it is that word for word from somebody else, right? Because if they sit and explain it word for word, then that means they must have used somebody else's. And then they don't only check it from online, they also check it versus other virtual students, they check to see if any other if they have exact same papers as any other virtual students.

Participant 11 went on to explain that a "phone call helps to confirm if they cheated because if they're able to answer the question quickly, and respond, then I can assume they are not cheating."

Another aspect of monitoring emerged when three participants discussed monitoring for students' progress. Participant 6 also viewed formative assessment as "a means of monitoring students' progress." The qualitative data from Participant 6 showed

there is an intentional class design in the virtual learning environment to facilitate monitoring for progress:

> Formative assessment is very important to apply in our class setup for us to be able to monitor your student's progress over time. Basically, you get to hear from them, hear out their views, and even their ideas, and for them to feel at liberty to express themselves. That way you can know, what is what is not always a challenge to them. And what is something hard.

Likewise, Participant 5 also believed formative assessment was useful for tracking students' progress and stated the following:

> Formative assessment is necessary; I feel like it's a vital part of the monitoring process when you are trying to get students to track their own progress, as well as you are tracking their progress. There has to be periodic, consistent ways to measure student progress on a particular learning target or a standard.

Participant 5 further explained tracking students' progress throughout a lesson with "probing questioning" and having targeted conversation:

> So, I would track the students' responses as they're working. And then on the next task, if it is something that is connected to what they just did, then I may pull those students that were struggling and pull a small group or I just might identify those students to ask more probing questions in the chat, because I saw that they're struggling. So, I will just constantly monitor which students may be mastered that task or which students are struggling and then be able to adapt the lesson either add questions or ask more questions. When I am asking questions, I

> would target those [struggling] students first, to ask just to see if there has been progress and then maybe differentiate the lesson based upon the evidence.

Similarly Participant 3 confirmed tracking students' progress and added that formative assessment supports student engagement:

> Without formative assessment, there would be so many things that are not known. I think they are very necessary. Without [formative assessment], there would be so many things that are not known. Because it helps in active engagement with learners. And it also helps you to see where your students are in terms of progress.

Seven participants believed formative assessment supported student engagement. Like Participant 3, Participant 7 stated,

> I will ask follow-up questions and have them put an emoji. They either raise their hands or put a note in the chat box. For the virtual classes, they're done using Google Classroom. There's a link so they have a chat in our chat box where they can interact with me and their classmates. It's very engaging that way.

After member checking, Participant 7 added, "Formative assessment is also a key engagement piece, especially with asynchronous learning." Participant 11 confirmed formative assessment to be a strategy that can engage students:

> I think what [formative assessment] does is to give a more focused and targeted approach. The assessment is also personalized to the student. So, once it's personalized, that allows the student to take the initiative in their own learning. And then again, it's more specific to learning goals as well.

Participant 8 also believed formative assessment allowed students to be more engaged in the lesson. For instance, the participant explained that students in the virtual learning environment may be less interactive because they were not being seen. Participant 8 stated,

> Well, the twelfth graders are less interactive, actually. You know, you're talking to them, and you're not seeing them so it's just silence and mute if they're not showing themselves. I gave them that choice with the camera; but formative assessment keeps them engaged because they have to interact with me and their classmates to let me know what they understand. My ninth graders are more interactive than my twelfth graders.

Participant 4 also expressed that formative assessment helps with student engagement. The participant stated, "Formative assessment stimulates students' interest in the subject. The bonus is the mastery of content with time." Likewise, Participant 9 also confirmed that formative assessment strategies are a way to "reach the students and to maintain their interest."

A variance was observed when Participant 11 discussed keeping students engaged with digital tools that had questions embedded in them:

> I use two digital tools - Kahoots and quizlets. In both of those assessments, you can build quizzes. It is more of an interactive fun; pretty much gaming online you can use to create your questions. You have the students log in with the particular code, you start the game and ask the questions and students will respond with what they believe is the correct answer.

The pattern that emerged for theme 3 is that participants believed formative assessment was a monitoring tool for students' understanding and progress. In addition, participants believed formative assessment supported student engagement. Participants used questioning techniques and games to monitor for students' understanding and keep students engaged in the lesson. Themes 1, 2 and 3 addressed RQ 1 regarding teachers' perspectives on formative assessment in the virtual learning environment.

Research Question 2

The second set of themes that emerged from the qualitative data described participants' use of formative assessments in the virtual learning environment. Research Question 2 asked how do high school teachers use formative assessment in the virtual learning environment? I identified three themes for RQ 2.

- Some high school teachers use formative assessment strategies to empower students to take ownership of learning.
- High school teachers use formative assessment such as discussion-based assessments and academic games to clarify content in live lessons, phone conferencing, and tutoring.
- High school teachers use the formative assessment construct of specific, corrective, generalized, or formulaic feedback to guide students in the virtual learning environment.

Theme 4: Some High School Teachers use Formative Assessment Strategies to Empower Students to Take Ownership of Learning

High school teachers use the strategies of formative assessment to build capacity in students to take ownership of learning. Theme 4 created a basis for understanding high school teachers' use of formative assessment in the virtual learning environment. Qualitative data illustrate high school teachers use formative assessment to encourage students' agency in the virtual learning environment. Participant 2 summarized interaction with students in the following manner:

> [Students] don't just act independently. Some might be strong in one area and weak in another; so why not have them collaborate with each other?" When I read the report, I noticed there was like a group assignment that needed to be done and some did not participate. So, from looking at past progress, compared to what's going on now, then I decided to reach out to the students that were not engaging [in the lesson]. Okay, so the one thing that I know, with formative assessment, is that you're able to identify student comprehension in some ways. I had a one-on-one session and found out that they were dealing with something that was not related to understanding the assignment. So, I think having that conversation with the student can also give you some more answers. What I noticed was the problem was totally unrelated to the class itself.

The comment from Participant 2 illustrated how teachers used conversation with students to help them take ownership. Participant 5 helped students take ownership by teaching them to track their progress. The participant stated, Formative assessment is necessary; I

feel like it's a vital part of the monitoring process when you are trying to get students to track their own progress, as well as you are tracking their progress." Similarly, Participant 3 expressed, "I think formative assessments are very necessary because it helps in active engagement with learners. Also, it gives the students a sense of ownership about their learning." Both Participants 3 and 5 used formative assessment strategies to facilitate student agency.

Participant 8 stated that sometimes in the virtual learning environment, "[The teacher does] not see [students] so it's just silence and mute if they're not showing themselves." Participant 8 went on to explain:

> I will ask follow-up questions and have them put an emoji. They either raise their hands or put a note in the chat box. For the virtual classes, they're done using Google Classroom, okay. There's a link so they have a chat in our chat box where they can interact with me and their classmates.

Participant 8 used formative assessment strategies to help students develop ownership by engaging in metacognition to assess their understanding of content. For instance, Participant 8 guided students with using metacognition so students could assess if they understand content as it is presented:

> And so, I just tell him them to pick a Gif to show how they are feeling about the content right now. So that's what I use in that regard. Or I'll say, if you're with me, put "1" in the chat. If you'd like me to slow down or rewind, put "say that again, Miss X."

Participant 8 also facilitated conversations within the lesson and required students to respond with an emoji that shows their level of understanding. The participant helped students take ownership of learning by reflecting on content and with their peers.

Likewise, Participant 11 used formative assessment strategies to encourage students to make decisions about their learning. For instance, Participant 11 said,

> So, I'll go back in the chat and even if one person puts the three, I'll just try to do a recap and say it again, maybe say it in a different way, and ask them if they feel if they understand. If not, then I invite them to book a call with me or stay after the lesson so that we could talk about it again.

Participants 8 and 11 encouraged students' agency by helping students reflect on what they understand and be proactive with reaching out to the teacher when they need clarification on the content. Participant 11 asked the students to put a number in the chat. Conversely, Participant 8 asked students to use an emoji to show their level of understanding of content.

There was a slight variance in the follow-up method that participants used to help students take ownership of learning. Participants 6 and 10 included parent conferences when building capacity in students to take ownership of learning. Participant 6 stated,

> I have to reach out to them one on one, and by mainly talking to their parents, and find out what can be done. In our meeting one on one, it's basically the two of us, and the specific students who are having challenges. I would call and organize some time. Sometimes it is during the classes through the online platform where there's just us away from the rest of the class in a breakout room. And I feel like

> that keeps the class active such that even the students who have a lot of challenges they're able to keep up because of my extra time with them.

Participant 10 included parent conferences when students lack agency and lose academic integrity:

> But sometimes you can, as an ELA teacher, I can see when my students plagiarize something, or they copied something else. And that's a conversation that I do have with them and with their parents, you know, so it just takes a keener eye, as an instructor to see where my students are not being honest.

Participant 10 explained how to empower students to take ownership of learning:

> I can send messages to them privately to find out what's going on. First of all, I ask "Are you there?" because virtually, sometimes the students turn the computer on, and they're gone. So, they're not responding because they are not there. So, their name is here, but they're not here. So that's one of the issues that we do face when we teach virtually. But for the students who are actually there, and they're not getting it, you know, they're able to tell me, you know, what part they're having difficulties with? And I may say, okay, take 10 minutes, do a quick read. Read paragraph X and paragraph X. So, they caught up with what's going on.

Participant 10 provided students with supplemental materials and differentiated instruction so they can access academic content at their level of understanding:

> I would ask them how much they understand the skills, and they could type it in the chat box, and then they have to explain. So, if they are at level three, they must explain why they are a three. If they are at level five, why are they a five?

> They have to clarify by asking themselves, why am I there? What exactly did I learn? What exactly did I understand? If they're a one, Okay, why are you the one; what is it? So, the students do not just give a number, but they have also to explain. So, it's like taking ownership of where they are and where they need to go.

In other cases, high school teachers empowered students to take ownership of learning as they supported each other towards academic achievement. For example, Participant 7 explained after "I have them verbalize what they do not understand in a specific section. Then, I will have them break out into groups and strategically organize stronger students with the weaker ones."

Likewise, Participant 1 used the same strategy as Participant 2. However, the support occurred anonymously. In the case of Participant 1, students could see each other's responses to academic content and the teacher guided students to offer peer support. Participant 1explained it in the following way:

> So, we'd be able to anonymously share out student responses. And we could discuss them openly. Or we could talk about how it could be revised. And that way, there's no pressure on the student, everybody learns from it.

Participant 1 also had a schedule for interacting with students and empowering them to take ownership. The participant explained that live lessons were not required; however, the participant made it a required activity for students:

> We don't require live lessons, although I push it that they should come to one per segment. My third live lesson is a tutoring small group. Some kids come to that;

> some don't. Most of them use my appointment scheduler. That's how students make appointments with me.

There was a variance in how Participant 10 empowered students to take ownership of learning. For instance, Participant 10 helped with students' agency by requiring they reflect on learning based on a learning scale and read their own data. The participant explained students access the learner scale then meet with the teacher for a data chat:

> I empower my students to be able to read their own data. That way they really don't rely on me to let them know that they're not getting something. We have data chats, where they look back, and they assess it for themselves. There's actually a form that they get that they fill out about what do they do well, what are they lacking, and what do they need to know. And they do it themselves. Then they talk to me about it, and we come up with strategies together. So, I try to empower them with that skill.

Participant 10 further discussed helping students read their own data to take ownership of learning:

> Whatever we're doing, they know that 70% shows that they are at grade level, they know that anything above like 80% means that they're above the grade level. And 100% shows that they're exceeding so they know how to read the data falling below the 70%, they know what they either need to start paying more attention, or they really don't understand the concept.

The theme addressed RQ 2, and teachers' use of formative assessments to empower students to take ownership. Participants guided students with using metacognition and reflection on their learning to determine their level of understanding. Participants also helped students take ownership of learning by encouraging them to attend a live lesson or tutorial when they misunderstand content. One participant taught students how to read their own data.

Theme 5: High School Teachers Use Formative Assessment Strategies Such as Discussion-based Assessment and Academic Games to Clarify Content in Live Lessons, Phone Conferencing, and Tutoring

Theme 5 explored how high school teachers used formative assessment such as discussion-based assessment and academic games to clarify content in live lessons, phone conferencing, and tutoring in the virtual learning environment. When asked about how they used formative assessment in the virtual learning environment, participants shared instructional strategies and tools they use to help students learn academic content. The descriptions from participants included student-teacher interactions by live lessons, phone conferencing and tutoring, and the use of technology tools for practicing content.

Participant 2 explained that teachers in the virtual learning environment should be strategic and intentional about presenting the learning goals:

> In terms of wherever [students are] in the class setup, they have to understand that their objectives at the end of every topic, so that they are able to work with a clear objective and clear mind of what is expected from them.

Four participants discussed using data-based assessments in live lessons and phone conferences to reinforce and clarify content based on evidence from formative assessment. Participant 1 highlighted discussion-based assessments are used to assess student learning during phone calls and live lessons:

> Because your time with them is limited, and you don't have them every day in the classroom, they might come to a live lesson. You have their work that you grade every week. And then we do monthly calls… and a lot of phone calling we do is related to formative assessment. The other thing, we do something called a discussion-based assessment. it also is a way for the students to show what they know, for you to have a conversation with that individual student to kind of check the learning. So, if they don't pass a discussion-based assessments with you, you say "we need to reschedule, I think you need to review let's talk about this. You can schedule tutoring with me.

Similarly, Participant 11 used discussion-based assessments on a video or audio call to assess students' understanding of content:

> Well, the formative assessment that we have, in the virtual, there are two types. There's a discussion-based assessment, which is a video or an audio phone call with the student. There can be a video call, if we give them the option of a live lesson and do the discussion-based assessment during the live lesson. And each time it's me asking the students questions about the content they learned for that module, and their overall understanding of what they learned, and giving them problems to explain their methods of solving it, explaining their steps.

Participant 9 explained there is more involved in the virtual learning environment than simply submitting work. Participant 9 explained that teachers can be proactive to determine where students can potentially have difficulty, or where they need to offer support in the live lessons:

> But ah, well, we also do [formative assessment] in our live lessons. So, it isn't just the workday submit. So, within live lessons, we, [teachers] look at the content and determine what potentially students can have difficulty with, or where we need to support that in the live lessons. Live lessons can be offered if students do not understand a skill.

Similarly, Participant 10 also explained that they first identify in what areas students struggle then prepare a live lesson to support student learning. For instance, Participant 10 stated other instances when students can receive a live lesson:

> And in my oral exams, when we're talking, and they ask questions, or they say something, but don't say correctly, I can give feedback in that way. Like, for instance, I just got off the phone with discussion-based assessments. The young man gave a wrong answer. I had to give feedback of where he went wrong, so that he can understand.

Participant 8 also confirmed live lessons are offered when students have not grasped the concept and added that tutoring was also an option. Participant 8 stated, "So I'll try to see if they'd want to do it tutoring session or like a live lesson session for any topics or modules that they need help with." There was a slight variance in the response from Participant 1 with regard to live lessons. Participant 1 had a different experience in

the virtual learning environment in that, live lessons were not mandatory. Participant 1 stated, “We don’t require live lessons, but I push it that they should come one time per semester.”

Participants also used tutoring in the virtual learning environment to clarify content. Participant 10 described tutoring in the following way:

> Well, I would offer to them. If they want a tutoring session, if they want to go over any of the topics. I’d be like you missed this. You missed this problem, for instance, and this is in Section 2.3. If you want, I can kind of go over it with you.

Similarly, Participant 11 used tutoring to clarify instruction in the virtual learning environment.

> It gives them what I would say more of an intimate or personalized learning experience, because, you know, when you’re in a bigger group setting, oftentimes I found that they may not ask questions about something they don’t understand. In tutoring I can reach for a resource, directing them to it. I really feel tutoring gives them more opportunity to be open, to ask questions, and personalize their learning experience.

Conversely, Participant 1 offered tutoring in a different way. Tutoring was offered after a quiz if students failed it. Tutoring is required before a retake:

> On quizzes, if the students score low, and they reach out because they wish to retry a quiz, they have to do tutoring with us first. Only then we will reopen a quiz for them. So, they can just schedule an appointment of a 30-minute tutoring session whenever they would like. If they don’t [schedule time], I will put it in the

> feedback, “Hey, why don’t we meet to tutor if you want to revise and quiz again.” Or you know, something like that. It’s built in our intervention system school wide, which is the MTSS system, the multi-tiered support system. At level two is usually when they involve that tutoring with us.

A pattern also emerged regarding student-teacher interactions and technology tools for practicing content in the virtual learning environment. Qualitative data showed that high school teachers also use live lessons that have a small group instructional strategy, rather than a tutoring strategy. When high school teachers used small group instruction to clarify content, they used discussions, breakout rooms, or games. Participant 10 puts students in small groups for discussions:

> We can also do breakout rooms, and then I can have kids working, that are, you know, strong or not so strong. I tend to group them to where they can help each other to understand the concept a little better.

Similarly, Participants 5 and 7 used breakout rooms for discussions and group students in academically heterogenous groups. Participant 5 stated, “I can differentiate pull small groups and do more interventions, when I’m constantly using those formative assessment tools” while Participant 7 said “I put them into break out groups and ultimately, strategically stronger students with weaker ones.”

Some participants used academic games. High school teachers used academic games such as Quizlets and Kahoot to clarify and evaluate students’ understanding of content. Participant 11 stated the following.

> I use two digital tools Kahoots and quizlets. Both of those assessments are interactive and fun. You can use online gaming and create your questions. You have the students log in with the particular code, you start the game and ask the questions and students will respond with what they believe is the correct answer.

Similarly, Participant 5 uses academic games as a formative assessment to determine what students know and understand. The participant stated, "I use quizlett to make my formative assessments enjoyable, so that the students will pay attention."

However, both Participants 1 and 9 did not gamify the quiz. Participant 1 stated, "At the end [of the lesson], I use the quiz in Nearpod, to check their understanding and clarify that way." Similarly, Participant 9 asked a two or three-question quiz during the lesson to determine what students know or do not know, to identify what supports students would need:

> One of my formative assessments is a quiz; like a short two, maybe a three-question quiz. I could see the students who didn't perform well. Those who don't perform well, I'd probably do a quick pull out and put them in a small group, like a breakout group.

Participant 5 also used technology to support the use of formative assessment in the virtual learning environment. Participant 5 used Loomio to see students' worksheets and wrote directly on students' worksheets remotely:

> Technology for speaking towards the virtual learning process, I need to be able to have a tool that I could assess students' worksheets remotely. So, for example, I will use a platform called Loomio, which allows me to project a digital

> worksheet, I could project on a slide, and I could see what they're doing, I could see their screen live real time… [I] click on his screen and be able to even write on his assignment and give feedback.

Teachers engaged students with data-based assessments, quizzes, and educational games to check their knowledge of content. Theme 5, high school teachers used formative assessment such as discussion-based assessment and academic games to clarify content in live lessons, phone conferencing, and tutoring, addressed RQ 2, and teachers' use of formative assessment in the virtual learning environment. During member checking, Participant 1 reiterated discussion-based assessments created opportunities for individual "verbal interactions with students."

Theme 6: High School Teachers use the Component of Specific, Corrective, Generalized or Formulaic Feedback to Guide Students in Understanding Academic Content in the Virtual Learning Environment

High school teachers guided students in a variety of ways in the virtual learning environment. Participants indicated they used timely feedback to help students clarify misunderstandings. For instance, Participant 7 explained, "I provide feedback within 24 hours. I will give individualized feedback, so they know what they did well." Likewise, Participant 8 stated,

> I always give feedback based making sure that they hit the standards of that particular lesson. And if I see any need for correction, or what they can go back and do to correct since we're in this environment that they can resubmit assignments as many times. So, they have that opportunity to master that content.

> So that's how I give feedback. And in my oral exams, when we're talking, and they ask questions, or they say something, but don't say correctly, I can give feedback in that way. Like, for instance, I just got off the phone with a discussion-based assessment and the young man who, who gave a wrong answer. So, I had to give feedback, share, then break down with him where he went wrong, so that he can understand and make his changes and correction.

In addition, Participant 10 admitted to providing feedback regularly and consistently. The participant explained, "In the virtual environment, they encourage you to provide feedback more than less." Participant 10 explained guiding students using feedback in the following way:

> So, with data-based assessment, and with all the assessments that you do, you have to provide feedback. You are usually encouraged to provide feedback for all the assignments that they do. Feedback helps students understand what they did wrong and what they didn't understand.

The feedback used to guide students were corrective in nature and could be formulaic, specific, or generalized. For instance, two participants explained that high school teachers are expected to give feedback that is of a particular structure. To explain, Participant 1 stated,

> We are required to give a particular kind of feedback. It's kind of formulaic for us, but it works. We always acknowledge something positive. It's kind of a little formula, we kind of sandwich together. So, we always start with something positive, then we give the corrective feedback or the guiding information. And

> then we always reinforce with ending on a positive note. Something they're still doing well. So, we do have to sandwich it in that formula.

In the same manner, Participant 7 explained using feedback of a similar structure as Participant 10. However, Participant 7 further indicated using the formulaic structure to model for students how they can provide feedback to each other:

> Some students respond to feedback very well because I always starting off saying, "Oh, you did this extremely well. You know, you could work on this area." I'm also modeling for them, how to provide feedback to others as well. My ninth graders, on the other hand, have a challenge with hearing feedback. They're at that time in their life where they're just not receptive to it. But I found that when I use the sandwich effect strategy, that they're more open to feedback.

Contrary to Participants 1, 7, and 10, Participant 5 gave "immediate and consistent feedback" that is specific and not based on a formula. Participant 5 used Loomio to respond to students' worksheets in "real time": "I give students specific feedback. So, if they got a yellow or red, they know exactly why they got it and what they would need to do to get their color changed."

Participant 11 confirmed that feedback could be specific and provided students with personal feedback:

> For the most part, feedback should be detailed and specific, not generic. You have to be very specific, addressing personalizing, addressing by name, and then highlighting specific things within the assignment or project that they submitted, you're highlighting that providing that specific feedback.

Participant 1 did not agree with specific feedback. The participant explained using general feedback to acknowledge that the student to be "close" to the correct answer. The participant expressed the use of feedback in the following way: "Let's say you're doing something and getting the right or wrong answer. So that's one type. The other type is, you know, acknowledging that they're close. Some something more generalized."

When asked how high school teachers help students respond to feedback, participants explained using emails and technology tools, and requiring students to acknowledge receipt. Participant 8 explained,

> Most kids aren't going in and checking their feedback. Oftentimes, what I will do to try to help make sure they at least saw the feedback is that I click an option that says email directly to students. So not only will they see it on the assignment, but they'll see my feedback on an email.

One participant gave verbal feedback, and some participants used emails to provide feedback. However, two participants used technology. For example, Participant 9 stated using verbal corrections so the student could make the correction instantly:

> I just got off the phone with a DBA with the young man who, who gave a wrong answer. And so, I had to, you know, give feedback, and share them break down with him kind of like where he went wrong, so that he can understand and, you know, make his changes and correction.

Participants 6 and 8 send feedback to students by emails. Participant 6 stated, "I prepare feedback in the form of a report and send it to students' emails." Participant 8 went a step further and ensured students could see the feedback by "clicking on the

option that says email directly to students." By doing so, Participant 8 ensured that "if students do not see the feedback on the assignment, they'll see my feedback on an email."

Likewise, Participant 9 required an email notification from students to show they received the teachers' feedback by email:

> So, when I receive it back, that tells me, the student received it, they acknowledged it, okay, if I don't get a response, of course, I'm following up with the student, because technology issues can happen, and it may not be that the student does not want to respond. So that's one way that I do. And then, of course, when you send emails, and you require a receipt, then you can see when students have opened it and looked at it.

Both Participants 7 and 11 provided feedback using technology. Participant 7 used Google Classroom and Participant 11 used Kaltura. Participant 7 stated,

> Everything is done in Google Classroom. I'm posting these reflections in Google Classroom. And as they're answering, I turn them back in, then within 24 hours, I will give them their feedback, individualized feedback on what they did well, because I'm reflecting for them how to provide feedback to others as well.

Participant 11 also explained using technology to provide feedback:

> I use a tool called Kaltura, it's a media tool, it allows you to record a video and, or, or audio. And what I do with that, it's like between one to two minutes. I will provide that with, again, areas where highlight areas where the student have excelled, telling them where they have achieved, you know, or made progress,

and then areas where they could improve. And a great thing about this tool is that there is a kind of like a question you can insert in there, where I actually insert to have students acknowledge that they've received the feedback.

The theme addressed how high school teachers used the construct of feedback in formative assessment to guide students with understanding academic content. Teachers provide immediate and consistent feedback via conversation, email, or technology such as Kaltura. Teachers placed a notification alert to determine if students could see the feedback and required that they acknowledge that they received it. Feedback was corrective and could be general or specific. However, during member checking, Participant 9 explained that for feedback to be effective it should be specific. Some teachers used formulaic feedback by starting and ending on a positive note. Table 6 shows the themes related to the research questions.

Table 6

Themes Aligned with Research Questions

Research Questions	Themes
RQ 1: What are high school teachers' perspectives on formative assessment in the virtual learning environment?	Theme 1: High school teachers perceive formative assessment as beneficial for helping students understand and helping teachers disseminate the learning objectives.
	Theme 2: High school teachers perceive data from formative assessment informs instruction to help them determine consequent instructional strategies.
	Theme 3: High school teachers perceive formative assessment to be an effective monitoring tool to identify evidence of students' understanding and engagement.
RQ 2: How do high school teachers use formative assessment in the virtual learning environment?	Theme 4: Some high school teachers use formative assessment strategies to empower students to take ownership of learning.

Research Questions	Themes
	Theme 5: High school teachers use formative assessment such as discussion-based assessments and academic games to clarify content in live lessons, phone conferencing and tutoring. Theme 6: High school teachers use the component of specific, corrective, generalized, or formulaic feedback to guide students in understanding academic content in the virtual learning environment.

Summary

In Chapter 4, I presented the research findings based on qualitative data analysis guided by two research questions. The questions were (a) what are high school teachers' perspectives on formative assessment in the virtual learning environment and (b) how do high school teachers use formative assessment in the virtual learning environment? Participants shared their views and experiences openly and provided insight into the benefits of formative assessment strategies for teachers and students in the virtual learning environment. The results of my study indicated high school teachers had a positive perspective of formative assessment in the virtual learning environment and believed it was important for monitoring students' learning and vital for students' growth. High school teachers explained they used data from formative assessments to inform instructional strategies and provide feedback in the virtual learning environment. In Chapter 5, I offer an interpretation of the findings, the limitations of the study, the recommendations, and social change propositions.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this basic qualitative study was to explore high school teachers' perspectives on the use of formative assessments in the virtual learning environment. There was a lack of studies on using assessments in the virtual learning environment (Raes et al., 2020). In addition, there was a need to conduct a study that addressed the under-researched issue of teachers' perspectives on formative assessments in the virtual learning environment (Darling-Aduana, 2021). I used open-ended questions during semistructured interviews with 11 high school teachers who taught a content area subject for more than 1 year and used formative assessment in a virtual learning environment. The findings were that formative assessment was mutually beneficial to teachers and students, supported planned instruction, encouraged engagement, and promoted students' agency through teachers' support and feedback. Six themes related to the research questions, with three per research question:

- Theme 1: High school teachers in the virtual learning environment perceive formative assessment as beneficial for helping students understand and helping teachers disseminate the learning objectives.
- Theme 2: High school teachers in the virtual learning environment perceive data from formative assessment informs instruction to help them determine consequent instructional strategies
- Theme 3: High school teachers in the virtual learning environment perceive formative assessment as an effective monitoring tool to identify evidence of students' understanding and engagement.

- Theme 4: Some high school teachers use formative assessment strategies to empower students to take ownership of learning.
- Theme 5: In the virtual learning environment, high school teachers use formative assessment strategies such as discussion-based assessment and academic games to clarify content in live lessons, phone conferencing, and tutoring.
- Theme 6: High school teachers use the component of specific, corrective, generalized, or formulaic feedback to guide students in understanding academic content in the virtual learning environment.

Overall, the findings demonstrated that formative assessment, coupled with technology, provides a way for teachers in the virtual learning environment to present flexible, efficient instruction to engage students who did not attend a traditional bricks-and-mortar class setting. In this chapter, I discuss the interpretation of the findings from my study, the limitations, recommendations, implications of the study, and propositions for social change. In addition, I confirm the knowledge in the discipline by comparing the findings with information found in the peer-reviewed literature described in Chapter 2.

Interpretation of Findings

In this basic qualitative study, findings confirmed that high school teachers perceive formative assessment as having a mutual benefit to teachers and students and that it promotes planned instruction, which aids in correcting students' misconceptions as teachers strive to engage students towards agency in the virtual learning environment. I used empirical literature and the study's conceptual framework to interpret the findings.

Studies have supported high school teachers' perspectives affect their use of formative assessments in instructional practice (Correia & Harrison, 2020; Krishnan et al., 2021; Maier, 2021). Prior studies also found that schools would benefit from an improved approach to technology-enhanced learning for practical digital tools that target student-centered pedagogy (Williams & Corwith, 2021). For the conceptual framework, I used Black and Wiliam's (2009) theory of formative assessment, which adresses five components of the strategy for best practices for teaching and learning.

Findings Related to Research Question 1

Finding 1: Formative Assessment in the Virtual Learning Environment Benefited Both Students and Teachers

The first finding is that formative assessment is mutually beneficial to teachers and students. First, the participants indicated that formative assessment helped them assess students' understanding of content. Second, some of the participants reported that formative assessment helped students in the virtual learning environment interact deeper with content to master academic content.

Teachers in my study used technology to provide a flexible environment to disseminate information using formative assessment based on the learning objectives. My findings corroborated previous research that revealed high school teachers who worked in the virtual learning environment supported students' achievement by launching assessments to help students understand the content (Barana et al., 2019; Raes et al., 2020; Van der Kleij, 2019). Likewise, the teachers in the study reported that formative assessment helped students identify the critical content of the learning objectives and

determine their strengths and weaknesses. With the use of technology, teachers facilitated a flexible environment for students to engage with content. For instance, teachers interacted with students in chat boxes and breakout rooms, during Live lessons or tutorials, and launched formative assessment to help students think more critically. The teachers suggested that formative assessment was a midway step before students took a high-stakes test that allowed them to take risks when learning new concepts before they were required to show mastery of it.

In the virtual learning environment, high school teachers in the current study could also identify what students know and do not know from formative assessment. The teachers in the study were intentional about assessing students' level of understanding of academic content. The findings confirmed prior research of teachers' best practices with formative assessment as an approach to pedagogy that positively influences teaching and learning (see Zlabkova et al., 2021).

Students improved their understanding of concepts and interacted with content when responding to formative assessments during Live lessons and tutorials. Previous research revealed the national school leaving examination rates increased when teachers incorporated formative assessment strategies (Black et al., 2004). More recent research supports the findings that high school students' success increased when they build the capacity to interact with content (Jensen et al., 2021). Similarly, high school teachers in my study found that formative assessments helped students deepen their knowledge of content and prepare for state assessments.

As a mutual benefit, students gain a more robust understanding of content from formative assessment, and teachers get a snapshot of students' strengths and weaknesses to determine the areas to target for instruction. Previous research also found formative assessment was the principal way students demonstrate to what extent they understand the learning goal (Andersson & Palm, 2017). Formative assessment strategies allow teachers to assess what was taught, identify students' weak areas, and help them correct misconceptions (Andersson & Palm, 2017; Boesdorfer & Daugherty, 2020).

Finding 2: Using Data Informed Practices and Planned Instruction Based on Students' Specific Needs is Beneficial

The second finding was that using data-informed practices and planned instruction based on students' specific needs was beneficial. Many schools pivoted to online instruction after the pandemic of 2020. During the switch, some students found navigating the virtual learning environment challenging and needed academic, social, or emotional support. The teachers in my study were concerned about students' academic and social–emotional learning and used the appropriate instructional strategies based on students' need. For instance, depending on students' need, some teachers in my study created opportunities for students to work in groups, they checked in with students by phone, or explained concepts students did not understand.

Some teachers indicated that it was essential to identify where students needed the most support. Other researchers have found that students felt there was a lack of social and teacher presence in the virtual learning environment (Williams & Corwith, 2021). However, in my study, there was no evidence of a lack of teacher responsiveness;

instead, the teachers in my study responded to students' needs by providing academic and emotional support.

All the teachers in my study indicated that formative assessment informed instruction and provided data they needed to help students improve. The formative assessment strategy includes providing instructional steps and discourse with students to share learning progress and adjusting instruction based on evidence (Lamberg et al., 2020; Yan et al., 2021). The teachers in my study provided support by reteaching the core skills in a format that aided comprehension. In particular, participants contemplated what teacher response would be needed to improve students' performance and offered Live lessons and tutoring. Previous research showed pedagogical adjustment is a critical component of formative assessment and occurred when instruction is changed based on evidence (Bibbens, 2018; Krishnan et al., 2021; Wylie & Lyon, 2020; Yan et al., 2021). The effect of adjusting instruction is that students build knowledge of the content and strengthen self-efficacy (Carless & Boud, 2018; Maier, 2021; Nicol, 2020; Zlabkova et al., 2021).

High school teachers in the virtual learning environment determined the consequent instructional strategies based on their students' needs and their capacity to provide support. In some instances, teachers in the study created small groups and retaught the core skills, and some teachers created mixed-ability groups and empowered them to support each other. Other teachers guided students with teachers' notes or directed them to review modules independently to correct their misconceptions. Previous research found pedagogical instruction was based on the teachers' understanding of

students' needs and that formative assessment required data to be collected to assess how instruction can be changed to meet the students' needs (Brink & Bartz, 2017; Krishnan et al., 2021; Lamberg et al., 2020; Yan et al., 2021).

In a few cases in my study, high school teachers found it challenging to support students in the virtual learning environment because of time factors. Prior research showed that despite positive attributes, formative assessment strategies were time-consuming (Cisterna & Gotwals, 2018; Jensen et al., 2021). Another researcher found that lack of time caused teachers to default from formative to teacher-centered assessments (Alt, 2018). In my study, some high school teachers perceived the disadvantage of using formative assessment as it being time-consuming. In particular, the participants explained needing more time to identify resources to provide interventions. Three participants in the study used evidence from data to personalize pedagogy. They stated the collaboration needed to create follow-up lessons in the virtual learning environment was time-consuming and that it takes a long time to do evidence-based planning with their peers. In additional research, some teachers defaulted to teacher-centered assessments because of lack of time (Alt, 2018). However, the participants in my study consistently used formative assessment to gather data that informed subsequent instructional strategies.

The current study of formative assessment in the virtual learning environment revealed that despite challenges, high school teachers in the virtual learning environment consistently provided formative assessment strategies. In a comprehensive examination of teachers' collaboration in the online environment, researchers found teachers'

perspectives affected how they use the strategies in the learning environment (Correia & Harrison, 2020; Krishnan et al., 2021). In the same way, high school teachers in my study perceived that formative assessment was vital to supporting students' academic growth. Their perspective resulted in them being intentional about providing consequent instructional strategies based on evidence. Likewise, researchers have found that teachers' beliefs about the purpose of the formative assessment shaped their instructional practice (Krishnan et al., 2021).

The participants also suggested that formative assessment informed consequent instructional strategies in the virtual learning environment. Formative assessment provides opportunities for teachers to assess what students know and does not know when students express their understanding of the academic goal (Wylie & Lyon, 2020). Teachers determined appropriate follow-up lessons based on students' responses to their understanding of the academic goal. High school teachers decide on appropriate instructional strategies such as reteaching content, facilitating mixed ability groups and engaging peer support, or guiding students to support themselves in the virtual learning environment.

Finding 3: Students Benefit When Teachers Monitor for Misconceptions and Students' Engagement in the Virtual Learning Environment

The third finding was that students benefit when teachers monitor for students' misconceptions and engagement. High school teachers in the virtual learning environment could identify the extent to which students understood academic content and track learning. The participants explained that teachers had to be intentional about

monitoring to identify what students understood from the lesson. Most participants used questioning techniques to determine students' understanding, confirm academic integrity, and encourage peer support.

The virtual learning environment differs from the traditional bricks-and-mortar classroom. In recent research, students struggle with the intrinsic motivation to maintain the discipline of doing schoolwork without the vigilant, watchful eye of the teacher, which eventually leads to not completing work in the virtual learning environment (Émon et al., 2021). Teachers in my study reached out to students when they realized the student had not engaged in the module. On the contrary, teachers and guidance counselors who transitioned from the traditional bricks-and-mortar to the virtual learning environment did not reach out to students, which led to disengagement (Williams & Corwith, 2021). The teachers in my study engaged students by inviting them to Live lessons and encouraging them to respond in the chatbox with emojis and Gifs. Other research found that student engagement increased when they participated in activities in a synchronous class and completed work during live instruction (Aguilar et al., 2022).

Teachers in the current study also used probing questions to engage students, assess what students understood, identify their misconceptions, and track their progress. Teachers use formative assessment to monitor students' progress and level of understanding (Cotton, 2017). Additional research found that teachers gathered evidence from questioning to drive future instruction (Bibbens, 2018; Johnson et al., 2019; Lyon et al., 2019). Questioning also encouraged students to think about how to improve (Van der Kleij, 2019).

Some teachers in the current study monitored for academic integrity. Participants 10 and 11 used questioning to assess dishonesty and believed students understood the concept if they answered quickly with details from the content. Other teachers monitored for academic integrity to see if students had the same papers as any other virtual student. However, very little literature focuses on the issue of academic integrity in the virtual learning environment.

In addition to monitoring for misconceptions and academic integrity, high school teachers track engagement. Students in the bricks-and-mortar classroom are accustomed to teachers monitoring their learning and relying on teachers' directions to participate in class. However, some high school teachers expressed a barrier in the virtual learning environment; students sometimes fail to participate in a module or respond in synchronous classes because they signed in electronically but left the learning environment. Conversely, some participants in my study explained that there were extensive expectations on teachers in the virtual environment to track progress and that formative assessment helped support active engagement. Similarly, another qualitative study found that high school seniors struggled with the motivation to submit classwork or participate in the virtual learning environment without direction from a teacher (Émon et al., 2021).

Students also benefit when teachers intentionally engage students in the virtual learning environment. A notable study found low motivation in students from the lack of affective connections needed for student engagement in the virtual learning environment (Émon, et al., 2021). In addition, other studies have found that affective connections

encourage student engagement in the virtual learning environment (Blaine, 2019; Sanders & Lokey-Vega, 2020). Also, a previous qualitative study revealed that when teachers engage deeply with students in the virtual learning environment, they are more apt to interact with their teachers to analyze the quality of their work (Van der Kleij et al., 2017). Further, the authors found that teachers used questioning and scaffolding techniques to encourage students to build confidence by engaging in the virtual learning environment. In the current study, participants believed formative assessment provided a more focused and targeted approach to monitoring engagement, providing the opportunity for personalized support. The teachers who met with students synchronously used questioning techniques to encourage student engagement and requested students respond by using emojis, selecting the raised hand emoticon, or typing in the chat.

In the live classroom, the teacher directs the pace. However, in a virtual learning environment, the student directs their pace as they utilize the learning management system for content and assessments. The learning management system delivers closed-ended and open-ended activities that allow students to work independently (Barana et al., 2019). In some virtual environments, the learning management system can make computer-generated adjustments to instruction (Dalby & Swan, 2019). Contrary to the versatility of the virtual learning environment, in the bricks-and-mortar environment, students are kept on pace with daily class instruction with hands-on support from the teacher.

In the current study, I observed another element of student engagement when high school teachers empowered students to support each other. For instance, participants in

the study facilitated peer support when they anonymously shared students' responses to the virtual board and facilitated a discussion on how the work could be revised. Participants explained that anonymous sharing reduces pressure on the student and increases the opportunity for students to learn from each other. Another way that teachers empowered students to support each other was by placing them in mixed-ability groups for discussions and visiting each breakout room to monitor the discussions. Similarly, in a recent study, the author found that some high school students became more active members of the learning community when teachers created opportunities for peers to support each other (Zlabkova et al., 2021).

Findings From Research Question 1 Based on the Conceptual Framework

Black and Wiliam (2018) described formative assessment as an assessment of learning. This study focused on the perspectives and use of formative assessment in the virtual learning environment. Based on Research Question One, the findings are that high school teachers perceive formative assessment as benefiting teachers and students, promoting planned instruction, and correcting students' misconceptions as they strive to engage students towards agency in the virtual learning environment.

First, formative assessment supports teaching and learning. The proponents of the theory made a distinction between assessment as learning and assessment for learning (Black & Wiliam, 2018). Assessment as learning leads students to monitor and direct their learning, and assessment for learning leads teachers to decide if students learned the lesson's objectives (Black & Wiliam, 2018). The mutual benefit of formative assessment

was evident when teachers provided instruction and helped students demonstrate academic gains in the virtual learning environment.

Second, the teachers in my study revealed that it is effective for students to participate in the virtual learning environment so they could assess what students know or do not understand. The teachers explained planning instruction based on evidence. Some participants illustrated that students experienced success when they adjusted instructional targets and clarified misconceptions. Recent studies found that formative assessment defines teachers' active monitoring and subsequent adjustment of instruction based on the evaluations of students' performance or response (Krishnan et al., 2021). The preceding finding supports Black and Wiliam (2009) formative assessment theory in that formative assessment provides opportunities for planned data-informed instruction. The authors demonstrated that teachers provide students with the indicators for success and adjust instruction to support students' learning (Black & Wiliam, 2009).

Finally, I used Black and Wiliam's (2009) theory of formative assessment as my conceptual framework. The theory includes five components of formative assessment, including clarifying the learning intention, facilitating the learning tasks, providing feedback, building student capacity to support each other, and empowering students to take control of learning. Therefore, formative assessment strategies lead to student agency in the virtual learning environment. Teachers can better guide students toward academic progress and agency when they monitor learning and seek engagement from students in the virtual learning environment.

Findings Related to Research Question 2

Research Question Two addressed how high school teachers used formative assessment in the virtual learning environment. Three themes emerged from the exploration. The themes were that high school teachers used discussion-based assessment and academic games to correct students' misconceptions and engage students towards agency in the virtual learning environment using specific, corrective, generalized, or formulaic feedback to guide students in understanding academic content. Overall, students learn content when teachers have conversations using open-ended assessments, and feedback positively affects the utility of students and subsequent academic outcomes.

Finding 4: Students Learn Content When Teachers Have Conversations Using Open-Ended Assessments

The fourth finding is that students learn content when teachers have conversations using open-ended assessments. High school teachers interact with students in one-on-one conversations using discussion-based assessment to determine what they already know and their misconceptions. Participants in my study explained discussion-based assessments as open-ended conversations with students about content. The teachers would determine if students needed further support based on how well they responded to the discussion-based assessment.

When students needed academic support, teachers facilitated individual and group activities to build students' capacity to support themselves and each other. For instance, the teachers directed students to the module they should review, and other teachers invited students to one-on-one time with them in small group classes to receive peer

support. Other researchers found the benefit of conversation in small groups to include peer support, increased agency, and affective interactions as they learn academic content (Blaine, 2019; Sanders & Lokey-Vega, 2020). In my study of teachers' use of formative assessment in the virtual learning environment, teachers used a collaboration board called Jamboard and breakout rooms to have targeted conversations about content.

Conversation is a vital component of positive interaction in the virtual learning environment. Teachers used not only discussion-based assessment but also used open-ended questions based on students' learning. Teachers in the current study achieved this by conversing with students about their progress. For example, some teachers in my study consistently measured students' progress and taught them to read their data. Some teachers empowered students to pay attention to their scores and to identify when they did not understand a concept. Researchers found that teachers occasionally stopped to question and analyze performance with the student (Van der Kleij et al., 2017). Additionally, the study showed that students in the virtual learning environment responded non-verbally and verbally but increased their understanding of content when they articulated knowledge and used self-evaluation.

Another way that students could track their progress was by using rubrics to measure how well they understood a concept. The strategy was consistent with Bibbens (2018), Sanchez et al. (2017), and Yan and Brown (2017), who found that students used rubrics to connect what they knew and what they needed to know. Unlike the findings from Sanchez et al. (2017) and Zlabkova et al. (2021), there was no evidence from my study of teachers' perspectives and use of formative assessment in the virtual learning

environment that teachers allowed students to participate in peer grading who found peer grading increased scholarship in some students. However, authors found that there were low implementation rates for peer assessment (Lyon et al., 2019).

Another consequence of conversation is that it builds relationships and supports students' agency in the virtual learning environment. The conversation could be one-on-one or with parents, depending on the nature of the concern. However, Blaine (2019) and Sanders and Lokey-Vega (2020) found that sometimes affective connections are absent in the virtual learning environment. The current study did not corroborate the literature. For example, in the study, teachers held conversations with students to determine their needs and then provided support to meet them. Instead, my study affirmed that collaboration and peer support allowed some students to become engaged members of the learning community (Zlabkova et al., 2021).

The virtual learning environment has unique needs for providing parameters for teachers to provide instruction and for students' support with content and engagement. Prior research showed that technology addresses affective and academic needs in the virtual learning environment. For instance, An and Mindrila (2020) found that faculty at the university level used avatars and online platforms such as Zoom, Rumii, and Mozilla Hubs to engage students in the virtual learning environment. Conversely, Sanders and Lokey-Vega (2020) found that high school teachers used adaptive software, Google Forms, and chat boxes to personalize the online experience. In the study of high school teachers' perspectives and use of formative assessment in the virtual learning

environment, most participants used chat boxes and Google classroom to encourage affective interactions and personalize the virtual experience.

Teachers also facilitated students taking ownership of learning by engaging them in metacognition. Metacognition occurs when students self-assessed their thinking to determine personal progress regarding reaching learning goals (Lyon et al., 2019). In practice, students get the opportunity to think about their thinking when teachers ask them to rate their understanding based on the content. Lyon et al. (2019) found that when students conducted self-assessments, they processed the learning goals and competencies. Teachers in the virtual learning environment helped students self-reflect by responding in the chat about their level of understanding using emojis, gifs, or commenting. Students took ownership when they reflected on their learning.

In other cases, high school teachers empowered students to take ownership of learning by equipping them to support each other toward academic achievement. Peer support comes in various forms and requires that students understand the learning objectives. For example, after a formative assessment, participants would explain the answers, correct the misconceptions, and place students in mixed-ability groups to support each other in breakout rooms. My study on high school teachers' perspectives and use of formative assessment in the virtual learning environment affirms Andersson and Palm's (2017) finding that students support each other's learning, including suggestions to peers about how their peers can reach the learning goal.

Finding 5: Feedback Positively Affected Students' Agency and Subsequent Outcome

The fifth finding was that feedback positively affected students' agency and subsequent outcomes. However, sometimes students do not check teachers' feedback. To reduce the occurrence of students ignoring feedback, teachers in the virtual learning environment require students to respond that they have accessed the teacher's feedback. The virtual learning environment differs from the bricks-and-mortar classroom. Students in the virtual learning environment sometimes have the added responsibility of understanding the content without the aid of live interaction and using online feedback tools to correct misconceptions. The online feedback tools were messages from emails and teachers' voice notations on Kaltura. The student was responsible for seeking extra support by signing up for tutorials or live classes with the teacher.

Previous research showed that teachers also used video to facilitate feedback in the virtual learning environment. The authors found that some teachers required students to watch video-aided feedback, self-reflect, and participate in a feedback conversation with their teacher (Van der Kleij et al., 2017). The authors also found that during feedback conversations, students focused on content, what they did wrong, and how they could self-correct. The teachers in my study did not make video recordings or have feedback conversations with students. Students in the virtual learning environment would benefit if teachers required self-reflection and followed up with feedback conversations with students because agency increases with reflection and conversation.

The participants in the study provided feedback from discussion-based assessments and academic games to strengthen students' academic growth. Discussion-

based assessments contrast with online quizzes or assessments that have closed responses. Previous research illustrated that online multiple-choice quizzes were easy to deliver and usually promoted shallow learning (Chen et al., 2021; Darling-Aduana, 2021; Enders et al., 2021; Ogange et al., 2018). However, participants offered feedback on open-ended quizzes to guide students' learning.

Participants explained that the discussion-based assessment is a formal quiz conducted as a conversation between the student and teacher on the phone or via a video conference. For instance, in an in-depth study, Van der Kleij (2019) found that formal assessment methods, including quizzes and informal conversations between peers and teachers. The participants in the study provided feedback during live lessons and tutoring if students responded to the DBA incorrectly. The live lessons were offered as one-on-one instruction or as a small group meeting to help students improve students' outcomes in subsequent assessments. Furthermore, when students receive feedback, they recognize in what areas they are proficient or need improvement (Dalby & Swan, 2019; Enders et al., 2021).

Students benefited from feedback and used acquired knowledge to increase scores on subsequent examinations. Participant 2 explained that the strategies in formative assessment help teachers prepare students for state assessments by helping teachers identify students' weaknesses. Formative assessment is an ongoing process that includes teachers' feedback and students' self-regulating their learning as they collaborate with peers (Wylie & Lyon, 2020). Consequently, students show academic gains when teachers use feedback in formative assessment strategies.

Additionally, students received feedback from technology. The technology tools that teachers used during live lessons and tutoring helped students practice content in the live lessons or tutoring sessions. Some technology was gamified, and some technology tools supported students and teachers. Participants in the study used academic games such as Quizlets and Kahoot to clarify and evaluate students' understanding of content and technology tools such as Loomi and Kaltura as instructional support tools. Sanders and Lokey-Vega (2020) stated that teachers in the virtual learning environment used technology to personalize the online experience for students. Students enhance their skills and knowledge when they respond to feedback and when teachers modify instruction based on data (Cisterna & Gotwals, 2018; Fuller, 2017; Johnson et al., 2019; Maier, 2021; Yan et al., 2021). Thus, teachers found feedback beneficial and required that students respond to show that they received the notification.

Teachers explained that they used academic games with computer-based feedback, such as Quizlet and Kahoot, during live lessons and tutoring in the virtual learning environment. Authors in similar studies found that online gamified tools such as Kahoot, Quizlet, and polling provided high school teachers with real-time students' responses to formative assessments (Chen et al., 2021; Sanders & Lokey-Vega, 2020). Similarly, the participants in my study used the digital tools of Kahoot and Quizlet to build quizzes that create an interactive and fun environment where they can assess student responses in real time.

Teachers use interactive tools for feedback in the virtual learning environment to provide instructional support. For instance, some teachers used Loomio to make

corrections to students' worksheets in real time and Kaltura to provide feedback to students in a video format. An and Mindrila (2020) found that online tools such as Zoom, Rumii, and Mozilla Hubs helped engage students in the virtual learning environment.

Teachers stated that a barrier to learning in the virtual environment was time-consuming feedback. However, labor-intensive feedback decreased when the teacher did not have to provide feedback but relied on computer-generated feedback. For example, technology could provide reward-based or self-referenced computer-generated feedback to give students information on how well they responded to an activity (Maier, 2021). By receiving computer-generated feedback, the students can pace themselves, take ownership of learning, progress through the content independently, and, overall, strengthen self-efficacy. However, in my study, teachers in the virtual learning environment could not access computer-generated feedback. They were solely responsible for providing feedback and supporting students with understanding content without computer-generated feedback. High school teachers in the virtual learning environment would benefit from gaining access to a computer-generated feedback tool in the learning management system.

Findings From Research Question 2 Based on the Conceptual Framework

I found consistency between the literature and practice when exploring teachers' use of formative assessment in the virtual learning environment. In their earliest work, Black and Wiliam (1998) stated that there is no clear understanding of what occurs during the instruction, so raising the standard of teaching and learning was difficult.The study I conducted used the formative assessment theory as a framework. The findings

were that students learned content when teachers had conversations using open-ended assessments and that feedback positively affected students' agency and subsequent outcomes.

Teachers in my study used formative assessment as checkpoints to determine what students understand to make instructional decisions and had conversations with students about the evidence. The teachers also indicated that they provided individualized feedback regularly and consistently to help students clarify misunderstandings. Feedback is essential because students enhance their skills and knowledge when responding to feedback (Cisterna & Gotwals, 2018; Fuller, 2017; Johnson et al., 2019; Maier, 2021; Yan et al., 2021). One participant from my study stated that teachers were expected to provide feedback for all assignments.

The high school teachers in the study on the virtual learning environment stated they provided written feedback in emails or Google Classroom and video or audio feedback on Kaltura. Previous research indicated that students were not passive bystanders during the feedback process (Lyon et al., 2019). Researchers also found that students sought feedback, assessed it, and self-reflected based on the learning criteria (Yan & Brown, 2017). Similarly, teachers in my study required students to acknowledge that they received feedback. In similar studies, authors found that students enhanced their skills and knowledge when they responded to feedback and when teachers modified instruction based on data (see Cisterna & Gotwals, 2018; Fuller, 2017; Johnson et al., 2019; Maier, 2021; Yan et al., 2021).

Finally, my study I uncovered the types of feedback teachers use in the virtual learning environment. Some teachers provided corrective, generalized, or formulaic feedback based on evidence from formative assessment. The teachers in my study did not use a numeric grade for feedback. Similarly, researchers found that one of the strategies for feedback is to use comments rather than a numerical grade when marking (Black & Wiliam, 2009).

Limitations of the Study

I considered three limitations when analyzing the findings of the qualitative research study. The limitations were methodological, such as purposive sampling, data analysis techniques, and sample size. I recruited high school teachers who taught a content area subject for more than one year in the virtual learning environment and used formative assessment. Purposive sampling could limit the generalizability of the study. The data analysis technique was the inductive approach, where I set aside preconceived notions to assess qualitative data from semistructured interviews. I used a reflective field journal to keep a memo of my thoughts during the coding process. I carefully exercised vigilance over my position and reduced researcher bias. Finally, I had a small sample size of 11 participants which could also limit the generalizability of the study.

Recommendations

Formative assessment is an essential component of pedagogy and defines teachers' active monitoring of students' understanding, leading to teachers' subsequent adjustment of instruction based on students' performance. The following recommendations for future research and practice reform stemmed from the data

findings, data analysis, analysis, and findings of the exploration of teachers' perceptions and use of formative assessment in the virtual learning environment. Findings indicated that high school teachers perceive formative assessment as mutually beneficial to both teachers and students and promote planned instruction which aids in correcting students' misconceptions as they strive to engage students towards agency in the virtual learning environment. As a result, I make the following recommendations for future studies.

Recommendations for Further Research

Teachers in my study stated there were challenges with using formative assessment in the virtual learning environment. Teachers' beliefs about the purpose of the formative assessment shaped their instructional practice (Krishnan et al., 2021). Therefore, there is a need for future research on teacher support through professional development for using formative assessment in the virtual learning environment. Policymakers would identify challenges teachers may experience using formative assessment strategies in the virtual learning environment to prepare teacher support through professional development.

The findings from the study provide evidence that teachers find feedback from formative assessment essential for student growth. Evidence of its importance is that teachers in the virtual learning environment require students to acknowledge that they have received feedback. Therefore, it is beneficial to explore how high school students use feedback in the virtual learning environment is necessary. Bibbens (2108) and Carless and Boud (2018) found that ego and emotional responses inhibit the uptake of feedback. Because uptake of feedback is essential for students' academic growth, it is

important to delve into the effect of feedback in the virtual learning environment in future studies.

Further, I recommend a quantitative study of high school teachers' perspectives and the use of formative assessment in suburban and rural America to corroborate the findings in my qualitative study. The independent variable could be teachers' use of formative assessment in the virtual learning environment. The dependent variable could be students' scores on a subsequent assessment. The current study used a basic qualitative approach that explored how participants experience their environment (Yin, 2015). However, a quantitative study would reveal the effect of teachers' using a specific strategy, such as formative assessment, in a virtual learning environment. A quantitative study could also provide rich data on the significance of supporting teachers with its use.

Recommendations for Practice Reform

The findings also showed that students benefitted when teachers monitored for misconceptions in the virtual learning environment. Participants in the study used a range of technology tools such as Jamboard, Google Classroom, Loomio, breakout rooms, chatboxes, email, and Kaltura to disseminate information, facilitate collaboration among students, provide feedback, and create an environment for teaching and learning. An and Mindrila (2020) discussed the use of technology in the virtual learning environment at the university level, and Sanders and Lokey-Vega (2020) illustrated how technology was used to personalize the online experience for high schools. However, there is a need to explore the use of technology in the virtual learning environment at the elementary and

middle school levels to ensure that information is available to support elementary and middle schools.

Further qualitative research studies should also be conducted on peer assessment in the virtual learning environment. Schools in the United States transitioned to remote learning due to the Covid-19 pandemic, and students left the bricks-and-mortar classroom to participate in learning online. In a recent study of students' engagement in distance learning, the author found that students in synchronous classes had increased engagement with peers, completed schoolwork and homework, and had stronger connectedness with teachers than those in an asynchronous environment (Aguilar et al., 2022). Similarly, in my study of high school teachers' perspectives and use of formative assessment, I found that teachers were concerned with students' negative affective response to learning in the virtual learning environment. Two participants stated that students do not complete the learning activities when they experience personal or social challenges.

The findings were that formative assessment was mutually beneficial to teachers and students, supported planned instruction, encouraged engagement, and promoted students' agency through teachers' support and feedback. The findings from this study also indicated that students learn content and develop agency, utility, and improved outcomes when teachers have conversations around open-ended assessments and provide feedback on students' responses. Overall, the findings indicate that future research topics are needed that relate to formative assessment and its use for stakeholders in the virtual learning environment, should there be another global catastrophe requiring distance learning.

Implications

Formative assessment provides teachers with information about students' skills and knowledge. This study on high school teachers' perspectives and use of formative assessment in the virtual learning environment added to the scholarly conversation and established a framework for understanding the instructional design for teaching and learning in the online space. Further, the study provided insight to policymakers and school district leaders about the unique needs of the virtual learning environment.

Walden University values social change and encourages students and alumni to be change agents in their community. By its very nature, formative assessment has implications for feedback, self-regulated learning, and peer-assisted learning (Andersson & Palm, 2017). Therefore, educators' perspectives on formative assessment may affect teachers' use of formative assessment strategies for planned instructional interactions for academic growth.

This study could contribute to positive social change at the district and institutional levels to guide policy-making decisions in school districts and building sites. Administrators at the school district level play the vital role of ensuring students' and teachers' success. They support families and offer professional development to teachers. Therefore, administrators would benefit from the information provided in the study about best practices with formative assessment in the virtual learning environment, which increases students' scholarship. In addition, schools in the virtual learning environment could use the study as a resource to increase parental involvement and support teachers.

Further, at building sites, teachers have a responsibility toward students' agency, scholarship, and social-emotional learning. Thus, teachers could use the information in the study to determine how to improve students' utility using formative assessment, identify the technology tools that support learning and feedback, and recognize challenges teachers may face with data-informed planning. Therefore, current high school teachers will get support with targeted instruction, and teachers considering the virtual learning environment will gain knowledge about teachers' experiences.

The study also contributes to social change for policy making. Conditions within a school environment are critical for increasing students' academic growth. The study provided an in-depth exploration of teaching and learning in the virtual community. The findings inadvertently identified future instructional needs for affective and pedagogical interactions in the virtual learning environment. Consequently, policymakers could create support systems, technology, and instructional design strategies to improve online teaching and students' experiences with distance learning.

Methodological Implications

The implications of using a qualitative study and conducting interviews using technology were that teachers discussed their experiences in their authentic environment (see Kahlke, 2014; Merriam & Tisdell, 2015; Thorne, 2016). Further, teachers thoroughly understood the phenomenon of formative assessment to provide reliable information about their perspectives and its use in the virtual learning environment. In addition, I used the participants' words, secondary resources, and emerging themes to demonstrate the significance of the findings (see Saldaña, 2015). Thus, the implication is that this study is

relevant, credible, and can be generalized to examine similar environments for elementary, middle, and high schools.

Conclusion

Formative assessment is vital to supporting students' erudition. The study explored high school teachers' perspectives and the use of formative assessment in the virtual learning environment. All participants taught a content area subject for more than one year in the virtual learning environment and used formative assessment. The conceptual framework for the study was Black and Wiliam's (2009) theory of formative assessment, with the constructs being: clarifying the learning goal, facilitating learning activities, monitoring for understanding to adjust instruction as needed, providing students with feedback, and building capacity in students to support each other. The participants shared valuable insights based on their perspectives and experiences using formative assessment in the virtual learning environment.

Multiple researchers have found the benefits of formative assessment are increased student engagement and teachers adjusting instruction based on the evaluations (Brink & Bartz, 2017; Holmes, 2018; Johnson et al., 2019; Krishnan et al., 2021; Raes et al., 2020; Sanders & Lokey-Vega, 2020; Wylie & Lyon, 2020). Further, students' scores on subsequent assessments improved from acquired knowledge from feedback from teachers and peers (Andersson & Palm, 2017; Bibbens, 2018; Carless & Boud, 2018; Cisterna & Gotwals, 2018; Fuller, 2017; Johnson et al., 2019; Maier, 2021; Yan et al., 2021). However, the previous studies also illustrate affective connections can be absent in the virtual learning environment (Blaine, 2019; Sanders & Lokey-Vega, 2020).

Therefore, students need to manage affective results because ego and emotional responses inhibit the uptake of feedback from formative assessment (Bibbens, 2018; Carless & Boud, 2018). Notably, the participants in my study of teachers' perspectives and use of formative assessment perceived formative assessment in the virtual learning environment to be essential. The participants used written feedback, and conversations to support learning as they built capacity in students to support themselves and each other.

The study can guide policy-making decisions at the district and institutional levels. District leaders could identify effective and innovative instructional technologies that meet the unique needs of teachers and learners in the virtual learning environment. School administrators could use the information in the study to assess specific needs for their institution and identify resources to increase parental involvement and support teachers. Finally, teachers could determine what additional supports would promote self-efficacy toward ongoing advancements for pedagogy in the virtual learning environment.

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Appendix: Interview Protocol

1. What subjects do you teach online, and for how long have you been teaching?

2. What is your perspective on a formative assessment?

3. What are the most critical elements that affect the use of formative assessment in the virtual learning environment?

4. What skills are important for teachers to use formative assessment?

5. Please explain formative assessment strategies that you routinely use in the virtual learning environment.

6. How do you check to see if students understand the content?

7. What do you do when students do not understand the content?

8. Tell me about a time you provided feedback to your students in the virtual classroom.

9. How do you help students respond to feedback?

10. What are the advantages of formative assessment?

11. What are the disadvantages of formative assessments?