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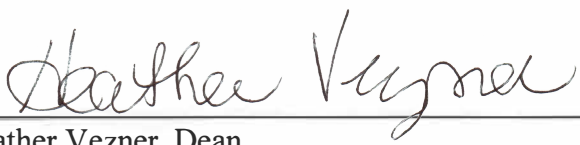
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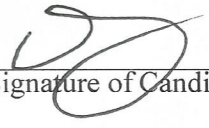
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EXAMINING THE RELATIONSHIP OF SCHOOL LEADERSHIP WITH  
IMPLEMENTATION OF TECHNOLOGY-BASED FORMATIVE ASSESSMENTS AND  
PROFESSIONAL DEVELOPMENT

by

David Agapito Gago

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## ABSTRACT

Schools are utilizing and acquiring more technology to meet the needs of 21st Century learning and the world that their students will enter into. It is imperative that we implement technology-based formative assessment practices to support teacher pedagogy and increase student achievement. The purpose of this study was to examine the relationship of school leadership to the effective implementation and professional development of technology-based formative assessments. The research included a review of formative assessments, professional development, teacher and school leadership roles, and the use of technology.

A mixed methods study was used that included quantitative and qualitative data for the triangulation of the study results. A correlational research design was used for the quantitative approach and was chosen to examine the relationships between the variables and to describe the current state. The case study design was chosen for the qualitative approach because the study was focused on how this affected a school site, with the subjects (teachers and administrators) from a 9-12 high school located in Central California. The methodology of the study included a survey and interviews for both teachers and administrators to understand how technology-based formative assessment, professional development, and external factors can provide or prevent the implementation of these important practices. While the statistical findings did not reflect strong correlations, the non-statistical findings reflected a positive relationship between school leadership as it related to the effective implementation of and professional development for technology-based formative assessments. Technology-based formative assessments provide educators with tools to promote student achievement and school leadership is an important element in the process of providing professional development and implementation.

Key words: formative assessment, professional development, and technology

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## CHAPTER 1: INTRODUCTION

Education is facing a perception problem in society between what the public believes is taught in schools and what is learned by students as measured by standardized test scores. Society looks at data provided by standardized tests and sees that students are not reaching the goals that have been set for students to achieve. School leaders and teachers understand that while these goals are laudable, they have been unrealistic given the numerous variables that students bring to the classroom. Students themselves have felt that education is abstract and has very little application towards real world use and working through struggles they face once they leave the school for the day, or upon graduation. To address these concerns would bring power to education and untap the potential ability for all students. The question then is, how?

For centuries, education has operated under the assumption that the teacher holds all the knowledge, and the role of the student was to soak up the accumulated knowledge based on the way the teacher presented it. If the student did not show academic growth, then it was considered the fault of the student for their lack of progress. This ultimately meant that large numbers of students who did not learn based on the specific way the teacher taught were left behind academically, while the teacher and system continued on without change. Society has since come to the realization that schools have a duty to do better and make learning effective as well as accessible for all students, not just those who are able to succeed based on if they get it the first time. To address this, the interaction between student and teacher is highlighted as a focus point towards positive change.

Interaction in the classroom can be part of an active learning exercise, daily quiz, journal entry, or any form of communication between teacher or student that provides information about learning to both parties. This is what is called formative assessment. Formative assessment

strategies can give a quick snapshot to teachers and students about the knowledge that students have at a particular time so teachers and students can close the learning and achievement gap together using a variety of strategies (Ayala, et al., 2008). Teachers can use this information to address student learning in a positive way, and students through the process can increase motivation, confidence, and become more effective learners (Akkaraju, et al., 2019). One of the main keys to the use of formative assessment is the feedback process between students and teachers.

Formative assessment strategies that use technology can help to make the feedback process quicker and more efficient. "... technology has made it easier to do this more often and collect significantly more information about where a student is the learning process" (Davis, 2015, p. 2). This allows educators to make quicker decisions on adapting instruction, remediating student learning, and providing effective feedback. Technology-based formative assessment practices can also allow those with disabilities greater access to curriculum and learning by tapping into formats that are conducive to their individual learning styles (Farrell & Rushby, 2016). As technology is implemented in all facets of life, the use of technology in education to help learning is essential to the academic achievement of our students.

Providing the technology for formative assessments is not enough to ensure that students and teachers will successfully use it and benefit accordingly. It is also important that sufficient training is provided to help teachers use the technology and assessment strategies in their classrooms. Learning gains for students were observed when teachers participated in a professional development program that focused on formative assessment (Andersson & Palm, 2018; Furtak et al., 2018) and those that included technology (Polly, et al., 2017; Yin, et al., 2015). This is important for school leaders to consider when looking to make positive changes to

student achievement. “This process is a relatively slow one and takes place through sustained programs of professional development and support” (Black & William, 1998, p. 12). The desired changes to promote growth will not happen overnight, but can be achieved with purpose and training.

### **Statement of the Problem**

One major issue that policymakers and the general public have with education is that when students leave K-12 education they are not prepared for college or the workforce. According to the California Department of Education (2019), 44.1% of the students in the class of 2019 were considered prepared for college or career. Looking deeper into subgroups, African American students were only 23.7% prepared, students with disabilities were 10.8% prepared, 36.1% of Hispanic students were prepared for college/career, and only 16.8% of English Learners were prepared for college or career after finishing their education. Overall, in the state of California, 60.7% of the students in public education are considered socioeconomically disadvantaged. These numbers are striking considering that between 2017 and 2019, the percentage of students who are prepared for college or career has only increased 1.9% (CA Department of Education, 2019). Each year, more than half of the students who leave public K-12 education in California are not prepared for college studies or have enough career skills.

Formative assessment with technology can help bridge the educational gap and achievement of our students. “Formative assessment is a powerful tool that can motivate students, build their confidence, help them develop strong study skills, provide room for their failures, allow them to be uncomfortable, and grow into self-regulated learners” (Akkaraju, et al., 2019, p.72). Formative assessment not only helps students with their learning, but it also helps teachers identify student academic needs and what steps are needed to provide effective feedback

to reach the academic goals of the student. Technology can help streamline and make the entire process quicker for both teacher and student. It reduces the time lost between assessment and action and allows for support outside of the school day or classroom as technology is more portable and accessible from different locations.

Policymakers look to quick fixes to lessen learning and achievement gaps in education. The key to better academic achievement is not necessarily a new technology or curriculum, but investing in the training of teachers to use valid and reliable assessment data to help students grow academically. Professional development time and training must be a priority so educators can put the skills of formative assessment into practice in their classrooms.

### **Purpose of the Study**

The purpose of this mixed-methods case theory study is to understand the connection between student achievement, implementation of technology-based formative assessments, and targeted professional development for teachers in a K-12 setting. At this stage in the research this connection of the three concepts will generally be defined as implementation of technology-based formative assessments. This case study informs educational leaders who are looking to improve student achievement and should look towards prioritizing technology-based formative assessments and professional development as a way to improve teacher efficacy towards academic goals.

School leadership has a duty to provide an effective learning environment for its students. The use of formative assessments in the classroom is just one aspect of the learning environment for students, but can be a powerful one. "...teachers who frequently embed formative assessments in their lessons tend to have fewer discipline problems. This is because formative assessment has such a tremendous impact on student motivation, self-efficacy, time on task, and

self-regulation skills” (Buelin, et al., 2019, p. 22). Knowing this, it is essential to provide training that is domain specific and provides meaningful classroom materials that teachers can use in their classroom immediately (Lyon, et al., 2018). Therefore, the purpose of this study is to determine the relationship between technology-based formative assessment and professional development to student academic achievement and progress.

### **Research Questions**

This study addresses the following four research questions:

1. What is the relationship between school leadership and the successful implementation of technology-based formative assessments?
2. What is the relationship between professional development and successful implementation of technology-based formative assessments?
3. What is the relationship between formative assessments and instructional decisions made by teachers?
4. What is the relationship of external factors that influence the effectiveness of school leadership to implement technology-based formative assessments?

Null Hypothesis 1: There is no relationship between school leadership and the successful implementation of technology-based formative assessment.

Null Hypothesis 2: There is no relationship between professional development and successful implementation of technology-based formative assessments.

Null Hypothesis 3: There is no relationship between formative assessments and instructional decisions made by teachers.

Null Hypothesis 4: There is no relationship of external factors that influence the effectiveness of school leadership to implement technology-based formative assessments.

### **Theoretical Framework**

Students continuously learn from their environment, teachers, mentors, and other factors that can impact their academic progress. Their ability to reach their academic goals is impacted based on their self-efficacy, as well as the feedback they receive from those around them. In education, formative assessment is a tool that can be used to find the level of progress for a student and to help determine what the next steps are for their progression. This communication between student and teacher is essential for the growth, achievement, and efficacy of the student, and also for the continued instructional evolution of the teacher as well.

Vygotsky's theory of social constructivist learning contends that learning is not solely an individual process, but one that is social in nature between teacher and student. As students learn, they are able to do more with the knowledge that they gain; however, there is a point where they may need help crossing a certain threshold (Vygotsky, 1978). The teacher is tasked to not only provide information and experience, but to build the skills of the learner through communication and to facilitate the learning process. It is through this social context that academic success has the potential to be realized for both teacher and student.

### **Significance of the Study**

This study will contribute to the knowledge of technology-based formative assessment, targeted professional development, and the positive relationship to student academic achievement. The study will also provide potential uses of instructional professional development for educators to consider. Educators are looking for ways to reduce the achievement gap for students, and formative assessment can be a tool to work towards this goal. This study supports the use of technology-based formative assessment strategies in all courses



and disciplines. Formative assessment not only promotes student achievement, but also supports teacher instructional efficacy.

Students will see a positive impact from this study if educational leaders are exposed to the results of this study and take steps towards the implementation for technology-based formative assessment strategies at their school sites. Students will also receive academic support through timely feedback, discussion of academic goals and plans, and more focused instructional teaching. Students will see their instructional time used more effectively and will be more motivated to achieve their individual academic goals. The use of formative assessment has the potential to increase student confidence, but also their skills and achievement.

This study also provides professional development for the not just the researcher, but also other educators, as the incorporation of technology-based formative assessment in classrooms is emphasized. The additional time that it takes to prepare, evaluate, and operationalize technology-based formative assessments in the classroom is significant, but minimal weighed against the potential benefits and reduced with the use of targeted professional development. While there are many different forms of formative assessment, this study focuses on the use of technology-based formative assessment in the classroom. This focus provides a benefit for both educators and students towards meeting learning targets in an efficient manner.

### **The Researcher**

The researcher is able to contribute to the writing of this study as he is a teacher within the K-12 setting. He has also helped in implementing and training with formative assessment technology in his district. He received his credential in mathematics education, a Master of Arts in Education, and a Master of Arts in Education with an emphasis in Educational Technology. The researcher sees the importance of formative assessment as a tool for effective teaching and

sees the use of technology as a way to help with the implementation of formative assessment strategies. As an educator, the researcher wants to share his knowledge through his research.

### **Definition of Terms**

This study provides the following definition of terms to clarify understanding within the context of this study and to prevent confusion.

*Feedback:* Atjonen (2014) states, “Feedback should follow a three-way path: from pupils to teacher so that the teacher can understand the pupils’ level of understanding; from teacher to pupils... or extends the pupils’ ideas and from pupil to pupil” (p. 243).

*Formative Assessment:* Aschbacher and Alonzo (2006), “[Formative assessment’s] purpose is to determine what the student understands and why, so that teaching and learning may be optimized. Formative assessment can be formal or informal and includes eliciting, analyzing, and responding to information about student understanding” (p. 180).

*Professional Development:* According to The Glossary of Education Reform (2013) “...professional development may be used in reference to a wide variety of specialized training, formal education, or advanced professional learning intended to help administrators, teachers, and other educators improve their professional knowledge, competence, skill, and effectiveness” (para. 1).

### **Limitations**

The target population of this research was educators and administrators from a grade 9-12 setting from one school district. Therefore, the results were limited to only that specific population group. No students were included in the study.

The survey link was sent via email to teachers and administrators with a two-week window that was allowed for replies. The amount of completed surveys was dependent on those

who checked their emails during that time period, as well as their willingness to participate. Because this was a voluntary study, the sample size and demographics of the teachers and administrators willing to participate in the survey and interviews were out of the researcher's control as well.

### **Delimitations**

Currently, the researcher is a teacher that uses technology-based formative assessment strategies in the classroom and trains other teachers in using technology-based formative assessment strategies. The researcher has prior knowledge of the positive aspects of implementing technology-based formative assessment and providing targeted professional development for teachers and administrators. The delimitations set by the researcher focused on collection of data from different school formats, and in designing this study, the researcher prepared to conduct twenty-three interviews with teachers and administrators. These delimitations were put in place for the purpose of managing time constraints and monetary resources.

The delimitations used in this study were determined with the goal of understanding the relationship between educational leaders and their role in implementing technology-based formative assessment at their school sites.

### **Assumptions**

This study includes the following assumptions: the participants, both teachers and administrators will respond to the surveys and interviews honestly and accurately, the participants, both teachers and administrators, understand the concepts and vocabulary associated with formative assessment, and the data that is collected accurately measures the perception of

school leaders and their ability to implement technology-based formative assessment at their school sites.

### **Organization of the Study**

This research study has been organized into five chapters. Chapter 1 includes the background of the study, a statement of the problem, purpose of the study, research questions, the theoretical framework for the study, significance of the study, information about the researcher, definition of terms, limitations, delimitations, and assumptions of the study.

Chapter 2 presents a review of the literature including formative assessment, misconceptions about formative assessment, teacher assessment knowledge and beliefs, types of formative assessment strategies, benefits and disadvantages of formative assessment, effectiveness of formative assessment, training and professional development for formative assessment practices, and school/district leadership roles and factors in implementing formative assessment.

Chapter 3 outlines the methodology used to conduct this research study, including participant selection, instrumentation, data collection, and procedures for data analysis.

Chapter 4 is a presentation of the results and findings of the study which include demographic information, research questions, and the results of the data analysis for the four research questions.

Chapter 5 is a summary of the research study, including a discussion of the findings, implications of the findings for theory and practice, recommendations for future research, and final conclusions.

## **Summary**

With the advancement of technology, and the need to reduce the achievement gap, it is essential that instructional and professional development time and money are used effectively to improve student achievement. The purpose of this study was to examine how technology-based formative assessment in conjunction with targeted professional development can raise academic achievement and teacher efficacy. The subsequent chapter presents a thorough review of the research and theories related these topics. Technology-based formative assessment has the potential to provide educators with the ability to know how students are progressing academically, provide targeted feedback, and adjust instruction accordingly and efficiently to raise academic achievement. The long-term outcomes of this study seek to inform school leaders about the importance of technology-based formative assessment and professional development to better serve their students and increase academic achievement.

## CHAPTER 2: REVIEW OF LITERATURE

This chapter presents the issues surrounding the implementation of effective technology-based formative strategies in K-12 education from a leadership perspective. The concept of formative assessment is not new to education, and while it is generally seen as important for student success, it has also been misused or not applied properly for lasting positive results. The use of formative assessment strategies can provide many educational benefits not just for students, but for the instructional practice of teachers as well. However, formative assessment is not used consistently in the classroom due to many factors that are outside the control of the educator, but more importantly, are part of the responsibility of school leadership. This study will look to what values educational leaders have regarding the effective implementation of technology-based formative assessment strategies, and how they correlate to teacher perceptions, and ultimately student achievement.

One aspect of effective implementation is the training and professional development of teachers. Teachers must know what formative assessment is, and how it can be used to draw out student understanding without placing an undue burden on instructional planning time for educators. Teachers must be trained on how to collect data, interpret it, revise instructional decisions, and provide timely and useful feedback to students. The proper use of formative assessment strategies has been found by researchers to increase student achievement and participation considerably. However, this can only be achieved when educational leaders value the need for teacher training in this area. This study shows the potential benefits for all educational stakeholders when leadership places formative assessment as a priority.

Education is evolving and beginning to rely on technology to aid in the instruction, testing, and evaluation of student understanding. This also means that education should use

technology to effectively show instructors and students where there are gaps in learning and provide the tools to communicate what needs to be improved in a timely and efficient manner. Technology-based formative assessment strategies can help both teacher and student realize greater potential and should be a priority for educational leaders.

Educational leaders are tasked with many items that at times can be conflicting. Student achievement should be a high priority, if not the highest, and should take precedence when deciding on what to concentrate on. Therefore, the purpose of this study was to highlight and show the importance of school leadership values when implementing technology-based formative assessment, and the potential benefits that it brings to teacher effectiveness and student achievement. The scope and organization of the review represents the pertinent research and literature on formative assessment, professional development, and leadership values for effective implementation.

### **Formative Assessment**

There is a considerable gap in education on what a student has been taught, and what they know and understand. Implementation of new curriculum and standards has been used as a basis to fix this ever-growing gap. Much focus has been placed on new curriculum or higher standards as a way to improve education, with little effect. The use of formative assessment within the classroom can highlight for both student and teachers where the learning gap is, how it can be closed by both teachers and students, and lastly, how it could provide educational benefits that are long-lasting.

### **Formative Assessment Theory**

The theoretical framework for this study was inspired by the work of Lev Vygotsky (1978). Vygotsky's theory of social constructivist learning is built on the idea that knowledge

and understanding of new information is not solely an individual act, but as part of a social context that is interactive between expertise and inexperienced (Trumbull & Lash, 2013).

Collaboration within the learning experience between teacher and student creates a community of learners where each participant can learn from one another. Individual students learn from text, educational resources, and interaction with others by acquiring and constructing their knowledge. However, there are gaps in the knowledge that is acquired, and how it can be applied in the educational context. It is the role of the teacher to ask questions of the student to obtain the necessary information about the student's learning and understanding, and to help them plan to manage these gaps in learning (Ozan & Kincal, 2018). The interactive dialogues between teacher and student help build the skills of the student while the teacher also learns how to best lead the student(s) forward, a process called reciprocal teaching (Ibrahim, 2017).

Vygotsky's Zone of Proximal Development (Figure 1. 1) allows individuals to reach a higher level of competence by moving from skills that they presently have mastery on towards skills they do not, but need assistance with (Ryan & Cooper, 1972; Vygotsky, 1978). The zone begins with items that a learner or student cannot do on their own without guidance or help. The next zone is met when the student works on items that can be completed with limited help or guidance. In this case, a teacher would support the development of the student until they become proficient enough to reach the last zone, where they can complete the task without any aid. To facilitate this progression, a series of communicative steps between teacher and student are needed to provide the framework for success. As Trumbull and Lash (2013) state:

Formative assessment is part of this process—whether implicitly or explicitly—as the teacher uses information about how a student responds to instruction in order to give

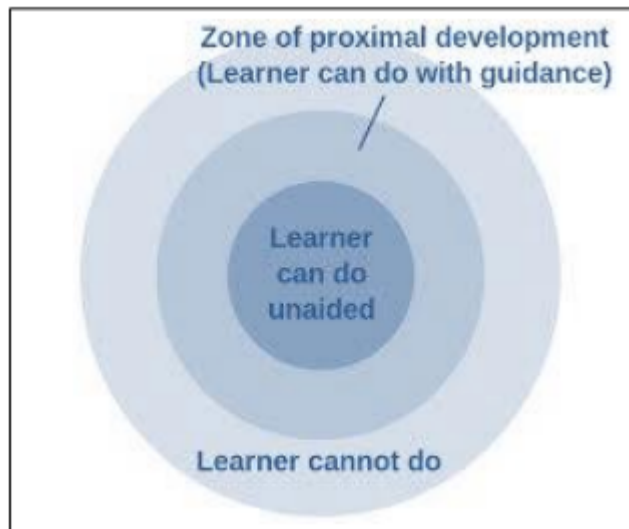


feedback to the student and/or adjust instruction so as to prompt learning or performance.

(p. 5)

### Figure 1

*Vygotsky's Theory of Proximal Development. Adapted from Ryan & Cooper, 1972.*



When students are matched with a well-trained teacher, there is a higher probability that the student will move closer to mastery on skills that would have been too difficult for them to master on their own. The joint productive activity, where student and teacher are working together to reach learning goals is essential to this process. The student needs to be an active participant in this process, and the teacher becomes more of a facilitator between the student and the specific learning goal, providing the necessary support to help achieve the goal (Trumbull & Lash, 2013).

### Formative Assessment Basics

According to Black and William (1998), formative assessments are instructional activities defined as:

...those activities undertaken by teachers -- and by their students in assessing themselves -- that provide information to be used as feedback to modify teaching and learning activities. Such assessment becomes *formative assessment* when the evidence is actually used to adapt the teaching to meet student needs. (p. 3)

Formative assessments are used as a guide for educators to make changes to their instruction based upon the level of understanding that the student has at a particular moment of instruction (Shirley & Irving, 2015). Formative assessments should be low-stakes assessments, and can be part of an active learning exercise, quiz, journal, or activity that is done during the learning period (Akkaraju et al., 2019). This would make formative assessments more of a process, than a true test of ability, and can be used to monitor student progress over a period of time (Marzano, 2010; Marzano & Heflebower, 2012). The resulting instruction can be changed on a personal level, or even on a class-wide level depending on the results (Andersson & Palm, 2017b; Hattie, 2012; Kiryakova, 2010). This type of assessment should be focused on improving learning for both student and teacher, not just within the class setting but also for their future (Marzano, 2010; Spector, 2013).

According to Lee, Feldman, and Beatty (2012), "...the use of formative assessment by teachers can produce significant and substantial learning gains across ages, school subjects, and countries" (p. 523). Black and William (1998) found that the typical effect size using formative assessments was between 0.4 and 0.7. This could potentially help low achievers close the achievement gap through the understanding of their current state of learning (Egelandstal & Riese, 2020). Formative assessment allows instructors to monitor and intervene to address cognitive or disposition issues that could impede student learning (Akkaraju et al., 2019; Hattie, 2012). Students are then tasked to be active participants in their learning, including their

progression and what steps are needed to move forward (Heritage, 2007). Students learn more when they know what they are getting right or what they are getting wrong as they continue through a class through feedback. This feedback, when timely and effective, can have a strong effect on the motivation and feelings of self-efficacy, which then can influence learning (Heritage, 2007; Ayala et al., 2008; Marzano, 2010; Frey & Fisher, 2011; Hattie, 2012; Akkaraju et al., 2019). Formative assessment is considered a good teaching practice that fosters growth and motivation, as well as the engagement of the students (Hattie, 2012; Buelin et al., 2019; Spector et al., 2016). The use of formative assessment also can be a positive factor in student achievement on summative and standardized tests (Marzano, 2006; Shirley & Irving, 2015). While summative and standardized tests provide data on the learning of a particular student, they typically do not provide timely data to drive changes to academic instruction when the students need it the most (Irving, 2006).

### **Formative Assessment vs. Summative Assessment**

The difference between formative and summative assessments is based on when the learning check is made. “Formative assessment has been likened to a checkup at the doctor’s office, where summative assessment (such as a final examination) is more like an autopsy” (Buelin et al., 2019, p. 22). Formative assessment is closely related to the concept Assessment for Learning (AfL), while summative assessment is related to the concept Assessment of Learning (AoL) (Davies et al., 2014). Summative assessments provide information at the end of a unit or course that can contain information about a program and curriculum and can help inform outside parties on progress or standing (Gewertz, 2010). This can lead to positive pressures for change but has also shown to increase anxiety and affect self-esteem in students (Atjonen, 2014).

## **Teacher Assessment Knowledge and Beliefs**

Knowledge and beliefs regarding assessment with teachers is mixed and play a role in how formative assessment is perceived and used. If teachers view formative assessments as mini-summative assessments, then feedback could potentially be provided far too late to be effective (Ayala, et al., 2008). Time to plan effective formative assessments, including anticipating and planning for common issues is an important feature to good formative assessment practice which is lacking in many schools and districts (WestEd, 2010). According to Heritage (2007):

Teachers' skills in drawing inferences from students' responses are crucial to the effectiveness of formative assessment. No matter what the assessment strategy — observation, dialogue, asking for a demonstration or a written response — teachers must examine students' responses from the perspective of what they show about their conceptions, misconceptions, skills, and knowledge. (p. 144)

One major factor limiting the use of formative assessment with teachers is the limited assessment background, capacity, and time to develop or analyze data to make adaptive instructional decisions (Feldman & Capobianco, 2009; Phelan, et al., 2011). Another factor that can limit the effectiveness of formative assessment is not providing timely and adequate feedback in such a way that a student can use the information to make positive changes to their learning (Akkaraju et al., 2019; Deeley, 2018).

## **Formative Assessment Misconceptions**

There are many misconceptions about formative assessment which prevents clarity amongst scholars. Some will argue that formative assessment is like an instrument or test that should be scored. Others will argue that it is a process, while there are some that would claim that it is a combination of both an instrument and process (Bennett, 2011). Formative assessment

has been defined in most literature as any instructional activity that provides information about student learning that can then be used to adapt the teaching and learning for students. Planned formative assessment usually consists of three phases in an ongoing cycle: eliciting information from students, interpreting the information, and acting on it (Falk, 2012; Hattie 2012). The way that a teacher approaches formative assessment can also determine the perception of learning from not only the teacher but the student. Formative assessment that is prescriptive can miss the value in how students reason. Responsive formative assessment can provide more substance into the way that students think and provide avenues for scaffolding (Frey & Fisher, 2011; Hattie, 2012; Clinchot et al., 2017). However, the main problem concerning formative assessment is that there is no one activity that will work for every student and/or subject. This can create misconceptions about formative assessment, reduce its potential value, and prevent educators from taking valuable planning time to put it into practice (Andersson & Palm, 2018).

### **Types of Formative Assessment Strategies**

Instructional strategies with formative assessment are numerous and can be used with or without technology. Non-technological formative assessment strategies are used by instructors to gain a glimpse into student understanding, and the feedback provided by teachers can aid in comprehension of topics. The use of technology and formative assessment allows for better collection of data, and a quicker turnaround in planning and feedback for both students and teachers, reducing instructional time loss.

#### **Non-Technological**

Formative assessment does not have to include a technical aspect to it in order to be effective. Since formative assessment can be formal or informal, targeted questions, exit tickets, notebooks, and any other instructional resource could be used if it is to gather information to

provide feedback that will improve learning (Aschbacher & Alonzo, 2006). The interactions between student and teacher are the primary instrument to use informal formative assessment. Student and teacher questions, as well as reactions using body language can be a way to use informal formative assessment in the classroom (Lyon et al., 2019). Formative assessment can also take place within peer assessment as students look and evaluate each other's work and provide recommendations for further modification (Falk, 2012).

### **Technological**

Connected Classroom Technology (CCT) consists of a response device that is connected either through wires, or wireless technology that provides data to teachers through a variety of possible responses (Shirley & Irving, 2015). These can also be called Classroom Response Systems, or CRS. This technology allows for teachers to collect data not just from one, or a handful of students, but potentially from every single student (Beatty & Gerace, 2009; Shirley & Irving, 2015). Students can be connected from a variety of devices, including computers, tablets, and smartphones where many of them are interconnected within their everyday life (Dobbins & Denton, 2017). Students and teachers have the potential of viewing responses quickly, driving immediate changes in instruction and remediation (Shirley & Irving, 2015).

In a classroom, CCT's can increase curricular engagement with students, create positive classroom dialogue, and make aware for both student and teacher, where the learning for the student is currently at (Shirley & Irving, 2015; Fies & Marshall, 2006; Lee et al., 2015). According to Spector, et al. (2016), "From a learning perspective, there are clear links between engagement, efficiency, and effectiveness" (p. 60). Clickers, or any connected classroom technology, can transform lectures from a one-way learning experience to an interactive classroom (Fies & Marshall, 2006; Filer, 2010) In a classroom with this technology,

accountability for all students is potentially realized. It can provide a chance for students to answer questions anonymously, but at the same time, teachers can check to see that all students are answering (Beatty & Gerace, 2009). Students who are afraid, or too shy to ask questions in a traditional classroom, will have the ability to be heard using CCT's, and teachers will know how those students are learning as well (Salend, 2009). According to Irving (2006), "These tools provide a window into a learner's prior and present understandings and feedback loops that support teacher's instructional decision making and monitoring" (p. 17). With one set of CCT, such as clickers, students feel more comfortable about giving answers because anonymity, the ability to make mistakes without penalty, and the opportunity to see that more students are at the same level of understanding that they are. All of this breeds further student engagement (Filer, 2010).

Internet based applications such as Flipgrid or Pear Deck allow students and teachers to capture and store student learning to help make decisions in a timely manner. Flipgrid allows students to make short videos using their phones or computers to discuss topics within a group or class and can be accessed outside of school to facilitate discussions from many groups of people, and Pear Deck is an internet-based program where teachers can ask questions of students, and they respond using a computer, tablet, or even through their phones. The teacher can then see all of the responses in real-time, show student responses anonymously, and even create additional questions on the fly to facilitate learning. The flexibility of these applications can keep student responses from being lost or forgotten and can be used to present a powerful electronic view of student learning with video, images, and written responses in real-time and asynchronously (Cohen, 2017; Herold, 2014). The ability to save these records of student interaction digitally and have access on multiple devices and platforms assures that teachers can then plan effective

instruction based on these artifacts (Bates, 2013; Demski, 2010; Molnar, 2014). Other digital platforms can keep track of all the interactions that a student has during a time period or create a list of topics that are (or not) mastered for the teacher to view and then adjust instruction (Davis, 2015). With the proliferation of hand-held cellular devices or smartphones, teachers can also use these internet-based applications to not just elicit information about student learning, but also increase engagement (Davis, 2015; Gullen & Zimmerman, 2013). This can ensure that teachers know accurately what their students know but also provide through these applications a way to also provide timely feedback to students (Farrell & Rushby, 2016; Mitten, et al, 2017).

Computer-based assessments (CBA) are another technological method for formative assessment that can reduce the feedback time to help students know where they need to work on for further success (Karay, et al., 2012. Timmis, et al, 2016). CBA's that use tablets or Chromebooks to provide assessments are another method to gather information for formative assessment (Cayton-Hodges, et al., 2015). Many technology-based formative assessments are using internet applications such as Google Docs to allow students to respond at times even outside of the school day, but also allow teachers to provide immediate feedback to promote learning and prevent loss of timely feedback. It can also be used to allow for more student-student interaction as part of peer assessment (Bates, 2013; Gullen & Zimmerman, 2013). The ability to save information on multiple technology platforms is a way for instructors to use the information at a time that will allow for more appropriate feedback, but better instructional planning (Bates, 2013).

### **Benefits**

One of the major benefits is that the feedback cycle time is reduced and that students can receive feedback through technology that is timely and informative (Karay, et al., 2012).



According to Kingston and Nash (2011), the “...use of a computer-based formative system produced a similar mean effect [compared to non-technological] size of 0.28 with a confidence interval of 0.26 to 0.30” (p. 34). The more that a technology-based formative assessment system is used with students, there is a statistically significant positive relationship with achievement (Polly, et al., 2018). One study, conducted by Andersson and Palm (2017b), showed significant improvement in mathematics scores between a pre- and post-test allowing the only difference between the groups being the use of formative assessment strategies. In this particular case, twenty-two teachers were randomly selected to participate in professional development for formative assessment. The study, which was conducted in Sweden, involved teachers and professional leaders meeting for at least 144 hours during one term, and then providing another 72 hours to plan and reflect on the strategies that they were learning. Most of the teachers used between eight and 34 formative assessment strategies during this study. The researchers found that not only did the formative assessment strategies help, but that they adapted instruction for both whole class, and individual students (Andersson & Palm, 2017a). Teachers also developed their feedback strategies for students during this time as well. As part of the study, the students achieved more proficiency on the post-test for both procedural skills in math, but also application of skills when compared to a control group (Andersson & Palm, 2017b).

Technology can also help those students that may not be able express their thoughts conventionally and can make it easier for those students to participate in the learning process (Cohen, 2017). The ability to produce assessments in multiple formats along with the ability to gain responses in a variety of formats and time schedules can give greater access to those that might have physical or mental difficulties and can lead to greater self-esteem and motivation (Farrell & Rushby, 2016). Technology-based formative assessment can assist teachers and

students by providing more opportunities for interaction between the teacher and student, student and student, and even technology and student which can allow teachers to construct rich formative assessment processes (Dalby & Swan, 2019).

### **Disadvantages**

Any formative assessment, non-technological, or technological, is limited on what can be assessed. Add in the time and ability to analyze these assessments, this can be a disadvantage for educators to properly use formative assessment (Hunt & Pellegrino, 2002). Formative assessment takes valuable time within the classroom; fears of not covering the curriculum to the desired standard are a concern of teachers (Atjonen, 2014). Another major disadvantage to technology-based formative assessments is whether or not teachers know how to use this information effectively to respond instructively and help students reach their learning targets (Ayala, et al, 2008). Technology issues, especially those involving hardware, software, internet access, and student accessibility are concerns for teachers before there can be implementation of technology-based formative assessment (Feldman & Capobianco, 2008). While technology access has expanded, technology-based formative assessments and assessments with technology in general have not been developed as quickly for all areas and subjects which also limits their effectiveness (Timmis, et al, 2016).

### **Effectiveness of Formative Assessment**

Formative assessment is one area of instruction that has the potential to boost student achievement, increase interest, and provide transformative feedback that can provide lasting benefits in the instructional strategies for teachers and in the future success of students. Formative assessment is not a one-time strategy, but a development of assessment, data

collection, and feedback that both teachers and students learn, grow, and have enduring success with.

### **Achievement**

Formative assessment in any form was the third most influential factor out of a possible 138 factors for the achievement in education for students. Feedback, which is an essential quality of formative assessment was considered the eighth most influential (Ozan & Kincal, 2018). At one community college, the professors used formative assessment to increase the pass rate in one course from 60% to 83% (Akkaraju, et al., 2019). The researchers used formative assessments to not only help with identifying how much students knew, but to also check for punctuality and attendance. Students were reminded through Remind, a private mobile messaging app that there would be a formative assessment, and what it would cover. The formative assessments that they would use would be challenging, but achievable for all of the students with some preparation. The researchers used a benchmark of 80% to show students that they are satisfactorily completing the assessments. Instructors used these assessments to keep track of not only student engagement, but to also look for those students who are struggling or disengaging from the learning. Instructors then communicated with those students who needed help to provide tutoring or services for those that needed it. In the end, not only were students more engaged with the learning, but 83% passed the course, and 90% of all students remained in the course until the end of the semester (Akkaraju et al., 2019). Typically, students who do not feel comfortable or skilled enough would drop the class or stop attending. The ability to provide feedback and services to students in a timely manner is a positive aspect of formative assessment.

Formative assessments that were used frequently within a classroom showed greater achievement from the students than those who did not use formative assessments as regularly

(Polly, et al., 2018). In this case study, 307 teachers from 65 schools participated in using the AMC Anywhere formative assessment system with kindergarten and first-grade students on developing number concepts. Teachers were provided 72 hours of professional development time to not only learn how to use the AMC Anywhere system, but to learn different mathematics activities that they could use within their classrooms. At the end of the study, students showed higher performance where the AMC Anywhere system was used more frequently than in classrooms where it was used sparingly. The use of more data that the system provided may have led to better design and implementation of instructional activities (Polly, et al., 2018).

### **Interest**

Formative assessment not only has the ability, when used right, to improve achievement, but to also increase student interest in a subject or class (Fies & Marshall, 2006). In a study conducted by the University of Cologne, students took the Berlin Progress Test (BPT), a medical formative exam embedded within their studies at the university. The test was normally offered as a paper-based examination, but the researchers wanted to see if a computer-based version of the examination would prove to be better for students. The paper-based test was administered, but results would not be available for four to eight weeks after the exam date. The computer-based examination would be able to provide results immediately and allow students to compare their answers with the correct answers. Students responded that this directed and detailed feedback had a greater impact to their studies than previously. This positive impact on their learning behavior would provide greater benefit and utility to their studies than waiting for the results as with the paper-based assessment (Karay et al., 2012).

In an experiment conducted in Turkey, two fifth-grade social studies classes were used for a comparison on formative assessment and achievement. There was not just a statistical

significance on increased achievement, but also in the interest of the students in the class. All of the students that were interviewed as part of the experimental class had positive attitudes toward the strategies used by the teacher, found it enjoyable, and showed a positive relationship between the students and teacher. The class that used formative assessments within the class found that the group work and quizzes increased their learning and participation and gave them the chance to see their opportunities for growth (Ozan & Kincal, 2018). Self- and peer-assessments that were used as formative assessment activities were found to be useful to compare themselves with their friends and see their gaps in learning. According to Ozan and Kincal (2018), "...it can be inferred that students were very positive about formative assessment practices and wanted to take classes in which these practices were applied" (p. 102).

### **Instructional Response by Educators**

At the core of formative assessment lies the concept of feedback. Feedback occurs in three possible ways in a classroom: from teacher to student, student to teacher, and finally, student to student (Atjonen, 2014). Feedback can be oral or written dialogue between parties, and should highlight strengths, weakness, and where improvements in learning can be gained. Proper and timely feedback can not only lead to higher achievement, but also increased interest (Andersson & Palm, 2017a; Ozan & Kincal, 2018). In order for the feedback process to be effective, instructional goals must be clear for all students, and that the feedback must articulate what the student needs to do to reach the goal that is set (Gewertz, 2014; Heritage, 2007; Miller, 2009). This specific feedback not only guides students towards reaching their goals, but also provides information to the teacher to provide instructional actions to help each student with their learning. This will also reduce the gap between what the students think they know and what they do not know, hopefully improving planning, study, and academic skills (Hudesman et al.,

2013; Lopez-Pastor & Sicilia-Camacho, 2017). This can also have a positive effect when students are engaged in their learning and practice self-assessment. Formative assessment that promotes student-initiated self-assessment has a medium-sized positive impact on learning (effect size = .61) and promotes an active role for students in their learning (Lee, et al., 2020).

Formative assessment should also be used to collect information and data to track student achievement and understanding throughout a unit or course (Ayala, et al., 2008; Hattie, 2012). This tracking of information should be used by instructors to make proper instructional decisions to help with student learning. In one study involving 22 teachers in Sweden, formative assessment practices were used, and 19 teachers used the information to modify whole-class instruction, and 9 used information to adjust or provide extra instruction small groups of students (Andersson & Palm, 2017a). This also provided instructors with information to reduce time on instructional activities that did not produce results that were optimal for the learning of their students.

Formative assessment can also help teachers broaden and refine their pedagogical content knowledge (PCK) within their teaching (Falk, 2012). Pedagogical content knowledge is defined by Shulman (1986) as “...the dimension of subject matter knowledge *for teaching*” (p. 9). This includes knowledge of curriculum, student understanding, assessment, and instructional strategies. Formative assessment can provide a reciprocal relationship with PCK where engagement in formative assessment activities provided deeper understanding of teaching knowledge. “Teachers both built and subsequently used knowledge of goals for learning and assessment and knowledge of student understanding through formative assessment” (Falk, 2012, p. 285). The use of formative assessment can help teachers analyze, revise, and refine

instructional goals and strategies with the use of student responses, while also providing information for students to use for their own learning.

### **Problems with Formative Assessment**

Black and William (1998) have described the effect size of formative assessment to be between .40 and .70. However, while this has been accepted within the educational community as fact, Kingston and Nash (2011), have only been able to find 42 usable effect studies since 1988. Based on their findings, their mean effect size was .20, which is significantly lower than the findings from Black and William (p. 33). There were also wide variations in the effect sizes of formative assessment between subject areas. In mathematics the mean effect size was found to be .17, English language arts was .32, and in science it was .09 (Kingston & Nash, 2011). A recent study by Lee et al. (2020) found that after looking at 33 studies the mean effect size overall was .29, with mathematics .34, literacy .33, and arts .29. Formative assessment can be a significant help for student learning, but the results do show that it is not as high as previously thought.

Formative assessments and activities must be embraced in order for them to be effective. This also means understanding all aspects of formative assessment practice, otherwise the effect will be limited (Phelan, et al., 2011). In Arizona, an informal survey was given to teachers to define and gives examples of formative assessment. Of the 20 teachers who took the survey, none of them could define formative assessment completely. Around half had it partially correct, but all of the teachers were missing the feedback loop which is one of the most important pieces in formative assessment (Heitin, 2015).

The background of teachers' assessment skills is another factor that can limit the effectiveness of formative assessment. Teachers that have limited knowledge of assessment

practices might treat formative assessments as summative assessments, which might increase the feedback time to students about their progress and reduce the effectiveness of information provided to make positive instructional changes (Ayala, et al., 2008; Offerdahl & Tomanek, 2011). The assessment mindset of teachers is another pivotal piece that must be considered. A positive growth mindset would look at the formative assessment results and look to see what is needed for reinforcement. A mindset that is fixed might look at the results and conclude that the students did not learn the material and continue to move on (WestEd, 2010). The process of teaching and formative assessment should not be viewed as separate tasks. If so, then formative assessment will be seen as another task that is enacted externally on them and will not be used effectively (Heritage, 2007).

Formative assessment can cause issues for students if teachers do not use feedback in an appropriate or timely manner. This can influence attitudes, motivation, and effort, especially with low performing students (Clinchot et al., 2017). Effective feedback is not just timely but is presented in such a way that students understand and can act on. If there is a misinterpretation or misunderstanding of the feedback, this could result in a missed opportunity for learning, or worse, dissatisfaction between the teacher and student (Deeley, 2018; Jenkins, 2010). Feedback that is interpreted as critical could negatively impact the identity and self-worth of a student; a perception of failure rather than growth (Egelandstal & Riese, 2020).

### **Training and Professional Development for Formative Assessment Practices**

One of the biggest limitations on the effectiveness of formative assessment is the fact that many teachers are not trained on how to use it in a way that benefits both student and teacher. Training and professional development is crucial to the effective use of formative assessment strategies, both technological and non-technological, in the classroom. This professional



development cannot be a one-time session, nor will it be fully implemented in even one school year but must be looked at as a long-term investment. The importance of content-area focus and strategies that teachers can use immediately is an area that must be realized for implementation.

### **Teacher Training on Formative Assessment**

Teachers need training on formative assessment strategies in order to effectively implement them in their classrooms. Teacher training during their university studies is limited on assessment strategies, and most curriculum is tailored towards summative assessment needs, rather than formative assessment (Ashbacher & Alonzo, 2006; Phelan, et al., 2011; Randel et al., 2016). Teachers also need training on data collection, setting learning goals and targets, and how to adjust learning activities to meet the needs of the students (Ashbacher & Alonzo, 2006; Phelan, et al., 2011; Torrance & Pryor, 2001). Additional essential trainings that teachers need are in how to identify where learners are at in their learning, and in what steps are needed to bridge the gap of where they are at, and where they need to be (Hattie, 2012).

In one study, Bronx Community College (BCC) had a graduation rate of 16% with at least 90% if their incoming freshmen needing at least one remedial course (Akkaraju, et al., 2019). They knew that to improve their graduation rate, they would need to implement training for their instructors on using formative assessment in their teaching. They instituted a year-long professional development seminar for new faculty that emphasized using formative assessment in the classroom. New hires would be given a problem to address for their classrooms during their first semester of teaching and would prepare a potential solution which they would implement, and then report back to the group of new hires with data and reflection. During the next semester they would then either continue to refine their strategy or select a new one and report their data and progress at the end of the semester to the entire group again. As the program

has progressed over four years, 21% of the full-time faculty have participated and completed the program, and around 4,000 students each semester are taught by instructors that have completed this training. In one of the courses they used formative assessment strategies, they improved the passage rate from 60% to 83%, and 90% of the students who enrolled in the course stayed all the way until the end of the term (Akkaraju, et al., 2019).

### **Teacher Needs**

One of the biggest needs for teachers to use formative assessment in the classroom is targeted professional development that not only trains in the use of formative assessment practices, but also in the value of assessment for student learning (Ayala, et al., 2008; Fisher, et al., 2012; Heritage, 2007; Polly, et al., 2018; Shepard et al., 2018). The professional development must include activities or strategies that can be used in the classroom immediately, time to practice the activities, support for implementation and reflection, and extended time to coordinate and plan activities (Andersson & Palm, 2017b). Professional development must also focus on setting specific learning goals, collecting student evidence, and identifying instructional activities to fit student needs (Heritage, 2007; Poskitt, 2014). Professional development on formative assessment, when it is continuous, presents a positive mean effect size of .30 when compared to not providing professional development of 0.18 (Lee, et al., 2020). In one study involving 22 teachers in Sweden, teachers had significant time, 144 hours, to plan out, evaluate, and reflect on formative assessment activities with groups to flesh out these strategies for maximum effect (Andersson & Palm, 2018). The researchers found that teachers' motivation increased as they could see the strategies working in their classrooms, and that they could effectively see student thinking when compared to previous practices. The professional development also allowed teachers to have more agency on which activities they found had the

greatest value, and with the time given, allowed them to make these positive changes with the support and feedback to make it sustainable (Andersson & Palm, 2018).

Professional development with formative assessment also needs to be content specific so that teachers can see the entire assessment cycle from beginning to end (Lyon et al., 2018). In order to collect quality evidence of student understanding, questions that are rooted in content and context are needed for teachers to see how and what instructional steps need to be made as part of the cycle. In a study conducted with 202 high school mathematics and science teachers, over a period of two years with a professional development workshop to highlight formative assessment techniques and including monthly professional learning communities (PLC) meetings, there was a significant increase in the quantity and number of different activities that were used in these classrooms (Lyon, et al., 2018). The study also showed that between the two content areas, different formative assessment strategies were used depending on the content area, and it is thought that content specific tasks and activities can result in a quicker adoption of formative assessment in the classroom.

Teachers also need leadership, principals, and district administrators to know what formative assessment is and how it looks within a classroom (Heitin, 2015; Leong & Tan, 2014). Principals and school leadership not only provide evaluations on teacher practice, but they should be able to coach teachers on how to improve their teaching with student achievement as the focus (Moss et al., 2013). School leadership should be able to accurately identify what the learning targets are in each classroom, and immediately see student evidence to corroborate the practices. The leadership then should be able to give targeted and specific feedback to the teachers to help them improve, thus helping student achievement in the process (Moss et al., 2013).

## **Misconceptions**

One misconception with regards to professional development and formative assessment is that teachers will automatically see the benefit and quickly install these practices in the classroom. Like many individuals, teachers are reluctant to change, and can resist based upon a mental model with assumptions and convictions of teaching and learning that may be outdated (Lysaght & O’Leary, 2013). To overcome this, extended support and professional development is needed, not just one seminar or training.

There is also a misconception that formative assessment activities must produce a specific result and instead of providing insight into student learning, promotes achieving criteria, thus changing the assessment activity from being used ‘for learning’ and transforming it to ‘of learning’ (Ayala, et al., 2008; Egelandstad & Riese, 2020; Offerdahl & Tomanek, 2011). Researchers found that without providing guidance on how to use formative assessment strategies instructors would use them in a way that was more summative rather than formative. Three instructors were given a strategy of using reading questions, and while they could see the student thinking through the questions, they ended up using these as another way to judge learning and did not use them to adjust instruction or see where student learning was at as a whole (Offerdahl & Tomanek, 2011).

## **Teacher Training on Technology-Based Formative Assessment**

The use of technology with formative assessment can bring benefits, but also requires training in both technology and in crafting formative assessment at the same time. In order to realize the full benefit of technology-based formative assessments, teachers must not only feel comfortable with the underlying concepts of formative assessment, but they must also have a

positive attitude on using technology (Hsiao, 2012). Technology usage for teachers is based on their knowledge, expertise, and comfort, which means some teachers will need extra training with technology (Feldman & Capobianco, 2008). In one study, 30 seventh-grade math teachers in Hawaii participated in professional development where one group of teachers learned about formative assessment during the first year, and then the second year learned how to use the TI-Navigator system as part of a connected classroom with formative assessment. The second group of teachers were trained on formative assessment at the same time that they were also implementing the TI-Navigator systems in their classrooms (Yin et al., 2015). The results of this study showed that training on formative assessment before technology will produce higher acceptance of technology-based formative assessment strategies than by trying to combine the two together (Yin, et al., 2015). Technology training and teacher attitudes are a significant barrier to implementing technology-based formative assessments in the classroom (Hsiao, 2012).

### **Time and Cost Issues**

To successfully implement technology-based formative assessment in the classroom, it is imperative that not only is the professional development well-designed, but that it also include coaching, support, and time to work with the technology (Feldman & Capobianco, 2008; Yin, et al., 2015). Technology is also a major cost to school districts at a time where budgets are squeezed. In 2017, it was expected that school districts across the country would spend nearly \$1.6 billion dollars on assessment programs that included formative assessment (Molnar, 2017). The cost to purchase, train, and implement the technology can also cause a ripple effect where other services or programs lose funding or priority (Fisher, et al., 2012). This does not include the additional costs of batteries or power systems, inventory and tracking, and maintenance costs

which can increase the overall cost of the technology implementation after purchase (Demska, 2010).

### **Examples of Positive Professional Development on Formative Assessment**

One study, conducted by Andersson and Palm (2017b), not only showed significant improvement in mathematics scores between a pre- and post-test, but also showed how specific professional development could help teacher's assessment skills. In this particular case, 22 teachers were randomly selected to participate in professional development for formative assessment in Sweden. The study involved the professional development leader and the teachers meeting around six hours per week during one term, and then providing another 72 hours to plan and reflect on the strategies that they were learning and implementing in their classrooms. Most of the teachers used between eight and 34 formative assessment strategies during this study. The researchers also made sure to compare the teachers' formative assessment practices before they participated, during, and after. The researchers found that not only did the formative assessment strategies help, but that the teachers began to adapt instruction for both whole class, and individual students (Andersson & Palm, 2017a). The study showed that 21 teachers implemented mini whiteboards to elicit evidence of student learning, and 17 used exit passes or tickets at the end of the lesson to gain a glimpse of student understanding. Teachers also developed their feedback strategies for students during this time as well. They became more aware of their feedback and used the awareness to structure in positive ways but to also inform the students better about their work. Several of the teachers saw the increased information they received as a guidepost to adapt lessons to accurately meet student learning needs. Students within these classrooms also found more agency to find and use peer support and promote positive self-regulation (Andersson & Palm, 2017a). Additionally, the students whose teachers participated in

this study achieved more proficiency on the posttest for both procedural skills in math, but also application of skills when compared to a control group (Andersson & Palm, 2017b). Teachers can gain not only better assessment knowledge, but it can also help students in their learning.

A study conducted by Furtak et al. (2018) also found that professional development for formative assessment produced positive results in student achievement and in teacher efficacy within a science unit. This study used data from seven high school teachers over a period of four school years. The teachers came from two high schools who had similar types of students; majority in both schools were Caucasian, and the next largest group of students were of Hispanic origin. Both schools have at least a quarter of its students qualifying for free and reduced lunch. For three school years, the researchers conducted monthly professional development at each school site, meeting each time for 60-90 minutes. All meetings or trainings were conducted during the teachers' preparation periods or during the school day. The results of the study show an increase in student achievement when analyzing pre-posttest scores, with larger gains over the last two years of the study. The professional development provided teachers with time and knowledge to prepare formative assessment tasks that would increase student achievement.

### **Professional Development Concerns and Focus**

The amount of scaffolding that may need to be done to increase the pedagogical content knowledge of using formative assessments may be higher than is presently possible with professional development (Falk, 2012). There is also a concern that district, and school leadership may not produce enough buy-in or productive implementation to sustain formative assessment practices without significant monetary resources (Fisher, et al., 2012; Gewertz, 2010; Heritage, 2007). The limited time that teachers have to participate in professional development and apply the lessons to their own practice can prevent implementation without a reduction in

duties (Andersson & Palm, 2017a; Feldman & Capobianco, 2008; Poskitt, 2014). There is also a concern that as teachers learn about the formative assessment process and work to implement these new strategies into their teaching, that the teacher evaluation process will be tougher as these strategies are gradually implemented (Heitin, 2015). One last major concern is that the professional development and strategies that are used by a district or school may still produce positive results for teacher self-efficacy or higher rates of student participation, but not for student achievement (Randel, et al., 2016). This could have a significant effect on future professional development or the assessment views for teachers.

### **School/District Leadership and Formative Assessment**

In order for formative assessment to work within a school setting, leadership must not just be supportive, but must value and understand the importance of these strategies for not just sound teaching practice, but also for student achievement. Leadership must be prepared to invest time, money, and professional development into technological resources to aid in expanding teachers' pedagogy and must take an active role in its implementation. Leadership should also know what sound formative assessment looks like from a teacher and student standpoint and be willing to help mentor teachers as they work to use this in the classroom. School and district leadership also needs to work to mitigate any external factors that might inhibit the use of formative assessments by teachers.

### **Leadership Values/Views on Technology**

School leaders are not just the educational foundation for the success of schools but are now increasingly leaders towards the implementation of technological tools for learning (Chang et al., 2008). Responsible leadership with technology will identify the connections with technology, the vision and mission of the school, and educational goals (Chang et al., 2008;



McLeod, 2015). It is important that school leaders convey to all stakeholders the importance of the technology to the school's mission to provide a framework for the successful implementation and lessen any anxiety that might be present (Persichitte, 2013; Raman & Shariff, 2017).

As technology has the ability to promote deeper thinking and problem solving, this does not mean that school leadership has to be skilled in the usage of technology, but that they provide meaningful professional development and support to promote the advancement of student learning (McLeod, 2015). This means that the decision to implement any technology must focus on balance, preparation, education of all those involved to overcome resistance and pitfalls that can occur with any new tool (Persichitte, 2013). The instructional component of educational technology should be the main focus, as it is a means to an end. Leadership that views technology differently runs the risk of losing the main feature that it is designed to do, help student learning (Webster, 2017).

### **Role of Leadership on Implementation**

The role that the school or district leadership plays with implementation of effective formative strategies cannot be understated. It is important that in order to strengthen the practice of formative assessment, leadership must obtain deep content knowledge, understanding of concepts, and pedagogical content knowledge for their teachers (Al-Wassia et al., 2015). In order to obtain the knowledge needed for the effective implementation of formative assessment, opportunities must be provided for training, professional development, collection of data, and planning of subsequent activities for the growth of learners (Aschbacher & Alonzo, 2006; Al-Wassia, et al., 2015; Ayala, et al., 2008).

Before formative assessment strategies can be effectively implemented, leaders must not only have a good pedagogical grasp of formative assessment, but they must also be able to

identify it in different contexts to be the support that is needed for teachers. It is essential that instructional leaders to understand formative assessment in order to model and coach teachers properly to increase student achievement (Davies et al., 2014). To help teacher self-efficacy with formative assessment, increasing cooperative leadership is one way to increase the connection of the culture of a school and the strategic planning that is desired (Arbabi & Mehdinezhad, 2015). Responsibility must be distributed with leadership and teachers to ensure proper implementation. This does not mean that the leaders give up control; it means that leaders must model, and hold themselves accountable as well as teachers (Davies, et al., 2014). School leaders will also distribute the leadership towards instructional coaches that may have greater knowledge and can help with continuous improvement and building the buy-in for the entire staff (Crawford et al. 2017; Leong & Tan, 2014). Singapore has begun to use teachers as coaches and worked to make time for teachers to work on activities that produced student-centered results with formative assessment practices (Leong & Tan, 2014). Scotland, through one educational authority, the Highland Council, also supported distributed leadership when deciding leadership roles and found that the leaders positively worked to implement the instructional methods of formative assessment (Wallace & Priestley, 2011).

Understanding the pedagogy behind formative assessment will also help school leaders be able to provide specific feedback to teachers to help improve their practice. Most school principals and leaders can identify which teachers are effective and which are not. However, the issue lies in distinguishing the quality for those teachers in the middle, and what steps can be done to help them with the capacity and efficacy (Blitz & Modeste, 2015). These conversations with teachers will be deeper and richer if principals and leadership know about how formative

assessments work so they will know what is occurring in their classrooms (Brookhart & Moss, 2013; Davies, et al., 2014).

A project took place during the 2009-2010 school year where administrators met monthly to receive professional development on formative assessment and then to lead that same professional development for teachers (Brookhart & Moss, 2013). The main focus was on only two elements of formative assessment, shared learning targets and effective feedback. The professional development that the principals used involved videos, self-study packets, and conversations with individuals and groups of teachers. Most of the principals believed that their teachers were already using formative assessment in the classroom. However, it was found that while formative assessment was used, it was not implemented properly. Based on their training, the principals were able to provide specific feedback and suggestions that would help teachers with their practice. “Teachers are expected to provide students with specific feedback, and the principals realized the same recommendations applied to their feedback to teachers” (Brookhart & Moss, 2013, p. 14). School leadership must know and learn about formative assessment if they are to know what students are learning in the classrooms. Principals must be the lead learner must know what learning looks like at deep levels. Principals that relinquish this responsibility will have a tough time building a pervasive learning culture within a school (Brookhart & Moss, 2013).

There is an expectation that teachers must have clear instructional goals, communicate to students effectively, use appropriate instructional materials, and make sure that the needs of the students are met. The leadership of the school is central to achieving this. Leaders who are effective not only promote accountability, but provide high-quality professional development, necessary materials, and access to knowledge or pedagogy that will improve their teachers’

instructional skills (Goldring et al., 2009; Halverson et al., 2014; Heritage, 2007; Poskitt, 2014). Effective leaders are also monitoring the professional development and assessing student learning consistently to see if the practices are matching the outcomes (Fisher, Frey, & Nelson, 2012). Engagement of the leaders with staff can lead to a positive learning culture that will place the focus of formative assessment on student learning, rather than meeting outside standards or goals (Guetterman & Mitchell, 2016).

It is important to note that there are some obstacles that leadership must overcome in order to effectively implement formative assessment practices. Leadership must have a strong knowledge of curriculum, instruction, and assessment (Brookhart & Moss, 2013). As teachers move up to become school leaders, including principals, their training does not ensure that they are capable of analyzing the instruction of another teacher, recognizing, and helping improve classroom instruction, and implementing curriculum (Hallinger & Murphy, 1987). Another major obstacle is the time needed, amongst all of the duties leadership must perform in a school, to plan and assess curriculum, observe, and conference with teachers about instructional practices (Hallinger & Murphy, 1987).

### **Values/Culture of School/District**

The values or culture of a school or district can make implementation of formative assessment strategies easy or challenging. The leadership of a school whose strategy is pointing the way forward for staff and students will work to embed evidence-based practices to collect and look at student data to make appropriate decisions (Quong & Walker, 2010). Values that embrace a growth mindset and look deeply at the pedagogy will help to ensure that formative assessment practices are not just implemented but sustained (Akkaraju, et al., 2019). Knowing that implementing these practices are not just time consuming but can also force teachers outside

of their comfort zone, it is important that the leadership of the school support the teachers with the appropriate resources and training (Atjonen, 2014; Blitz & Modeste, 2015).

One school district, Chula Vista, realized that instructional materials on their own will not be enough to provide lasting, and effective growth (Fisher, et al., 2012). It took leadership, from the district office, down to the individual teachers, to make new instructional practices work for improving student learning. This was also an approach that was expected to take years to embed as part of the district culture. Throughout the process, the gains for students did not have a linear growth pattern but comprised of starts and stops with steps forward and backward at times. The district valued targeted professional development and with the teachers created an instructional framework for English Language Arts that would focus on student learning, rather than the use of curriculum. Over the ten years of the study, the overall API growth for the district went from 689 to 861. Percentages of students that performed proficient or advanced increased from 29.5% to 72.3% by the end of the study, and similar increases were also found in all of the district's subgroups as well (Fisher, et al., 2012). The API, or Academic Performance Index, was used by California to show how a school was performing on the state standardized tests. The scores that a school could received were on a scale from 200 to 1000, with 800 as the main target. Each year, a school would have a base score, and a target score, with the ultimate goal for each school to reach or exceed 800 (Education Data Partnership, 2013).

In order to increase faculty support for effective change, school leadership and faculty leaders must work together to not only foster buy-in from reluctant teachers, but to also help teachers make sense of the changes that are needing to be made (Guetterman & Mitchell, 2016). Productive change is ensured not only when leadership is supportive and engaged with teachers, but also when teachers are empowered to make the changes that fit their teaching, but also know

how to evaluate and reflect appropriately for student learning (Wallace & Priestley, 2011).

Cooperative leadership will not only reduce resistance, but increase the efficacy of teachers, and also the positive effect of heightened student learning (Arbabi & Mehdinezhad, 2015).

### **External Factors**

The use of formative assessments effectively within the classroom is based on a few priorities. The primary challenge is to gather data, analyze it, and then make changes to instruction promptly (Shirley & Irving, 2015). According to Bhagat and Spector (2017), "Timely and informative feedback is essential for formative assessment to be effective, although the amount and timing of feedback should be appropriate for a particular learner" (p. 312). Effectiveness of formative assessment is also based on clear expectations and goals that the instructor has set out, so when feedback is provided, it relates back to the overarching context of the learning (Hattie, 2012; Akkaraju et. al., 2019). High-quality feedback is critical to formative assessment since it psychologically has positive effects and is important towards motivation to complete tasks (Hattie, 2012; Karay et al., 2012; Ozan & Kincal, 2018). Instructors also find that conducting formative assessments can be difficult to use due to the time it takes to gather, aggregate, and analyze the data in a manner that can drive instruction efficiently and effectively (Lee et al., 2012; Phelan et al., 2011). Another issue that instructors may have is that using formative assessment means that teachers must be aware of all the ways that students may learn the material, but also how they might have problems grasping topics, and know of alternative methodologies that can be implemented quickly to help those that need help (Hunt & Pellegrino, 2002; Hattie, 2012). Any delay in feedback can cause problems with learning, especially in classes where information is learned in sequence, like math and science classes (Irving, 2006).

Instructional changes are usually put off until there is time to implement new ideas, and usually that is with a different set of students. (Filer, 2010)

Formative assessments should provide instructors with a door into not just what and how students think, but also diagnose where there may be gaps in their knowledge, misconceptions, and academic needs that must be addressed for the student to be successful (Hunt & Pellegrino, 2002; Irving, 2006). Although the formative assessment data should provide immediate feedback, it is crucial that this fosters discourse and student engagement, and should be non-threatening (Irving, 2006). Ideally, according to Hunt and Pellegrino (2012), “A formative assessment program should provide a continuous inventory of a class’s educational status, taken during ongoing activities, just as a bar code system provides a continuous, unobtrusive inventory in a large store” (p. 75). Teachers who use formative assessments correctly know where their student’s strengths and weaknesses are and adapt their teaching to meet the needs of each student effectively.

### **Summary**

The relationship between the values of school leadership and the effective implementation of formative assessment strategies have been presented through the theories and research outlined in this chapter. Formative assessment has been identified as a key instructional strategy that can dramatically improve student achievement and motivation when used properly. Formative assessment provides an opportunity to provide timely feedback to both teachers and students that can promote the achievement of academic goals. Feedback, which is an essential part of formative assessment practice, provides both students and teachers the information needed to adjust their learning or teaching to meet these goals. On its own, formative assessment

strategies used effectively will prevent the loss of instructional time in the classroom and can serve to increase the motivation of students.

Technology-based formative assessment works to provide this information and feedback in a quicker cycle to prevent less loss of instructional time, and to quickly reduce gaps in knowledge. The use of technology can also increase the meaningful feedback between teacher and student since technology can also be used outside of the classroom. This level of social communication can increase the time that teacher and student are in the Zone of Proximal Development as defined by Vygotsky (1978). Teachers with technology can help guide students within the zone much more effectively than without it.

In order to realize these potential benefits, training and professional development need to be prioritized by school leadership to implement these strategies. This professional development must work to develop a teacher's pedagogical content knowledge, and assessment beliefs (Falk, 2002). Leadership that values this will provide adequate time for training for both teachers and administrators so that effective feedback can be provided to teachers about their own practices (Moss, et al., 2013).

This research study demonstrates that the values and priorities of school leaders when implementing technology-based formative assessments has the potential to increase teacher efficacy and ultimately student achievement.



## CHAPTER 3: METHODOLOGY

The primary goal of this study was to test the research questions related to technology-based formative assessment, role of teachers and administrators in the implementation of technology-based formative assessment, professional development and its effectiveness, and external factors with formative assessment as noted in Chapter 1. Both quantitative and qualitative measures were used to operationalize these variables. The methodology to assess the research questions is outlined in this chapter. The chapter that follows is organized into categories of research design and rationale, setting and participants, sampling procedures, instrumentation and measures, reliability, validity, data collection, data analysis, narrative structure, and ethical issues.

### **Research Design and Rationale**

This purpose of this mixed-methods case study was to examine the role of administrators and teachers in promoting technology-based formative assessment, the effectiveness of professional development from teachers' perspective, instructional decisions that are made with technology-based formative assessment by teachers, and the external factors that could help or inhibit the adoption and/or effectiveness of technology based formative assessment from an administrative perspective. Quantitative and qualitative data was used for triangulation of the study's results. To study the quantitative side a correlational research design was used, while a case study design was implemented for the qualitative side.

The following research questions were used to guide this research and explore the relationship between teachers and administrators regarding the implementation of technology-based formative assessments:

1. What is the relationship between school leadership and the successful implementation of technology-based formative assessments?
2. What is the relationship between professional development and successful implementation of technology-based formative assessments?
3. What is the relationship between formative assessments and instructional decisions made by teachers?
4. What is the relationship of external factors that influence the effectiveness of school leadership to implement technology-based formative assessments?

### **Setting and Participants**

This study's sample of 31 teachers, and 5 administrators come from a 9-12 grade high school in Central California. The city that the school belongs to is a primarily residential community nestled at the southern end of the San Joaquin Valley, in Kern County. According to the United States Census Bureau (2019), the population of the city is estimated to be around 384,000, which has increased 9.4% since 2010, when the population was counted at 347,483. The racial makeup of the city, by percentage, is as follows: 50.2% Hispanic; 32.5% Caucasian; 7.6% African American; 7.4% Asian; 0.9% American Indian; 0.2% Hawaiian; and 1.2% other, or not listed. More than 80% of the people 25 years or older have a high school diploma, whereas only 21.9% have a bachelor's degree or higher in the same age range.

The U.S. Census (2019) estimates that in 2019 there are 117,050 households with an average of 3.19 people per household. The median household income in 2019 was \$63,139, with the median price of a house at \$247,400. Only 59% of the households in the city occupy single-family homes though. The city does have a poverty rate of 17.4% and 41.6% of the people in the city speak a language other than English spoken in their home for ages five and up.

The school has over 2,400 students enrolled in grades 9-12. The population of the school makes it one of the largest schools in the district. The population makeup of the school is as follows: 84.8% Hispanic; 6.1% Caucasian; 5.6% African American; 2.2% Asian; 0.4% American Indian; 0.4% Filipino; 0.2% Hawaiian. The student body also features these characteristics: 89.8% are considered socioeconomically disadvantaged; 6.6% are English Learners (EL), and 10.3% are in special education.

### **Sampling Procedures**

In order to gain a high participation rate, the researcher requested participation from as many teachers and administrators as possible from the one Central California school. To this end, the researcher used purposive sampling as all of the administrators and teachers all worked for the school and district. To protect the privacy of the participants and the integrity of the study, the name of the school or any participants will not be used.

### **Instrumentation and Measures**

Two instruments were used to provide data to answer the research questions on the implementation of technology-based formative assessment. The first instrument, the survey, which was administered to both administrators and teachers, was created by modifying questionnaires from two student dissertations entitled, “Teachers Valuation and Implementation of Formative Assessment Strategies in Elementary Science Classrooms” (Jett, 2009), and “The Relationship Between Formative Assessment and Teachers’ Self-Efficacy” (Eufemia, 2012). The researcher modified some questions so they could be used with perspectives from administrators which were not present in the questionnaires from the dissertations. The Formative Assessment Initial Survey for Teachers (Appendix A) consists of 14 quantitative questions that ask the participant to state their responses by choosing: *Completely Agree, Agree,*

*Sometimes, Disagree, Completely Disagree*. One question asked participants to provide a numerical answer. The survey also included three qualitative questions to allow the researcher to determine the personal views of the participants, and cross-tabulate consistencies and differences between teachers and administrators. The Formative Assessment Initial Survey for Administrators (Appendix B) consist of nineteen quantitative questions that ask participants to choose between: *Completely Agree, Agree, Sometimes, Disagree, Completely Disagree*. Fourteen questions followed this format, with one question having responses: *Consistently, Often, Sometimes, Occasionally, Never*, and four questions with responses: *Not at all, Little Impact, Some Impact, Moderate Impact, Impacts Greatly*. This survey also included three qualitative questions to determine the personal views of the participants and to highlight similarities and differences with teachers and administrators.

Semi-structured questions were also modified from the same dissertations and used as the second instrument, the individual interviews. This was a qualitative instrument as it provided narrative data for the case study being analyzed. The individual interviews (Appendix G) consisted of 20 teachers and three administrators responding to 13 questions. Participant selection for both teachers and administrators were based on those who agreed to participate in the interviews or focus groups at the end of the initial survey. The interviews were recorded using an online platform called Zoom and were later transcribed. The table below (Table 1) shows the basics of each instrumentation the researcher used.

**Table 1***Research Questions and Potential Survey Questions*

Research Question	Quantitative	Qualitative
What is the relationship between school leadership and the successful implementation of technology-based formative assessments?	<p>Admin and Teacher Survey</p> <p>Example (admin): How often do you ask teachers about formative assessment practices?</p> <p>Likert Scale: 1-never – 5-consistently</p> <p>Example (teachers): How often does admin communicate to you about formative assessment in the classroom?</p> <p>Likert Scale: 1-never – 5-consistently</p>	<p>Semi-structured interviews with both administrators and individual teachers</p> <p>Sample (admin): Where do you see good formative assessment practices at this site?</p> <p>Sample (teachers): How does admin promote formative assessment for your practice?</p>
What is the relationship between professional development and successful implementation of technology-based formative assessments?	<p>Admin and Teacher Survey</p> <p>Likert Scale</p> <p>Example: Professional Development in formative assessment is effective towards implementation in the classroom.</p> <p>Likert Scale: 5 - Completely Agree, 4 - Agree, 3 - Sometimes, 2 - Disagree, 1 - Completely Disagree</p>	<p>Semi-structured interviews with both administrators and individual teachers</p> <p>Sample (admin): Do you feel that professional development helps teachers to use technology-based formative assessments in the classroom?</p> <p>Sample (teachers): Do you receive professional development to successfully implement formative assessment strategies in the classroom?</p>
What is the relationship between formative assessments and instructional decisions made by teachers?	<p>Teacher Survey</p> <p>Likert Scale</p> <p>Example: Formative assessment data drives instructional decisions in my classroom.</p> <p>Likert Scale: 5 - Completely Agree, 4 - Agree, 3 - Sometimes, 2 - Disagree, 1 - Completely Disagree</p>	<p>Semi-structured individual interviews with teachers</p> <p>Sample (teachers): How often does formative assessment drive instructional decisions in your classroom?</p>
What is the relationship of external factors that influence the effectiveness of school leadership to implement technology-based formative assessments?	<p>Admin Survey</p> <p>Likert Scale</p> <p>Example: How much does budgeting play an impact in adopting technology based formative assessment?</p> <p>1-not at all to 5 – impacts greatly</p>	<p>Semi-structured individual interviews with administrators</p> <p>Sample (admin): What issues do you find that influence the purchase of technology or professional development for formative assessment?</p>

## **Reliability**

To address reliability, the researcher looked to creating a strong intercoder agreement. With the researcher's chair, and another colleague, the researcher individually, and as a group, examined the codes and came to an agreement on at least 80-90% of the passages that are checked together (Creswell & Poth, 2018). An agreement from multiple sources helps with the reliability of the interpretation and results. Reliability was also enhanced with the transcriptions of all of the interviews and focus groups and detailed notes taken regarding body language, tone of voice, and other non-verbal communication that provided extra data. The recordings and transcriptions were viewed by all coders in order to come to an agreement and provide the extra reliability for the study. Lastly, to ensure reliability of the quantitative instruments, a Cronbach's Alpha test was run in SPSS against the teacher and administrator survey. A level of reliability of .70 was used, which is a generally accepted value.

## **Validity**

In order to promote validity, the researcher obtained responses from both teachers and administrators and triangulated the results into themes that were developed from the data. At the end, the researcher will be able to display these themes through generalizability (Thomson, 2011, p. 79). The goal was to come up with themes on the abstract level that can be applied to a larger audience, i.e., external generalizability, while looking at the situation within the participants, i.e., internal generalizability (Thomson, 2011, p. 79).

Another way that the researcher worked to promote strong validity is through descriptive validity. In order to develop the connections and themes for this, the researcher must accurately describe the experiences, and thoughts of all of the participants (Thomson, 2011, p.78, Maxwell, 2013, p. 126). During the interviews, the researcher not only paid close attention to what was

said, but also take into consideration tone, inflection, and body language of the responses. Then the researcher described everything in great detail in order to provide rich data to be used to develop the themes.

Addressing validity also means to corroborate the data with triangulation. The researcher will be using different sources of data (surveys and interviews) from potentially two distinct populations. The quantitative surveys and interviews used instruments that had been previously used by other researchers and were already proven to be valid instruments for the purpose of survey and interview questions. Validity should be increased with this type of triangulation (Creswell & Poth, 2018). Lastly, all interviews were recorded, transcribed, and member checks were conducted to confirm all narrative data was accurate.

### **Data Collection**

Data collection for this study was broken up into two parts. The first part was the administration of the quantitative survey to both teachers and administrators to create a baseline for the data, and to identify participants for the second phase of the study. The second part was the execution of the individual interviews with selected teachers and administrators. Each interview was recorded as part of a Zoom meeting. At the conclusion of each interview, a transcription of the interview was sent to each participant as a check for accuracy. Reliability for the study is increased with member checking. All individual interviews consisted of semi-structured questions that were open-ended, and the opportunity for follow-up questions was utilized. During these interviews, respondents were asked for any artifacts or examples of formative assessments that could be submitted to verify their responses.

### **Data Analysis**

During the analysis of this study, descriptive and inferential statistics, along with domain analysis were used. The software used for the quantitative statistics was SPSS. In order to analyze the quantitative data collected, descriptive and inferential statistics were calculated. Descriptive statistics such as measures of central tendency and measures of variability were calculated. This includes calculations such as frequency distribution percentages, mean, median, and mode, and variability measures such as range and standard deviation.

Pearson  $r$  correlations were conducted for statistical data analysis between the two separate groups. Correlations that had an absolute value above .70 were considered to be strong, while those between .30 and .70 were considered to be moderately correlated. Statistical analysis of the quantitative data was used to see if there were any associations or correlations between multiple groups such as teachers and implementation of formative assessment, administrators and implementation of formative assessment, teachers and targeted professional development for formative assessment, and administrators and targeted professional development for formative assessment. Analysis was also conducted to measure associations with teachers and the use of data from formative assessment, and any external factors that administrators dealt as a factor in implementing technology-based formative assessment. To measure statistical significance, an alpha level of  $p < .05$  was used for all tests of significance.

All narrative data was analyzed with transcripts of each interview or focus group and open-ended responses. Included in this process is the analyzation of the field notes that the researcher took during the interviews and focus groups. All transcripts of interviews and focus groups were sent to participants to check for accuracy. Coding of the qualitative data was then performed by the researcher using MAXQDA and used axial coding procedures to start. Once



the researcher and coding team agreed on a codebook, this was used for the selective coding process to bring out the themes from the interview and focus group data. Figure 2 illustrates the steps taken for coding

**Figure 2**

*Steps for Coding*



### **Narrative Structure**

The qualitative data for this study was conducted through the approach of a case study. Thus, the narrative structure also followed the writing structure of a case study. A case study can be looked at as the study of an object and a product of inquiry (Creswell & Poth, 2018). The goal of this research is to understand how each set of individuals is experiencing this process and what common and divergent themes are present overall (Creswell & Poth, 2018). The researcher collected data through surveys for both teachers and school leadership, and through multiple interviews and focus groups with both sets. The intent of this study was to understand the

problem with the implementation of technology-based formative assessments from multiple cases, making for an instrumental case (Creswell & Poth, 2018).

### **Ethical Issues**

For all participants, to address ethical issues, complete informed consent was necessary for all methods; the initial survey and individual interviews. Each individual response was protected with privacy and confidentiality. All data, whether online or hard copy will be secured. All online data, including video and audio recordings, survey answers, and electronic artifacts will be secured in an encrypted file. Any hard copy documents will be stored in a locked cabinet. No individual identities will be used, and any data will be presented in aggregated form. Lastly, to ensure that the privacy and protection of the participants were secured after the completion of the study, any confidential information was stored for three years and then destroyed.

### **Summary**

This study looked to show a positive relationship between technology-based formative assessments, professional development, and implementation with educational leaders. To this end, a correlational research design was used to analyze the quantitative instruments and data and a case study design was used to analyze the qualitative instruments and data. Participants for the study included teachers and administrators that work at a public high school in Central California. The methodology of the study included surveys and interviews to operationalize the use of technology-based formative assessments, the effect of professional development on implementation, and the effect of school leaders and administrators in the formative assessment process. The subsequent chapters will provide the analysis of the quantitative and qualitative data. While studies have looked at formative assessment in great detail, the study of professional development with the effect of administrators has not been conducted to this

extent. The goal of the study is to inform and make aware of the impact technology-based formative assessment, targeted professional development, and the effect school leadership has on the implementation of formative assessments and the potential educational benefits it may have for all students.

## CHAPTER 4: FINDINGS

The purpose of this correlational case study was to explore the relationship between leadership, professional development, and the implementation of technology-based formative assessment. Quantitative data was gathered through a Likert survey for both teachers and administrators. Qualitative data was gathered through open-ended questions on the Likert survey, and through individual interviews. Descriptive statistics for the participants, both teachers and administrators will be provided first. For each of the four hypotheses, statistical analyses including correlational analyses will be provided at the beginning followed by non-statistical analyses that will include the themes or patterns that emerged.

Before proceeding with the findings, it is important to note key definitions as they were defined in this study. Formative assessment is defined by Aschbacher and Alonzo (2006) as, “[Formative assessment’s] purpose is to determine what the student understands and why, so that teaching and learning may be optimized. Formative assessment can be formal or informal and includes eliciting, analyzing, and responding to information about student understanding” (p. 180). Professional development is defined by The Glossary of Education Reform (2014) as “...professional development may be used in reference to a wide variety of specialized training, formal education, or advanced professional learning intended to help administrators, teachers, and other educators improve their professional knowledge, competence, skill, and effectiveness” (para. 1). Lastly, feedback is defined by Atjonen (2014) as, “Feedback should follow a three-way path: from pupils to teacher so that the teacher can understand the pupils’ level of understanding; from teacher to pupils... or extends the pupils’ ideas and from pupil to pupil” (p. 243). This correlational case study sought to answer four research questions: 1) What is the relationship between school leadership and the successful implementation of technology-based formative

assessments?, 2) What is the relationship between professional development and successful implementation of technology-based formative assessments?, 3) What is the relationship between formative assessments and instructional decisions made by teachers?, and 4) What is the relationship of external factors that influence the effectiveness of school leadership to implement technology-based formative assessments?

## **Subjects**

The participants in this study included a total purposive sample of thirty-one teachers and five administrators from one Central California high school. Both teacher and administrators participating in this study were given the opportunity to participate through informed consents that were signed by each individual. The demographics of the teachers that participated included 38.7% (12) males and 61.3% (19) females, which is typical within the educational field as there is a higher percentage of women than men. The number of years represented in the teaching profession is as follows with 12.9% (less than 1 year), 12.9% (1 – 5 years), 29% (6 – 10 years), 22.6% (11 – 15 years), and 22.6% (20+ years). The range of subjects represented by teachers is as follows with 48.4% in Mathematics, 19.4% in English, 9.7% in Science, 6.2% in Social Studies, 6.2% in Special Education, 3.2% in Foreign Language, 3.2% in Fine Arts, and 3.2% in Title I and Migrant Program Coordinator. The ethnicity of the teachers who participated is represented by 54.8% (White/Caucasian), 38.7% (Hispanic/Latino), and 6.5% (Asian/Pacific Islander). The highest educational degree achieved by teachers is represented with 64.5% (MA/MS), and 35.5% (BA/BS). The number of times that formative assessment is used in each classroom by teachers on a weekly basis is represented with 48.4% (1 – 3 times per week), 19.4% (4 – 6 times per week), 6.5% (7 – 9 times per week), 22.6% (10+ times per week), and 3.2% (Not Applicable). Participant demographic and characteristics for teachers are summarized

in Table 2.

**Table 2**

*Demographic and Characteristic Data for Teachers (n=31)*

Characteristic	Count	%
Gender		
Male	12	38.7
Female	19	61.3
Years in Teaching Profession		
< 1 Year	4	12.9
1–5	4	12.9
6–10	9	29
11–15	7	22.6
20+	7	22.6
Subject Taught		
Mathematics	15	48.4
English	6	19.4
Social Studies	3	9.7
Science	2	6.2
Foreign Language	1	3.2
Fine Arts	1	3.2
Special Education	2	6.2
Title I, Migrant Program Coordinator	1	3.2
Ethnicity		
White/Caucasian	17	54.8
Hispanic/Latino	12	38.7
Asian/Pacific Islander	2	6.5
Highest Educational Degree		
MA/MS	20	64.5
BA/BS	11	35.5
Formative Assessment – times used per week		
1-3	15	48.4
4-6	6	19.4
7-9	2	6.5
10+	7	22.6
Not Applicable	1	3.2

The demographics of the administrators that participated in this study included 40% (two) males, and 60% (three) females. The number of years as an administrator is given by 20% (less than 1 year), 20% (1 – 5 years), 20% (6 – 10 years), and 40% (11 – 15 years). The subjects that

the administrators taught while a teacher are 40% (English), 20% (Social Studies), 20% (Science), and 20% (Physical Education/Special Education). All five administrators (100%) are ethnically represented as White/Caucasian, and all five (100%) have a MA/MS as their highest degree achieved. Participant demographic and characteristic data are represented in Table 3.

**Table 3**

*Demographic Data for Administrators (n=5)*

Characteristic	Count	%
Gender		
Male	2	40
Female	3	60
Years as an administrator		
< 1 Year	1	20
1–5	1	20
6–10	1	20
11–15	4	40
Subject Taught as a teacher		
English	2	40
Social Studies	1	20
Science	1	20
Physical Education/Special Education	1	20
Ethnicity		
White/Caucasian	5	100
Highest Educational Degree		
MA/MS	5	100

### **Findings for Hypothesis One: Relationship Between School Leadership and Implementation of Technology-Based Formative Assessment**

#### **Statistical Findings**

The first hypothesis stated that there is no relationship between school leadership and the successful implementation of technology-based formative assessments. A Likert scale was first analyzed using descriptive statistics.

Eight questions on the online survey completed by teachers that were related to the first

hypothesis were sorted by mean, with the highest responses being first and the lowest being last. The ratings are based on a 5-point scale with six questions using: 1=Completely Disagree, 2=Disagree, 3=Sometimes, 4=Agree, 5=Completely Agree. One question used a 5-point rating scale with: 1=Never, 2=Occasionally, 3=Sometimes, 4=Often, 5=Always, and one question used a 5-point rating scale with: 1=Not at all, 2=Little Impact, 3=Some Impact, 4=Moderate Impact, 5=Impacts Greatly. The highest rated questions were question 12, “Formative assessment is something that my administration encourages or requires the use of ( $M=3.85$ )” and question 23, “How much does the culture of the school affect the implementation of technology-based formative assessment in your own classroom? ( $M=3.75$ )”. The lowest rated questions were question 11, “The administration communicates with me about formative assessment in the classroom ( $M=2.69$ )” and question 14, “Administrators can demonstrate the use of technology-based formative assessments and data effectively ( $M=3.08$ )”. Mean and standard deviation data related to school leadership and implementation of technology-based formative assessments is depicted in Table 4.



**Table 4***(M) Means and (SD) Standard Deviations of the 8 Survey Questions for Teachers (n=31)*

Teacher Responses <i>n</i> = 31	<i>M</i>	<i>SD</i>
Q12. Formative assessment is something that my administration encourages or requires the use of.	3.85	0.76
Q23. How much does the culture of the school affect the implementation of technology-based formative assessment in your own classroom?	3.75	0.84
Q20. I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom.	3.46	0.95
Q10. Technology-based formative assessment is something that my colleagues currently use.	3.41	0.62
Q13. Formative assessment practices are considered as part of the evaluation of my teaching practice.	3.30	1.04
Q15. I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject.	3.09	0.90
Q14. Administrators can demonstrate the use of technology-based formative assessments and data effectively.	3.08	0.83
Q11. The administration communicates with me about formative assessment in the classroom.	2.69	0.80

As shown in Table 5, Table 6, and Table 7, the percentages of teacher responses ranged based on the type of question that was asked. The highest level of positive feelings (completely agree and agree) were found on three questions. The first was on the question relating formative assessments and the requirements from the administration to use it, with 51.6% stating agree, and 19.4% stating completely agree. The second was on the question relating formative assessment practices and the evaluation of teaching by administrators, with 51.6% stating agree, and 6.5% stating completely agree. The third survey item with positive feelings was related to the need for

professional development to be spread over time for comfortableness with technology-based formative assessments, with 48.4% stating agree, and 9.7% stating completely agree. On one question regarding the communication from administration and formative assessment there were mixed feelings with 58.1% stating sometimes, 22.6% stating occasionally, and 9.7% stating never. On one question regarding the impact of school culture and the implementation of technology-based formative assessments, 35.5% stated a moderate impact, and 22.6% stated culture impacts greatly.

**Table 5***Frequency - Likert Survey: Hypothesis One (n=31)*

Likert Item	Completely Agree		Agree		Sometimes		Disagree		Completely Disagree	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Technology-based formative assessment is something that my colleagues currently use.	1	3.2	12	38.7	17	54.8	1	3.2	0	0
Formative assessment is something that my administration encourages or requires the use of.	6	19.4	16	51.6	9	29	1	3.2	0	0
Formative assessment practices are considered as part of the evaluation of my teaching practice.	2	6.5	16	51.6	8	25.8	6	19.4	2	8.5
Administrators can demonstrate the use of technology-based formative assessments and data effectively.	1	3.2	8	25.8	16	51.6	6	19.4	1	3.2
I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject.	1	3.2	11	35.5	9	29	10	32.3	0	0
I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom.	3	9.7	15	48.4	9	29	4	12.9	1	3.2

**Table 6***Frequency - Likert Survey: Hypothesis One (n=31)*

Likert Item	Never		Occasionally		Sometimes		Often		Always	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
The administration communicates with me about formative assessment in the classroom.	3	9.7	7	22.6	18	58.1	4	12.9	0	0

**Table 7***Frequency - Likert Survey: Hypothesis One (n=31)*

Likert Item	Not at All		Little Impact		Some Impact		Moderate Impact		Impacts Greatly	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
How much does the culture of the school affect the implementation of technology-based formative assessment in your own classroom?	0	0	1	3.2	13	41.9	11	35.5	7	22.6

A Cronbach's Alpha analysis was run to determine a scale of reliability (see Table 8).

Generally speaking, reliability between 0.60 and 0.80 is considered acceptable, and it was determined that for this hypothesis the Likert survey questions were reliable a .654.

**Table 8**

*Cronbach's Alpha: Likert Survey - Hypothesis One (Teachers)*

Cronbach's Alpha	N of Items
.654	8

Values for the eight questions were converted from ordinal data to interval data to facilitate the use of a Pearson  $r$  correlational test to determine if any significant relationship was found for the first hypothesis. A moderate, positive correlation was found between responses to four sets of variables. The relationship between the Likert item, *The administration communicates with me about formative assessment in the classroom* and *Formative assessment is something that my administration encourages or requires the use of* had a moderate, positive correlation ( $r(29) = .440, p < .05$ ), indicating a significant linear relationship between the two variables. Therefore, approximately 19% of the variance in teachers' responses toward the communication with administration with formative assessment is accounted for by the variance in teacher's belief that formative assessment is something that administration encourages or requires the use of. Teachers that have been communicated with regarding formative assessment are more likely to believe that formative assessment is something that the administration requires the use of in the classroom.

The relationship between the Likert item, *The administration communicates with me about formative assessment in the classroom* and *Formative assessment practices are considered as part of the evaluation of my teaching practice* had a moderate, positive correlation ( $r(29) = .502, p < .01$ ), indicating a significant relationship between the two variables. Therefore, approximately 25% of the variance in teachers' responses toward the communication with administration with formative assessment is accounted for by the variance in teacher's belief that formative assessment is something that administration looks for as part of the evaluation process.

Teachers that have been communicated with regarding formative assessment are more likely to believe that formative assessment is something that the administration uses during the evaluation process.

The relationship between the Likert item, *Formative assessment is something that my administration encourages or requires the use of* and *Formative assessment practices are considered as part of the evaluation of my teaching practice* had a moderate, positive correlation ( $r(29) = .421, p < .05$ ), indicating a significant relationship between the two variables. Therefore, approximately 18% of the variance in teachers' responses toward the belief that administration requires formative assessment is accounted for by the variance in teacher's belief that formative assessment is something that administration uses as part of the evaluation process. Teachers that have been encouraged by administration with regarding formative assessment are more likely to believe that formative assessment is something that the administration uses during evaluations.

Finally, the relationship between the Likert item, *Formative assessment practices are considered as part of the evaluation of my teaching practice* and *Administrators can demonstrate the use of technology-based formative assessments and data effectively* had a moderate, positive correlation ( $r(29) = .360, p < .05$ ), indicating a significant relationship between the two variables. Therefore, approximately 13% of the variance in teachers' responses toward the belief that administration considers formative assessment as part of the evaluation process is accounted for by the variance in teacher's belief that formative assessment is something that administration can demonstrate effectively. Teachers that have been communicated with regarding formative assessment in evaluations are more likely to believe that formative assessment is something that the administration can demonstrate effectively. Table 9 will show all of the values for each variable including those that are significant.

**Table 9***Pearson r Correlations Likert Scale: Hypothesis One (Teachers)*

Variable	<i>n</i>	1	2	3	4	5	6	7	8
1. Colleagues and FA	31	—							
2. Admin communication and FA	31	.27	—						
3. Required FA by admin	31	.20	.44*	—					
4. FA and evaluations	31	.31	.50**	.42*	—				
5. FA and admin demonstration	31	.13	.26	.18	.36*	—			
6. Opinion of FA	31	.10	.11	.09	-.04	.19	—		
7. PD over time for FA	31	.02	.32	.30	.30	.28	.14	—	
8. Culture of school	31	-.05	.12	.12	-.09	.10	.05	.25	—

\* $p < .05$ . \*\* $p < .01$ .

Eleven questions on the online survey completed by administrators that were related to the first hypothesis were sorted by mean, with the highest responses being first and the lowest being last. The ratings are based on a 5-point scale with six questions using: 1=Completely Disagree, 2=Disagree, 3=Sometimes, 4=Agree, 5=Completely Agree. One question used a 5-point rating scale with: 1=Never, 2=Occasionally, 3=Sometimes, 4=Often, 5=Always, and two questions used a 5-point rating scale with: 1=Not at all, 2=Little Impact, 3=Some Impact, 4=Moderate Impact, 5=Impacts Greatly. The highest rated question was question 12, “Formative

assessment is something that as an administrator I encourage or require of my classroom teachers ( $M=4.6$ )". The lowest rated questions were question 24, "My individual technological knowledge plays an impact on adopting technology-based formative assessment practices ( $M=3.0$ )" and question 18, "I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site ( $M=3.2$ )". Mean and standard deviation data related to school leadership and implementation of technology-based formative assessments is depicted in Table 10.



**Table 10**

*(M) Means and (SD) Standard Deviations of the 11 Survey Questions for Administrators (n=5)*

Administrator Responses <i>n</i> = 5	<i>M</i>	<i>SD</i>
Q12. Formative assessment is something that as an administrator I encourage or require of my classroom teachers.	4.6	0.55
Q6. Formative assessment is something I currently look for as part of my teacher evaluations.	3.8	0.84
Q23. How much does the culture of the school affect the implementation of technology-based formative assessment practices?	3.8	0.84
Q8. Technology-based formative assessment practices is something I currently feel confident demonstrating to teachers.	3.6	0.55
Q10. Technology-based formative assessment is something that my teachers currently use.	3.6	0.55
Q14. I can demonstrate the use of technology-based formative assessments and use the data from them effectively.	3.6	0.55
Q11. Teachers communicate with me about formative assessment in the classroom.	3.4	0.55
Q13. Formative assessment practices is considered as part of the teacher evaluation process.	3.4	0.89
Q15. I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject.	3.4	0.55
Q18. I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site.	3.2	0.84
Q24. My individual technological knowledge plays an impact on adopting technology-based formative assessment practices.	3.0	0.71

As shown in Table 11, Table 12, and Table 13, the percentages of administrator responses ranged based on the type of question that was asked. The highest level of positive feelings (completely agree and agree) was found on one question. This was on the question relating formative assessments and the requirements from the administration to use it, with 40% stating agree, and 60% stating completely agree. On one question regarding the communication from teachers and formative assessment there were slightly positive feelings with 60% stating sometimes, and 40% stating often. On one question regarding the impact of school culture and the implementation of technology-based formative assessments, 40% stated a slight impact, 40% stated a moderate impact, and 20% stated culture impacts greatly.

**Table 11***Frequency - Likert Survey: Hypothesis One (n=5)*

Likert Item	Completely Agree		Agree		Sometimes		Disagree		Completely Disagree	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Formative assessment is something I currently look for as part of my teacher evaluations.	1	20	2	40	2	40	0	0	0	0
Technology-based formative assessment practices is something I currently feel confident demonstrating to teachers.	0	0	3	60	2	40	0	0	0	0
Technology-based formative assessment is something that my teachers currently use.	0	0	3	60	2	40	0	0	0	0
Formative assessment is something that as an administrator I encourage or require of my classroom teachers.	3	60	2	40	0	0	0	0	0	0
Formative assessment practices is considered part of the teacher evaluation process.	0	0	3	60	1	20	1	20	0	0
I can demonstrate the use of technology-based formative assessments and the use of data from them effectively.	0	0	3	60	2	40	0	0	0	0
I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject.	0	0	2	40	3	60	0	0	0	0
I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site.	0	0	2	40	2	40	1	20	0	0

**Table 12***Frequency - Likert Survey: Hypothesis One (n=5)*

Likert Item	Never		Occasionally		Sometimes		Often		Always	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Teachers communicate with me about formative assessment in the classroom.	0	0	0	0	3	60	2	40	0	0

**Table 13***Frequency - Likert Survey: Hypothesis One (n=5)*

Likert Item	Not at All		Little Impact		Some Impact		Moderate Impact		Impacts Greatly	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
How much does the culture of the school affect the implementation of technology-based formative assessment practices?	0	0	0	0	2	40	2	40	1	20
My individual technological knowledge plays an impact on adopting technology-based formative assessment practices.	0	0	1	20	3	60	1	20	0	0

A Cronbach's Alpha analysis was run to determine a scale of reliability (see Table 14). Generally speaking, reliability between 0.60 and 0.80 is considered acceptable, and it was determined that for this hypothesis the Likert survey questions were reliable a .654.

**Table 14**

*Cronbach's Alpha: Likert Survey - Hypothesis One (Administrators)*

Cronbach's Alpha	N of Items
.635	11

Values for the eleven questions were converted from ordinal data to interval data to facilitate the use of a Pearson r correlational test to determine if any significant relationship was found for the first hypothesis. A strong, positive correlation was found between responses to one set of variables, and a strong, inverse correlation was found between responses to one set of variables. The relationship between the Likert item, *Technology-based formative assessment practices is something I currently feel confident demonstrating to teachers and I can demonstrate the use of technology-based formative assessments and the use of data from them effectively* had a strong, positive correlation ( $r(3) = 1.00, p < .01$ ), indicating a significant linear relationship between the two variables. Therefore, 100% of the variance in administrators' responses toward the confidence demonstrating formative assessment is accounted for by the variance in administrators' belief that formative assessment is something they can demonstrate effectively. Administrators that are confident demonstrating formative assessment are more likely to believe that they can demonstrate it effectively.

The relationship between the Likert item, *Formative assessment is something that as an administrator I encourage or require of my classroom teachers and I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be*

*used at my site/grade level/subject* had a strong, inverse correlation ( $r(3) = -1.00, p < .01$ ), indicating a significant relationship between the two variables. Therefore, 100% of the variance in administrators' responses toward the requirement of formative assessment is accounted for by the variance in administrators' belief that their opinion is asked for when looking for new formative assessment practices. Administrators that expect or require formative assessment are more likely to believe that their opinion is neither asked for or needed when looking at new formative assessment practices. Table 15 will show all of the values for each variable including those that are significant.

**Table 15***Pearson r Correlations Likert Scale: Hypothesis One (Administrators)*

Variable	<i>n</i>	1	2	3	4	5	6	7	8	9	10
1. FA and teacher eval.	5	—									
2. Admin confidence and FA	5	.33	—								
3. FA use by teachers	5	.33	.17	—							
4. FA and communication	5	.22	-.17	-.17	—						
5. FA and admin requirement	5	.87	.17	.17	.67	—					
6. FA and evaluation process	5	-.53	-.10	-.61	.61	-.10	—				
7. Admin demonstration of FA	5	.32	1.0**	.17	-.17	.17	-.10	—			
8. Opinion of FA practices	5	-.87	-.17	-.17	-.67	-1**	.10	-.17	—		
9. Admin leading FA	5	.79	.76	.22	.33	.76	-.13	.76	-.76	—	
10. Culture and FA	5	.64	.33	.33	.76	.87	.13	.32	-.87	.79	—
11. Individual Admin tech knowledge of FA	5	.42	-.64	0.0	.65	.65	0.0	-.65	-.65	0.0	.42

\* $p < .05$ . \*\* $p < .01$ .

### Non-Statistical Findings

Open-ended responses were received from the teachers related to administration and formative assessment. Specifically, teachers were asked about what things the administration could do to encourage the use of formative assessment in the classroom. One pattern that emerged was they could provide appropriate technology to teachers for formative assessment. A

second pattern that emerged was the need for administration to provide more professional development or trainings for formative assessment. A third pattern in the open-ended survey responses showed a need for administration to work with PLT/PLCs on the use and implementation of formative assessments in each subject area. Tables 16, and 17 will highlight these patterns in more detail.

**Table 16**

*Likert Survey Open-Ended Question Responses: What are some things that the administration can do to encourage the use of formative assessment practices in the classroom? (n=31)*

Teacher Responses <i>n</i> = 31
“Explain exactly what they are and how frequently they are used.”
“Provide new/different technology tools and platforms on which teachers can assess students.”
“They can provide in-service within PLT's for content focused Tech implementation for Formative Assessments. More so provide opportunities with small student focus groups without disrupting their instruction minutes; so pulling out TA's, office messengers, and/or library helpers to participate.”
“Emphasize its importance in meeting with department heads.”
“Visit PLT meetings.”
“Make PD available for pay more often. Mandate adoption of technology like Canvas to assist students in Universal Design re: Accessibility.”
“Administrators can model the effective use of formative assessment practices during teacher in-service meetings.”
“Pay for the creation of, implementation of, and time required to learn, and stick with a tool for more than a year.”
“They can provide the resources for teachers and students to use technology-based assessments. As well as enforce the use of these resources and discussion of how it is working effectively for all learners.”
“The administration can provide more professional development and allow teachers to try new technology-based formative assessment practices in their classrooms.”
“Provide trainings, use formative assessments in real time to survey the staff for needs and provide support, provide feedback on evaluations.”
“Offer professional development opportunities for teachers that want to grow in this area.”
“Give us examples of different formative assessments that can be used in the classroom and ones that can be used for certain subjects.”



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“Put it on our evaluations. Observe for that specifically.”

“Provide P.D. (maybe joint planning sessions with a consultant) and show examples of effective technology-based assessments.”

“More trainings at the PLC levels. Have trainers go to specific PLC meetings to be able to show some teachers how to use technology for their specific subject. In a general setting, a teacher might think that the technology presented only works for the subject the presenter teaches.”

“If administration backs a department on their chosen form of technological assessment, then a team can work on forming those assessments, or a schedule. Secondly, admin needs to be monitoring progress. Admin should be holding departments accountable to purchased resources. An admin must follow up to be sure they practices are being used consistently and effectively.”

“Provide teachers with needed technology to move around the room instead of being stuck at a desk.”

“Ask for evidence for how formative assessments are taking place in that specific PLT.”

“Time is always the biggest barrier for me. Allotting time during our contract days and outside (with compensation) to learn the technology and build formative assessments using it would be helpful.”

“Adopt some that have been well liked at different sites and focus on a small amount opposed to broad and ambiguous suggestions. Also asking for the data will enforce the use of the assessments (if done delicately).”

“Encourage collaboration and PD.”

“Ask for Data from our general formative assessments that we do in class with our students.”

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**Table 17**

*Frequency: Likert Open-Ended Questions: What are some things that the administration can do to encourage the use of formative assessment practices in the classroom? (n=31)*

Responses	Frequency
Technology	8
Professional Development or trainings	7
PLT/PLC	6
Time	3
Data	3
Evaluations	2

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Interviews were also conducted with teachers during the research study to operationalize the relationship between administration and formative assessment practices. For the first hypothesis, the following question was asked: *How does administration promote formative assessment for your teaching practice?* Frequencies of responses were calculated from the interview responses. The interviews were recorded via an online program called Zoom. The researcher transcribed the interviews and forwarded the transcriptions to each participant for their approval, to add validity to the qualitative data.

Complete interview responses reflect significant trends (see Table 18). One trend that emerged through the study was that administration promotes formative assessment primarily through the PLC/PLT process, although many admitted that the administration needs to follow through more with enforcement. Another significant trend is that administration does promote formative assessment through the offering of trainings and professional development even if it is sparse for many subject areas.

**Table 18**

*Frequency: Interview Question: How does administration promote formative assessment for your teaching practice? (n=20)*

Responses	Frequency
PLT/PLC	10
Professional Development or trainings	4
Technology	3
Data	3
Evaluations	3
Time	1

Highlights of participants' one-on-one interview responses when asked, *How does administration promote formative assessment for your teaching practice?* are reflected below.

For complete interview responses, see Appendix G.

**Table 19**

*Interview Question Response: How does administration promote formative assessment for your teaching practice? (n=20)*

Teacher Responses <i>n</i> = 20
<p>“Um, I well, you know, we have good support for our PLT process, but I wish that it was more formalized and more accountable because I think that we're all professionals. But the benefit of a good PLT process, you almost have to be in one to know what you're missing, essentially, and I was in a really good one. So I would say the framework is there and the support for the framework is there. But I, and they've provided trainings, their trainings and things. So it's pretty. In existence. But it's like most of the staff here on this campus anyway, a lot of the staff might need a little more push, and I think also we have some staff that aren't sure what formative assessment. They haven't wrapped their head around it and put it into practice in their own classroom, yet, you kind of need to see it happening. We've had trainings like the Pear Deck training and I know we have colleagues that are embracing Pear Deck and they may not even know they're doing it in the moment I have a feeling so yeah.”</p>
<p>“I think the emphasis like, you know, and to be quite frank, a comment to my PLT has never been particularly good at looking at data. We have common units that we develop, we have assignments within it. And then teachers also formatively assess within their classroom on their own with additional practices and additional ways. But I think that their intention with emphasizing common formative assessments is working with your PLT and looking at the data and letting the data help drive those decisions that you're making. Sometimes that's not always timely. Sometimes it seems kind of impractical and, I think this year, too, and last year, I mean, we're just so overwhelmed. So like, I feel I hear less and less. It seems like coming out about formative assessment and more and more just about D and F rates.”</p>
<p>“I want to say that they definitely want to see it if they come into observe your class. They are going to ask you, how are you formally assessing your kids? So that's probably one way they encourage it. I don't want to, I don't want to say negative things, but I don't think that they're giving us tools completely. I mean, yeah, there's Pear Deck and there's trainings for Pear Deck, but I don't think that they're, I guess they're encouraging it, but they're not enforcing it. And so as a result, not everyone's using it.”</p>
<p>“All I can think is from, like last year, my admin supervisor, he was very like formative assessment and he really helped me with exit tickets and understanding them. And that is probably why now this year I'm comfortable with giving exit tickets because I know how to. This year, my admin or in general, they are helpful, but there's not enough, I don't think information and whatnot.”</p>
<p>“Our admin, I think they give it lip service, but do they really check to see if it's happening? I don't know. I have no idea, I mean, I guess I'm just a person that I always try to make sure I'm doing what I'm supposed to do. Um. But I honestly don't know how important they find it. I'm also at a point in my teaching career where I only get evaluated every five years, so it's been a while since I've been evaluated. I'm sure it's coming up in the next year or so. But yeah, I don't know. I've never been told in an evaluation that it's important that they see formative assessment.”</p>

Open-ended responses were also received from administrators related to teachers and formative assessment. Specifically, administrators were asked about what things teachers could do to become more proficient with formative assessment in the classroom. One pattern that emerged was that teachers need to practice using formative assessment tools to become more comfortable using them. A second pattern that emerged was the need for PLTs to use formative assessments as a way to drive discussions on student learning. Table 20 will highlight these patterns in more detail.

**Table 20**

*Likert Survey Open-Ended Question Responses: What are some things that teachers can do to become more proficient with formative assessment practices in the classroom? (n=5)*

Administrator Responses <i>n</i> = 5
“Shadow other classes and watch real lessons with GV students.”
“Use it in the classroom over time and get more comfortable.”
“Trainings. I feel when individuals are more comfortable using certain type of programs, the more they will be used. Having individuals understand that it is a great tool to use for student learning and what they as teachers can get out of it.”
“Practice, practice, and more practice. Many teachers are wary of trying new technologies or assessment strategies. When faced with this uncertainty, they often default back to their traditional ways.”
“Formative assessment practices should drive discussions and content in effective Professional Learning Teams on campus. Every Wednesday, teachers should be discussing and reflecting on formative assessment practices in order to maximize student learning.”

Interviews were also conducted with administrators during the research study to operationalize the relationship between administration and formative assessment practices. For the first hypothesis, the following question was asked: *Describe how formative assessment help you, as an administrator, as you work with your teachers?* The interviews were recorded via an online program called Zoom. The researcher transcribed the interviews and forwarded the

transcriptions to each participant for their approval, to add validity to the qualitative data.

Complete interview responses reflect significant trends (see Table 21). One trend that emerged through the study was that administration promotes formative assessment primarily through the PLC/PLT process, although one admitted that there is a gap between the data and student learning. Another significant trend is that administration looks for formative assessment as how not only students learn but for classroom management and engagement. Highlights of participants' one-on-one interview responses when asked, *Describe how formative assessment help you, as an administrator, as you work with your teachers?* are reflected below. For complete interview responses, see Appendix G.

**Table 21**

*Interview Question Responses: Describe how formative assessment helps you, as an administrator, as you work with your teachers? (n=3)*

Administrator Responses <i>n</i> = 3
<p>“That's a good question, because really content doesn't touch my realm too often as a dean, but definitely the evaluative portion of my job working with teachers to create those formative assessments, see how their classroom runs. That's the relationship I have right now, but it's very limited.”</p>
<p>“Well, I think it's for me, it's less about numbers than it is about process, right? So when you look at our individual learning teams, it is, do they have one, an assessment structure, even if it's in progress, right? Do we have some sort of collaborative structure? And then do you have the commitment from all of those team members to stay kind of in the pace and conduct with fidelity, the assessments? And then the last piece, which is the toughest is getting that data back and sharing it out with student samples. So it's just that I'm looking more in the professional team for that process. And is there a commitment from all the members to be a part of that team and to have real conversations about student learning and how we can then change our instructional practices after we've had those collaborative conversations? And it's that that gap, I think, where I think we look at a lot of data, I don't know that it that it really informs and changes our instructional practice as much as it probably should. But yeah, I'm very interested in that process and monitoring that process for each learning.”</p>
<p>“I would say, yes, every single evaluation I look for that in every single observation evaluation I've made it very clear is, you know, what's an exit ticket look like. A meaningful exit ticket so you can gauge student learning for the day and teacher effectiveness regarding their instructional approach. And I even include that with all of the teachers that I have evaluated, and I know Teacher 1 probably has it in there. But that's probably the two biggest things that I look for is check for understanding and exit tickets and closing out your activity for the day and all that as well.”</p>

## **Findings for Hypothesis Two: Relationship Between Professional Development and Implementation of Technology-Based Formative Assessments**

### **Statistical Findings**

The second hypothesis stated that there would be no relationship between professional development and the successful implementation of technology-based formative assessments. A Likert scale was first analyzed using descriptive statistics.

Five questions on the online survey completed by teachers that were related to the first hypothesis were sorted by mean, with the highest responses being first and the lowest being last. The ratings are based on a 5-point scale with six questions using: 1=Completely Disagree, 2=Disagree, 3=Sometimes, 4=Agree, 5=Completely Agree. The highest rated questions were question 17, “I feel like I need more training in formative assessment and would participate in a workshop or training if it was available ( $M=3.97$ )” and question 16, “Professional development in formative assessment is effective towards implementation in the classroom ( $M=3.87$ )”. The lowest rated question was question 14, “Administrators can demonstrate the use of technology-based formative assessments and data effectively ( $M=3.08$ )”. Mean and standard deviation data related to professional development and implementation of technology-based formative assessments is depicted in Table 22.

**Table 22**

*(M) Means and (SD) Standard Deviations of the 5 Survey Questions for Teachers (n=31)*

Teacher Responses <i>n</i> = 31	<i>M</i>	<i>SD</i>
Q17. I feel like I need more training in formative assessment and would participate in a workshop or training if it was available.	3.97	1.02
Q16. Professional development in formative assessment is effective towards implementation in the classroom.	3.87	0.77
Q20. I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom.	3.46	0.95
Q19. Professional development has helped me to implement formative assessment strategies in my classroom.	3.45	0.68
Q14. Administrators can demonstrate the use of technology-based formative assessments and data effectively.	3.08	0.84

As shown in Table 23, the percentages of teacher responses ranged based on the type of question that was asked. The highest level of positive feelings (completely agree and agree) were found on two questions. The first was on the question relating professional development and the effectiveness with implementation in the classroom, with 51.6% stating agree, and 22.6% stating completely agree. The second was on the question relating the individual need for more training with formative assessment, with 29% stating agree, and 38.7% stating completely agree. On one question regarding the ability of administration to demonstrate effectively formative assessment there were mixed feelings with 51.6% stating sometimes, 19.4% stating disagree, and 3.2% stating completely disagree.

**Table 23***Frequency - Likert Survey: Hypothesis Two (n=31)*

Likert Item	Completely Agree		Agree		Sometimes		Disagree		Completely Disagree	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
I feel like I need more training in formative assessment and would participate in a workshop or training if it was available.	12	38.7	9	29	7	22.6	3	9.7	0	0
Professional development in formative assessment is effective towards implementation in the classroom.	7	22.6	16	51.6	9	29	1	3.2	0	0
I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom.	3	9.7	15	48.4	9	29	4	12.9	1	3.2
Professional development has helped me to implement formative assessment strategies in my classroom.	0	0	18	58.1	10	32.3	4	12.9	0	0
Administrators can demonstrate the use of technology-based formative assessments and data effectively.	1	3.2	8	25.8	16	51.6	6	19.4	1	3.2

A Cronbach's Alpha analysis was run to determine a scale of reliability (see Table 24).

Generally speaking, reliability between 0.60 and 0.80 is considered acceptable, and it was determined that for this hypothesis the Likert survey questions were reliable a .667.



**Table 24**

*Cronbach's Alpha: Likert Survey - Hypothesis Two (Teachers)*

Cronbach's Alpha	N of Items
.667	5

Values for the five questions were converted from ordinal data to interval data to facilitate the use of a Pearson  $r$  correlational test to determine if any significant relationship was found for the second hypothesis. A moderate, positive correlation was found between responses to two sets of variables, and a strong, positive correlation was found between responses in one variable. The relationship between the Likert item, *Professional development in formative assessment is effective towards implementation in the classroom* and *I feel like I need more training in formative assessment and would participate in a workshop or training if it was available* had a moderate, positive correlation ( $r(29) = .503, p < .01$ ), indicating a significant linear relationship between the two variables. Therefore, approximately 25% of the variance in teachers' responses toward the belief that professional development with formative assessment is effective with implementation is accounted for by the variance in teacher's belief that more training is needed, and teachers would participate if it was available. Teachers that have believe that professional development helps implement formative assessment are more likely to believe in more training, and will attend more training if it is available

The relationship between the Likert item, *Professional development in formative assessment is effective towards implementation in the classroom* and *I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom* had a moderate, positive correlation ( $r(29) = .444, p < .05$ ), indicating

a significant relationship between the two variables. Therefore, approximately 20% of the variance in teachers' responses towards the effectiveness of professional development and the implementation of formative assessment is accounted for by the variance in teacher's belief that professional development should be spread over time to help teachers feel comfortable with formative assessment. Teachers that believe that professional development is effective at implementing formative assessment are more likely to believe that professional development spread over time will help with the use and comfort of formative assessments.

Finally, the relationship between the Likert item, *I feel like I need more training in formative assessment and would participate in a workshop or training if it was available and I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom* had a strong, positive correlation ( $r(29) = .685$ ,  $p < .01$ ), indicating a significant relationship between the two variables. Therefore, approximately 47% of the variance in teachers' responses toward the belief that more training in formative assessment is needed is accounted for by the variance in teacher's belief that professional development needs to be spread over time. Teachers that feel like they need more training are more likely to believe that professional development spread over time is more effective with implementing formative assessment. Table 25 will show all of the values for each variable including those that are significant.

**Table 25***Pearson r Correlations Likert Scale: Hypothesis Two (Teachers)*

Variable	<i>n</i>	1	2	3	4	5
1. FA and admin demonstration	31	—				
2. PD and effectiveness of implementation	31	.06	—			
3. Individual need for more PD with FA	31	.22	.50**	—		
4. PD and individual implementation of FA	31	-.10	.34	.07	—	
5. PD of FA over time for comfort	31	.28	.44*	.68**	.15	—

\* $p < .05$ . \*\* $p < .01$ .

Six questions on the online survey completed by administrators that were related to the second hypothesis were sorted by mean, with the highest responses being first and the lowest being last. The ratings are based on a 5-point scale with six questions using: 1=Completely Disagree, 2=Disagree, 3=Sometimes, 4=Agree, 5=Completely Agree. The highest rated question was question 20, “Teachers need professional development spread over time to feel comfortable using technology-based formative assessment practices in their classrooms ( $M=4.4$ )”. The lowest rated question was question 18, “I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site ( $M=3.2$ )”. Mean and standard deviation data related to professional development and implementation of technology-based formative

assessments is depicted in Table 26.

**Table 26**

*(M) Means and (SD) Standard Deviations of the 5 Survey Questions for Administrators (n=5)*

Administrator Responses <i>n</i> = 5	<i>M</i>	<i>SD</i>
Q20. Teachers need professional development spread over time to feel comfortable using technology-based formative assessment practices in their classrooms.	4.4	0.55
Q16. Professional development in formative assessment is effective towards implementation in the classroom.	3.8	0.45
Q17. I feel like my teachers need more training in formative assessment and would participate in a workshop or training if it was available.	3.8	0.84
Q19. Professional development has helped to implement formative assessment strategies at my site.	3.8	0.45
Q14. I can demonstrate the use of technology-based formative assessments and the use of data from them effectively.	3.6	0.55
Q18. I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site.	3.2	0.84

As shown in Table 27, the percentages of administrator responses ranged based on the type of question that was asked. The highest level of positive feelings (completely agree and agree) was found on one question. This was on the question relating the need for professional development spread over time, with 60% stating agree, and 40% stating completely agree.

**Table 27***Frequency - Likert Survey: Hypothesis Two (n=5)*

Likert Item	Completely Agree		Agree		Sometimes		Disagree		Completely Disagree	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
I can demonstrate the use of technology-based formative assessments and the use of data from them effectively.	0	0	3	60	2	40	0	0	0	0
Professional development in formative assessment is effective towards implementation in the classroom.	0	0	4	80	1	20	0	0	0	0
I feel like my teachers need more training in formative assessment and would participate in a workshop or training if it was available.	1	20	2	40	2	40	0	0	0	0
I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site.	0	0	2	40	2	40	1	20	0	0
Professional development has helped me to implement formative assessment strategies at my site.	0	0	4	80	1	20	0	0	0	0
Teachers need professional development spread over time to feel comfortable using technology-based formative assessment practices in their classrooms.	2	40	3	60	0	0	0	0	0	0

Values for the six questions answered by administrators were converted from ordinal data to interval data to facilitate the use of a Pearson  $r$  correlational test to determine if any significant relationship was found for the second hypothesis. Unfortunately, there were no significant relationships found. Table 28 will show all of the values for each variable.

**Table 28**

*Pearson  $r$  Correlations Likert Scale: Hypothesis Two (Administrators)*

Variable	$n$	1	2	3	4	5	6
1. FA and admin demonstration	5	—					
2. PD and effective implementation of FA	5	-.41	—				
3. Teachers need more training of FA	5	-.76	.53	—			
4. Admin leading PD of FA	5	.76	-.53	-.64	—		
5. PD and implementation of FA at site	5	-.41	-.25	.53	-.53	—	
6. PD for FA spread over time	5	-.17	-.61	.22	.33	.41	—

\* $p < .05$ . \*\* $p < .01$ .

### Non-Statistical Findings

Open-ended responses were received from the teachers related to professional development and formative assessment. Specifically, teachers were asked about what professional development needs were essential to implement the use of technology-based formative assessment in the classroom. One pattern that emerged was that trainings were not

only necessary but should be structured to be subject-specific for easier implementation. A second pattern that emerged was the need for more trainings on technology in general, but also in ways that would help with making formative assessments. A third pattern in the open-ended survey responses showed that teachers are aware of technology-based tools already in use and would like more training on how to use them for their subject/grade level. Tables 29, and 30 will highlight these patterns in more detail.

**Table 29**

*Likert Survey Open-Ended Question Responses: What professional development needs are essential to implement technology-based formative assessment practices for your classroom or to use them more effectively? (n=31)*

Teacher Responses <i>n</i> = 31
“Training in the use of PROPER formative assessments.”
“More training on how best to implement tech tools/software”
“One truly lacking piece of PD and Tech is the students being involved so we can see how they interact, so we can get their feedback, and also so we can experiment before having to launch a new tech in the classroom. Also, I feel many of the current PD Practices are done with such a short block of time that Its cram in this is how you can use this tech now go use your free time (Unpaid) to implement this. Another thing is afterschool PD is often done after I am tired from working all day and it is hard for me to focus or even want to attend.”
“Demonstration of implementation in the math classroom.”
“Consistent trainings over time.”
“Nothing comes to mind for me, but there definitely needs to be greater buy-in for Canvas and deeper implementation of technology on the SAMR model.”
“PLC time to write these.”
“I would like to implement technology-based formative assessment practices that prevent students from easily copying answers and have high levels of thinking involved.”
“I am not sure, but I was trained to use IXL in my class last week. The meeting went well, and the IXL assignments were effective.”
“I would like to see some tips and tricks for using some of our online platforms more efficiently. The type of uses that come with great knowledge of Canvas, Google etc.”
“Training on Google Forms, Pear Deck, auto graded Google extensions, other technology that I don’t know about. It is also essential that it is subject based – what works for a science teacher doesn’t always work for a

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history or math teacher, etc.”

“Training regarding the operation of new digital assessment tools and how to implement it in classes.”

“Trainings. I think if we had trainings on different formative assessments and the different ways to use them as well.”

“Time. I don’t need 3 hours of training/lecture. I need 3 hours of time to work on building the assessments with an expert present if I need to ask them a question.”

“Knowing what is available to me from our district and workshops on using the technology.”

“Learning how to easily access and report the data. Google Forms makes it super easy.”

“Training on technology.”

“I believe our whole staff has a need for professional development in both the technological element and in development of common formative assessments, as well as the INTENT of the assessments and how to best use them.”

“Uses of technology by other teachers. It helps seeing how someone else is using technology in his/her classroom.”

“Our department uses IXL, but I would need more training to implement that more widespread. Trainings that show me how to implement in a classroom are most helpful and allowing participants to get hands on with the technology.”

“Learning of technological tools and time to design the lessons that include these tools.”

“Workshops I have previously attended seem to give a basic overview of the programs, but I would like to see a more thorough instruction with detail on how to create such assessments.”

“We used to have Edusoft and Illuminate, but no longer have a digital way to share data besides “quizzes” made by Google Forms. I feel like this is an important component of the PLT part we don’t get to use anymore.”

“I think the emphasis should be on using a few tools effectively and consistently rather than using too many technology-based tools.”

“An understanding of the basic uses and varieties of assessments. More detailed and complicated is not needed. Short, simple, and consistently used across the department is better in my opinion. Work smarter, not harder.”

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**Table 30**

*Frequency: Likert Open-Ended Question: What professional development needs are essential to implement technology-based formative assessment practices for your classroom to use them more effectively? (n=31)*

Responses	Frequency
Training	19
Technology	18
IXL, Pear Deck, Google, Canvas, or other technology	15
Time	5
PLT/PLC	2

Interviews were also conducted with teachers during the research study to operationalize the relationship between professional development and formative assessment practices. For the second hypothesis, the following questions were asked: 1) *Have you participated in any formative assessment trainings or workshops?* 2) *What did you gain from those?* 3) *How did they affect your teaching practice?* 4) *Did the workshops provide enough training to implement new practices?* 5) *What do you want from trainings/workshops to help with formative assessment?* Frequencies of responses were calculated from the interview responses. The interviews were recorded via an online program called Zoom. The researcher transcribed the interviews and forwarded the transcriptions to each participant for their approval, to add validity to the qualitative data.

Complete interview responses reflect significant trends (see Table 31, Table 33, Table 35, Table 37, and Table 39). One trend that emerged through the study was that the majority of teachers participated in formative assessment trainings, but many felt that there was not enough

training provided to effectively implement these practices. Another significant trend is that teachers need professional development that is geared towards specific subjects with examples on how formative assessment can be effectively used within those subjects. Lastly, another trend that emerged was the need for professional development on implementing formative assessment and the use of data for individual teachers and teams to analyze.

**Table 31**

*Frequency: Interview Question #1: Have you participated in any formative assessment trainings or workshops? (n=20)*

Responses	Frequency
Yes	13
No	4
Not Sure	3

Highlights of participants' one-on-one interview responses when asked, *Have you participated in any formative assessment trainings or workshops?* are reflected below. For complete interview responses, see Appendix G.

**Table 32**

*Interview Question #1 Response: Have you participated in any formative assessment trainings or workshops? (n=20)*

Teacher Responses <i>n</i> = 20
<p>“So I've had the good fortune of being able to work for the National Assessment of Educational Progress or NAEP. It's known colloquially as the nation's report card, and I was part of the team to create their civics model for assessment. So, I went through a lot of training with psychometricians and assessment experts. And then they ended up hiring me to write some questions the educational testing services. And there was more, more stuff for that. We've also had district level trainings. And then here in the district, when we had benchmarks, subject area benchmarks, I was the chair. I ran the Committee for the World History Benchmarks and we were using Edusoft had an Edusoft specialist who put all of us through some training, that's going back a ways.”</p> <p>“Yeah, I've done the Pear Deck training you provided. That's been very helpful to help me do some formative assessments, and in the past we used to get trained on other software. So maybe PLT institutes that we have during the summer or during the school year where they send us and they talk about formative assessing students, but that's about it. I would like to see some sort of assessment tool that our school district or school can start utilizing the science campus.”</p> <p>“Um, I have taken a couple of different assessment building type activities through the district and it has not been recently, though, that I have. So it's been some years now.”</p> <p>“Gosh. Over the years, probably. I know that we have gone over little things here and there, nothing that's really stuck with me, though. Just nothing. Nothing, really concrete. I think it was just maybe sprinkled in some somewhere at some type of meeting. There wasn't like specific devoted to different types of those assessments that I can remember. I mean, I'm not saying it never happened, but if it did, I don't remember it.”</p>

**Table 33**

*Frequency: Interview Question #2: What did you gain from those? (n=12)*

Responses	Frequency
Purpose	7
Technology	3
Student Point of View	2

Highlights of participants' one-on-one interview responses when asked, *What did you gain from those?* are reflected below. For complete interview responses, see Appendix G.

**Table 34**

*Interview Question #2 Response: What did you gain from those? (n=12)*

Teacher Responses <i>n</i> = 12	
“Well, knowledge about how to use technology or for learning for the students.”	
<p>“I think, you know, probably the big idea. Is that the understanding that teachers forget, because once we begin teaching, we're experts in our subject. So we forget very often that just covering something once didn't work for us. My first year teaching, I taught with a note outline in front of me. Pretty much my second year, I was able to teach with the Post-it Note, essentially with the main points I wanted to cover. And by the third year I could, I could do it off the top of my head. So that demonstrates that the gaining of knowledge and it being inculcated into your system, into your memory well enough to get it back out again in a new form is a process, not a one and done situation. I think the training's, not individually, but overall, the trainings helped me to get that, even though it seems like an obvious thing, we teachers forget what it's like to be students, I think. Yeah. So a training that can make you feel that way, is good.”</p> <p>“I think it makes it's made me more intentional in designing formative assessments rather than just kind of on the cuff, having like a quick little check. That's not to say I don't still do those things. I do still in the moment, you know, like, doing a lesson today, I did a simple check for, you know, and how well were kids understanding the writing prompt that we had just taken some time to dissect together and it was a simple, you know, in front of their chests, thumbs up, thumbs down or thumb sideways, you know, and we kind of defined what a thumbs up mean, what is thumb sideways mean versus what is thumbs down mean? And again, it's not me looking in that situation. It wasn't me looking at something on their paper. But it does still give me feedback to help me understand. Do I need to break this down further? Do I need to provide more models? Do I need to teach this when we get back on Monday?”</p> <p>“Ideas of how to better use formative assessment within the classroom without the students really like realizing they're being formative assessed.”</p>	

**Table 35**

*Frequency: Interview Question #3: How did they affect your teaching practice? (n=6)*

Responses	Frequency
Positive	5
Not at all	1

Highlights of participants' one-on-one interview responses when asked, *How did they affect your teaching practice?* are reflected below. For complete interview responses, see Appendix G.

**Table 36**

*Interview Question #3 Response: How did they affect your teaching practice? (n=6)*

Teacher Responses <i>n</i> = 6
<p>“I have enjoyed the instant feedback and I can use those results to kind of. Real time, calculate how my class is doing as a whole is just half the class get this does 80 percent of the class get this. Pear Deck’s been great.”</p> <p>“They have been extremely helpful. Honestly, I don't know if it's just because I'm a young teacher, but I love going to trainings. I love learning from people with wisdom. I love learning from seasoned teachers. And so every single time I go to a training I take, I feel like I take so much information in and I use it. I do my best to implement it within the classroom within the next day, or at least that next week. And it's really it definitely helps a lot.”</p> <p>“They're part of what convinced me to move away from the pen of paper, because that was what they really emphasized. They were all about that. And I'm like, no, kids don't like that in general want to be more creative, more expressive and demonstrating what they know as opposed to just taking another test.”</p> <p>“I think they made it better because I was able to make the lesson more fun, like, hey, let's try something new and without really realizing I'm giving them a formative assessment and they're like doing something different from the normal lecture and everything.”</p>

**Table 37**

*Frequency: Interview Question #4: Did the workshops provide enough training to implement new practices? (n=14)*

Responses	Frequency
Yes	7
No	7

Highlights of participants’ one-on-one interview responses when asked, *Did the workshops provide enough training to implement new practices?* are reflected below. For complete interview responses, see Appendix G.

**Table 38**

*Interview Question #4 Response: Did the workshops provide enough training to implement new practices? (n=14)*

Teacher Responses n = 14
<p>"I think that one training I remember in particular, actually set us back a bit and it was very abruptly done by an administrator years ago and it was here, read this article and then discuss and it had no, it was very provocative, and I think that was their intention, but it actually provoked people to move to their extremes. And no, no good work got done and then there was no follow up. It was just here, do this. You felt very much like. The. I felt at the time this that maybe that administrator gave it so that we could check a box for them. Either a WASC process or something, the district said, because it wasn't this ongoing, the PLC process or the PLT process should be the vehicle to make that happen, if it's done properly. And I, the fidelity to that process has been inconsistent. So if there's a training, then there should be the follow up and the debriefing and the try again part, and I don't always see that happening."</p>
<p>"I'm trying to think of back to a specific training. I think that where things can be implemented right away is just like simple little strategies to check for understanding, like having a bell ringer or an exit ticket. An exit ticket that asks them a question about their understanding or to articulate their understanding or question to demonstrate whether or not they've got the concept for the day. Or if you run out of time to do that the day before, then to use that as a starting point with a bell ringer the next day. So some of those little strategies and techniques and kind of having a few go to structures for it, yes, is something that you can definitely turn around and take right back into the classroom. But a lot of times when you're having the conversation about formative assessments, you're having the conversation in conjunction with having a conversation about summative assessments versus formative assessments and an entire learning cycle and unit of development. And I have gone to some trainings where I've left feeling completely overwhelmed, where I feel like this is all great, well and good. But when am I going to find the 20 hours it would take to plan all this?"</p>
<p>"I always feel like we need more help or more time. It's a lot of work to get these things in. I mean, you understand, I imagine, but for anybody else, that's reading this transcript. You know? If you're teaching three classes and every week you're creating a brand new quiz that takes an hour to create the quiz and you're looking at creating it. And it just comes down to a time management or who has the time to do these things per say."</p>
<p>"I would say yes, and the workshops were never, you know, they're never long enough, but they were enough, long enough and enough information for me to at least implement them. Yes."</p>
<p>"I would say some of them gave me stuff right away, and some of them, I'm like, I need to play with it a little bit more. Like, I want like ones that I didn't mention, like the IXL, like more like hands on. Like, try it yourself, type of things. I feel like those were easy for me to, Oh, let me see how it is from a student perspective, and I can quickly see myself using that the next day, you know? But not, not all of them. And I would say the big difference between the trainings that I was able to apply right away versus the ones that I couldn't. It had to do with that. Like the hands on that, I personally experienced learning it as a teacher and from a student perspective that made it that much easier to apply it in the classroom."</p>

**Table 39**

*Frequency: Interview Question #5: What do you want from trainings/workshops to help with formative assessment? (n=18)*

Responses	Frequency
Implementation	7
Application to Subject/Classroom	5
Technology/Training	4
Fairness/Grading/Data	3

Highlights of participants' one-on-one interview responses when asked, *What do you want from trainings/workshops to help with formative assessment?* are reflected below. For complete interview responses, see Appendix G.

Table 40

*Interview Question #5 Response: What do you want from trainings/workshops to help with formative assessment? (n=18)*

Teacher Responses n = 18
“I would say, different, different forms of technology. So that we can apply in the classroom and that it's easy for the students to use and for the teacher.”
“I would like to see different tools put into motion, so I guess an example done in class with the trainees to show us how to implement it because a lot of trainings are great that I've been going to. But not many are great for mathematics, so I'd like to see how they're implemented. For a math class and some, some tangible examples.”
“I would appreciate more real-world examples instead of big kind of academic, esoteric ideas. So, here's this class of 30 students that I had. And here's how I set up my grade book. And because what derails things is always the but only or the but for's. Teachers tend to think about the two kids or the five kids that they have who will abuse the process. Or there's a there's a justice, kind of it's not fair kind of situation. Like I remember having conversations about having test corrections. And the biggest sticking point was teachers who said it's not fair to those kids who try hard the first time. And that's true. So let's just make sure that on the test corrections, you can't get an A. Your test corrections are a B and that when we said that it was like, click, OK, that's fair, I could do that. That's still honors the kids who tried hard the first time. But it also admits the fact that for some kids it takes a second chance to the learning is going to happen in a different manner. I think also understanding that when the learning happens, how it happens is not nearly as important as that it happened. The learning happened. I don't care if it's because you... how it happened. I need you to know that thing. And the trainings don't always emphasize that, in my opinion. So that's what I would say.”
“Um, I think I would want to see more of like kind of what other music teachers do because a lot of times like, I mean, like we've talked about them like in meetings and whatnot, like teacher meetings. But I feel like it's more aimed towards like just the other subject matters. So I would want to just see like, OK, like how can I flip that to make it work for my subject matter?”
“Maybe more examples of like how PLTs might collect data. And comparing use it that that wasn't really a big focus, OK? I think collecting the knowing how to use that tool is the easy part. But then in the setting of a PLT team, how, you know, maybe a little bit better information on it.”
“And also like I know there's some trainings that do it like, they overdo it when it's like too much and then it becomes overcomplicated where I feel like, well, this is too much. I forgot how to start with the basics. I would just say, like having that hands-on, just like the bare minimum basics. And then if you want a follow up course and I would say, like, break it up into a follow up course, like level two or something, because I know like some of the Oh, I forget what it's called the Geogebra. I think like some of those, I think you have to personally make the time to go and investigate one on one because some of them like they move along and it goes too fast paced like depending on the presenter. I felt like they kind of lost some people along the way like I can see, you know this, these people are in question too, and this many people are on question 10 or whatever.”

Open-ended responses were also received from administrators related to professional development and formative assessment. Specifically, administrators were asked about what



professional development needs are essential for effective implementation of formative assessment in the classroom. One pattern that emerged was that teachers need highly engaging and interactive training that provides hands on experience for formative assessment. A second pattern that emerged was the need for training on how to collect and use data from formative assessments to drive instructional practices. Table 41 will highlight these patterns in more detail.

**Table 41**

*Likert Survey Open-Ended Question Responses: What professional development needs are essential to implement technology-based formative assessment practices at your school or to use them more effectively? (n=5)*

Administrator Responses <i>n</i> = 5
“Varies- we have staff members that would struggle with basic technology while many are proficient. I believe most could navigate the technology to create and implement the assessment. The greatest need for PD is how to collect and disaggregate the resulting data to inform the instructional program. This becomes increasingly complex as Professional Learning Teams are directed to assess and discuss collaborative formative assessments.”
“Professional development is extremely essential to implement an array of technology based formative assessments on a school site. Having multiple individuals available to be a part of a training while in their own classroom with students. Learning by doing aspect with assistance. Fear is the number one reason many teachers don't use the extra tools such as technology-based assessments.”
“Professional development that engages educators on how to use data to drive instruction and assessment. We have a number of PD opportunities offered at the district on the various formative assessment tools at our disposal.”
“Interactive, hands-on training.”
“Hands on time for teachers after being exposed to new tech ideas.”

Interviews were also conducted with administrators during the research study to operationalize the relationship between professional development and formative assessment practices. For the second hypothesis, the following questions were asked: 1) *Have you participated in any formative assessment trainings or workshops?* 2) *How did they affect your teacher evaluation practice?* and 3) *Do you feel that professional development helps teachers to use technology-based formative assessments in the classroom?* The interviews were recorded via

an online program called Zoom. The researcher transcribed the interviews and forwarded the transcriptions to each participant for their approval, to add validity to the qualitative data.

Complete interview responses reflect significant trends (see Table 42, Table 43, and Table 44). One trend that emerged through the study was that administration has had some experience with professional development on formative assessments, but that it was limited in nature. Another significant trend is that administration sees that there has been professional development with formative assessment, but that there needs to be professional development on how to bridge the gap with technology without overwhelming teachers at the same time. Highlights of participants' one-on-one interview responses when asked, *Have you participated in any formative assessment trainings or workshops?* are reflected below. For complete interview responses, see Appendix G.

**Table 42**

*Interview Question #1 Response: have you participated in any formative assessment trainings or workshops? (n=3)*

Administrator Responses <i>n</i> = 3
<p>"Oh, it's been a long time, but recently, no, just due to the nature of, I think, each position that I've gone through because I'm not in the instructional realm like Admin 1 is, so have been able to go to any of those trainings. And I, you know, as Dean, you don't get you don't get put into those, but I have been to the PLT stuff about, you know, I think more now is just like more checks for understanding and more like exit tickets and things like that too as well, that has been kind of ingrained, maybe not to the formal extent, but it's just been kind of intertwined within the new realm of, you know, teaching and all that too as well."</p> <p>"As an administrator, yes, and just how to facilitate that on a campus, but not as a teacher. There was never any sort of assessment workshops you just, you know, kind of went over to the unit, you covered and it was mostly after the fact, right? You didn't design a unit with assessment in mind. You designed it as kind of in chronological order. But as an administrator, yes, I you know how to foster a collaborative culture on campus. And part of that is having collaborative assessments."</p> <p>"As an administrator? No."</p>

Highlights of participants' one-on-one interview responses when asked, *How did they affect your teacher evaluation practice?* are reflected below. For complete interview responses, see Appendix G.

**Table 43**

*Interview Question #2 Response: How did they affect your teacher evaluation practice? (n=1)*

Administrator Responses <i>n</i> = 1
<p>"It's something I look for. I look for those informal checks and it is part of the evaluation process. If you know or the form itself, you look at the five categories that are part of our evaluation. Part of that is, you know, do you question students, are you determining where they're at in their learning? And really the best way to do that is through a formalized assessment structure. And that is having built in checks for understanding as in the lesson design. So, you know, are you stopping at certain points and then in the midst of your either whether direct instruction or an activity or whatever that is, you've designed a questioning strategy on how to determine what students know. And that's all students. You know, whether that's a random you go around, you gather feedback or you do it through a technological structure, technologies and technology to get those answers. It's something I look for when I'm when I'm in any teacher's classroom."</p>

Highlights of participants' one-on-one interview responses when asked, *Do you feel that professional development helps teachers to use technology-based formative assessments in the classroom?* are reflected below. For complete interview responses, see Appendix G.

**Table 44**

*Interview Question #3 Response: Do you feel that professional development helps teachers to use technology-based formative assessments in the classroom? (n=2)*

Administrator Responses <i>n</i> = 2
<p>“I mean, yes. I mean, there could be, but my biggest fear with more technology stuff is, I mean, it's kind of the what I was, we were all hoping with Synergy, right, like when Synergy came out, it's like we had... You don't want to have five million different programs that you have to rely on. If somehow it can be streamlined into one effective program that you can run formative assessments out of that can also do all the other things. Because I think there is a technology program fatigue, that makes any sense, you know what I mean? I think people, I think you are an example that you're a veteran enough teacher. I'm a veteran enough educator that we could probably pick up new programs. But if you're a new teacher that's having to have their head, you know, in a million different directions, it's it would be difficult to have the fatigue to go on there.”</p> <p>“I don't know. I think there's been a lot of professional development on what formative assessments are. I think there's been a lack of professional development, a gap in utilizing technology to fill that need. I think we've done some things here to try to promote the use of, you know, things like Pear Deck or Google Forms or that as part of a collaborative assessment. And then if you go back, even, you know, back to the Edusoft, you the kind of top-down approach, you know, where we had these benchmarks, right, that were scan sheet and you scanned them in and all of that. So, the structures have been there, but utilizing as technology advances, utilizing technology as a means to more efficiently and with fidelity, conduct formal, you know, or formative assessments over the course of the day. I don't I don't think we have.”</p>

### **Findings for Hypothesis Three: Relationship Between Formative Assessments and Instructional Decisions Made by Teachers**

#### **Statistical Findings**

The third hypothesis stated that there would be no relationship between formative assessments and instructional decisions made by teachers. A Likert scale was first analyzed using descriptive statistics.

Six questions on the online survey completed by teachers that were related to the first hypothesis were sorted by mean, with the highest responses being first and the lowest being last. The ratings are based on a 5-point scale with five questions using: 1=Completely Disagree, 2=Disagree, 3=Sometimes, 4=Agree, 5=Completely Agree, and one question using: 1=Not at All, 2=Little Impact, 3=Some Impact, 4=Moderate Impact, and 5=Impacts Greatly. The highest

rated questions were question 24, “Does your individual technological knowledge play an impact on adopting technology-based formative assessment practices ( $M=4.32$ )” and question 9, “Formative assessment can be a fast and effective way to learn about my students’ strengths and weaknesses ( $M=4.29$ )”. The lowest rated question was question 18, “I would feel comfortable leading a workshop or teacher training for technology-based formative assessments ( $M=2.71$ )”. Mean and standard deviation data related to formative assessments and instructional decisions made by teachers is depicted in Table 45.

**Table 45**

*(M) Means and (SD) Standard Deviations of the 6 Survey Questions for Teachers (n=31)*

Teachers Responses $n = 31$	$M$	$SD$
Q24. Does your individual technological knowledge play an impact on adopting technology-based formative assessment practices?	4.32	0.87
Q9. Formative assessment can be a fast and effective way to learn about my students’ strengths and weaknesses.	4.29	0.74
Q7. Formative assessment data drives instructional decisions in my classroom.	3.97	0.88
Q8. Technology-based formative assessment is something I currently feel confident using in my classroom.	3.55	0.72
Q15. I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject.	3.10	0.91
Q18. I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site.	2.71	1.22

As shown in Table 46, and Table 47, the percentages of teacher responses ranged based on the type of question that was asked. The highest level of positive feelings (completely agree and agree) were found on two questions. The first was on the question relating formative

assessments and the relationship with student strengths and weaknesses, with 38.7% stating agree, and 45.2% stating completely agree. The second was on the question relating formative assessment and the data driving instructional decisions in the classroom, with 51.6% stating agree, and 25.8% stating completely agree. On one question regarding the comfort level on leading a workshop or training on technology-based formative assessment there were negative feelings with 25.8% stating sometimes, 45.2% stating disagree, and 9.7% stating completely disagree. On one question regarding the impact of individual technological knowledge and the implementation of technology-based formative assessments, 35.5% stated a moderate impact, and 51.6% stated individual technological knowledge impacts greatly.

**Table 46**

*Frequency - Likert Survey: Hypothesis Three (n=31)*

Likert Item	Completely Agree		Agree		Sometimes		Disagree		Completely Disagree	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Formative assessment data drives instructional decisions in my classroom.	8	25.8	16	51.6	6	19.4	0	0	1	3.2
Technology-based formative assessment is something I currently feel confident using in my classroom.	3	9.7	12	38.7	15	48.4	1	3.2	0	0
Formative assessment can be a fast and effective way to learn about my students' strengths and weaknesses.	14	45.2	12	38.7	5	16.1	0	0	0	0
I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject.	1	3.2	11	35.5	9	29	10	32.3	0	0

I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site.	5	16.1	1	3.2	8	25.8	14	45.2	3	9.7
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**Table 47**

*Frequency - Likert Survey: Hypothesis Three (n=31)*

Likert Item	Not at All		Little Impact		Some Impact		Moderate Impact		Impacts Greatly	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Does your individual technological knowledge play an impact on adopting technology-based formative assessment practices?	0	0	2	6.5	2	6.5	11	35.5	16	51.6

A Cronbach's Alpha analysis was run to determine a scale of reliability (see Table 48).

Generally speaking, reliability between 0.60 and 0.80 is considered acceptable, and it was determined that for this hypothesis the Likert survey questions were reliable a .608.

**Table 48**

*Cronbach's Alpha: Likert Survey - Hypothesis Three (Teachers)*

Cronbach's Alpha	<i>N</i> of Items
.608	6

Values for the six questions were converted from ordinal data to interval data to facilitate the use of a Pearson  $r$  correlational test to determine if any significant relationship was found for the first hypothesis. A moderate, positive correlation was found between responses to three sets of variables. The relationship between the Likert item, *I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site* and *Technology-based formative assessment is something I currently feel confident using in my classroom* had a moderate, positive correlation ( $r(29) = .566, p < .01$ ), indicating a significant linear relationship between the two variables. Therefore, approximately 32% of the variance in teachers' responses toward the comfort of leading a workshop for technology-based formative assessment is accounted for by the variance in teacher's belief of their confidence in using technology-based formative assessment in their classroom. Teachers that comfortable in leading a training on formative assessment are more likely to be confident in using technology-based formative assessments in their classroom.

The relationship between the Likert item, *I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site* and *I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject* had a moderate, positive correlation ( $r(29) = .389, p < .05$ ), indicating a significant relationship between the two variables. Therefore, approximately 15% of the variance in teachers' responses toward their comfort in leading a workshop on formative assessment is accounted for by the variance in teacher's belief that formative assessment is something that they are asked about for their opinion. Teachers that have comfort in leading a workshop on formative assessment are more likely to believe they will be asked about potential new technology-based formative assessment practices for their site.



Finally, the relationship between the Likert item, *I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject* and *Formative assessment data drives instructional decisions in my classroom* had a moderate, positive correlation ( $r(29) = .382, p < .05$ ), indicating a significant relationship between the two variables. Therefore, approximately 15% of the variance in teachers' responses toward the belief that their opinion on formative assessment is accounted for by the variance in teacher's belief that formative assessment data drives instructional decisions in the classroom. Teachers that have communication with administration regarding potential new formative assessment practices are more likely to have and use formative assessment data driving instructional decisions. Table 49 will show all of the values for each variable including those that are significant.

**Table 49**

*Pearson r Correlations Likert Scale: Hypothesis Three (Teachers)*

Variable	<i>n</i>	1	2	3	4	5	6
1. FA data and instructional decisions	31	—					
2. FA and confidence in classroom	31	.29	—				
3. FA and student strengths and weaknesses	31	.01	.32	—			
4. Opinion on new FA practices	31	.38*	.22	.11	—		
5. Comfort leading PD on FA	31	.14	.57**	.02	.39*	—	

6. Individual tech knowledge and FA	31	.01	.24	.21	.00	.22	—
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\* $p < .05$ . \*\* $p < .01$ .

Seven questions on the online survey completed by administrators that were related to the third hypothesis were sorted by mean, with the highest responses being first and the lowest being last. The ratings are based on a 5-point scale with six questions using: 1=Completely Disagree, 2=Disagree, 3=Sometimes, 4=Agree, 5=Completely Agree. The highest rated question was question 12, “Formative assessment is something as an administrator I encourage or require of my classroom teachers ( $M=4.6$ )”. One of the lowest rated questions was question 7, “Formative assessment data drives instructional decisions in the classrooms I observe ( $M=3.4$ )”. Mean and standard deviation data related to formative assessment and instructional decisions made by teachers is depicted in Table 50.

**Table 50***(M) Means and (SD) Standard Deviations of the 7 Survey Questions for Administrators (n=5)*

Administrators Responses <i>n = 5</i>	<i>M</i>	<i>SD</i>
Q12. Formative assessment is something that as an administrator I encourage or require of my classroom teachers.	4.6	0.55
Q9. Formative assessment can be a fast and effective way to learn about students' strengths and weaknesses.	4.4	0.55
Q6. Formative assessment is something I currently look for as part of my teacher evaluations.	3.8	0.84
Q10. Technology-based formative assessment is something that my teachers currently use.	3.6	0.55
Q7. Formative assessment data drives instructional decisions in the classrooms I observe.	3.4	1.14
Q13. Formative assessment practices is considered as part of the teacher evaluation process	3.4	0.89
Q15. I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject.	3.4	0.55

As shown in Table 51, the percentages of administrator responses ranged based on the type of question that was asked. The highest level of positive feelings (completely agree and agree) was found on two questions. On the question relating how formative assessment can help learn about student strengths and weaknesses, 60% stated agree, and 40% stated completely agree. On another question whereas an administrator, formative assessment is encouraged or required, 40% stated agree, and 60% stated completely agree.

**Table 51***Frequency - Likert Survey: Hypothesis Three (n=5)*

Likert Item	Completely Agree		Agree		Sometimes		Disagree		Completely Disagree	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Formative assessment is something I currently look for as part of my teacher evaluations.	1	20	2	40	2	40	0	0	0	0
Formative assessment data drives instructional decisions in the classrooms I observe.	1	20	1	20	2	40	1	20	0	0
Formative assessment can be a fast and effective way to learn about students' strengths and weaknesses.	2	40	3	60	0	0	0	0	0	0
Technology-based formative assessment is something that my teachers currently use.	0	0	3	60	1	20	1	20	0	0
Formative assessment is something that as an administrator I encourage or require of my classroom teachers.	3	60	2	40	0	0	0	0	0	0
Formative assessment practices is considered as part of the teacher evaluation process.	0	0	3	60	1	20	1	20	0	0
I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject.	0	0	2	40	3	60	0	0	0	0

Values for the seven questions were converted from ordinal data to interval data to facilitate the use of a Pearson  $r$  correlational test to determine if any significant relationship was found for the third hypothesis. A strong, inverse correlation was found between responses to one

set of variables. The relationship between the Likert item, *Formative assessment is something that as an administrator I encourage or require of my classroom teachers and I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject* had a strong, inverse correlation ( $r(3) = -1.00$ ,  $p < .01$ ), indicating a significant relationship between the two variables. Therefore, 100% of the variance in administrators' responses toward the requirement of formative assessment is accounted for by the variance in administrators' belief that their opinion is asked for when looking for new formative assessment practices. Administrators that expect or require formative assessment are more likely to believe that their opinion is neither asked for or needed when looking at new formative assessment practices. Table 52 will show all of the values for each variable including those that are significant.

**Table 52**

*Pearson r Correlations Likert Scale: Hypothesis Three (Administrators)*

Variable	<i>n</i>	1	2	3	4	5	6	7
1. FA and teacher eval.	5	—						
2. FA and use of data by teachers	5	.37	—					
3. FA and student strengths and weaknesses	5	.76	-.32	—				
4. FA and teacher usage	5	.33	.72	-.17	—			
5. FA and admin requirement	5	.87	.32	.67	.17	—		
6. FA and evaluation process	5	-.53	-.20	-.41	.61	-.10	—	
7. FA opinion known to/from admin	5	-.87	-.32	-.67	-.17	-1.0**	.10	—

\* $p < .05$ . \*\* $p < .01$ .

### Non-Statistical Findings

Open-ended responses were received from the teachers asking what formative assessment practices (technological or non-technological) they use. One pattern that emerged was that

teachers are using subject-specific formative assessments in the classroom. A second pattern that emerged was the amount and variety of technological-based formative assessment practices that teachers were using. Table 53, and Table 54 will highlight these patterns in more detail.

**Table 53**

*Likert Survey Open-Ended Question Responses: What professional development needs are essential to implement technology-based formative assessment practices for your classroom or to use them more effectively? (n=31)*

Teacher Responses <i>n</i> = 31
“IXL, Kuta, Edmentum, Canvas.”
“Q&A, paper quiz, class discussions, individual student assessments.”
“Google Forms, Presentations (Slides/Power-point), Pear Deck, Virtual Stock Market Game, Canvas, Zoom/Meets recorded lectures, Kami, Flipgrid, NewsELA”
“Pear Deck, IXL, Exit Tickets, Informal questioning, I do-We do-You do.”
“Kahoot, Google Forms, Word Clouds.”
“Canvas Discussions, Quizzes, Google Workspace Apps (Docs, Slides, Forms), Entrance/Exit tickets, in-class discussions, one-on-one discussions, standards-based grading and feedback structure.”
“I use CANVAS quizzes to generate exit tickets, quizzes, and unit tests. I also use paper-based assessments, strategic questioning throughout the lesson, and projects as forms of formative assessments. I have also used Pear Deck.”
“Canvas, Desmos, IXL, Pear Deck, and Near Pod.”
“Google Forms, Paragraph writing, Exit Tickets, Thumbs Up/Thumbs Down, Bell Ringer, Polls/Quizzes, Reflection.”
“Mini quizzes, Quizizz, Kahoot, flashcard calling, warm ups, exit tickets, homework/classwork spot checking, circulating the room monitoring progress, CFAs, student organized tutor groups.”
“Kahoots, Desmos Activities, Khan Academy assignments, daily warm ups, verbal questions, exit tickets, Pear Deck presentations, checks for understanding using white-boards, etc.”
“Warm up, Exit Tickets, and Pear Deck.”
“Exit tickets, quick polling, student self-evaluation, quick writes, submissions in Canvas.”
“Inspire calculator, discovery through experimenting, math games.”
“I use Pear Deck, paper, Google Forms, exit tickets, Padlet.”

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“Check for understanding - thumbs up/down, warm-ups - we use warm-ups to work on skills, and I walk to each student to assess their understanding of the skill while they work on the independent work. This is not graded, but eventually will be assessed in a Google quiz. Canvas quizzes - use them to check their understanding of an assignment by utilizing the auto grading features of Canvas quizzes. Google Forms quizzes - limited, but we can assign a few questions in there to assess understanding of concepts.”

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**Table 54**

*Frequency: Likert Open-Ended Question: What formative assessment tools (technological or non-technological) do you use currently in your classroom? (n=31)*

Responses	Frequency
Subject Specific	24
Exit Tickets	14
Canvas	12
Quiz or Assessment	11
Pear Deck	11
Google Forms	9
Warmups	8
Q&A	6
Kahoot	5
Discussions	5
IXL	5
Whiteboards	3
Presentations	3
Flipgrid	1
Kami	1
Video Lessons	1

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Edmentum	1
Kuta	1

Interviews were also conducted with teachers during the research study to operationalize the relationship between formative assessment practices and instructional decisions. For the third hypothesis, the following questions were asked: 1) *Describe how formative assessment helps you, as the instructor, as you work with your students.* 2) *What do you feel are the benefits of formative assessment to your students?* 3) *How often do you give student feedback and what does it look like?* and, 4) *How often does formative assessment drive instructional decisions in your classroom?* Frequencies of responses were calculated from the interview responses. The interviews were recorded via an online program called Zoom. The researcher transcribed the interviews and forwarded the transcriptions to each participant for their approval, to add validity to the qualitative data.

Complete interview responses reflect significant trends (see Table 55, Table 57, Table 59, Table 60, and Table 62). One trend that emerged through the study was that formative assessment helps not only with student understanding, but also help lesson planning. Another significant trend is that for the students, in the eyes of the teacher, it helps with their understanding during a concept or unit. Lastly, another trend that emerged was that formative assessments play a significant role with the instructional decisions in the classroom.



**Table 55**

*Frequency: Interview Question #1: Describe how formative assessment helps you, as the instructor, as you work with your students. (n=20)*

Responses	<i>Frequency</i>
Student Understanding	18
Lesson Planning	10
Student Processing	4

Highlights of participants' one-on-one interview responses when asked, *Describe how formative assessment helps you, as the instructor, as you work with your students.* are reflected below. For complete interview responses, see Appendix G.

**Table 56**

*Interview Question #1 Response: Describe how formative assessment helps you, as the instructor, as you work with your students. (n=20)*

Teacher Responses <i>n</i> = 20
<p>“Yeah, formative assessment gives me a feel for where they're at. It's everything that I need to know moving forward because it's blind if I don't have a formative assessment, tell me as a whole how they did individually, how they did. It is my guide for how to move forward from today.”</p> <p>“So formative assessment helps me see concepts that they struggled on. So I see out of so like out of a test of our assessment of 10 questions say it's consistent that they're getting two of them wrong and I can see the mistake that they're making. Then maybe there was maybe it was misunderstood, or I didn't explain it clearly enough. So I know that those would be concepts that I need to revisit or hit heavier the next year when I get to that point.”</p> <p>“It does. It gives you a measuring point again for their understanding level. And that's what I mean, you can tell from multiple choice stuff, but they got what they mastered this and that. But again, it gives me the measurement even when we're doing practices in class, excuse me, interactive activities that I can see them and their comprehension. And then also, as they're talking about it and discussing it or performing it, I can stop the students and add to their skills further and say, Hey, it seems like you guys were way off track on this part. Let's bring it back over here to the standard where you're supposed to be.”</p> <p>“Well, the fastest thing it does is allow me to reteach or go back over something if I notice that quite a few of the kids are like off base. I can do it right there in the moment. Ok, now remember, let's go back and review this because I said this earlier, but that's not what I'm seeing. And then we can get that reteaching done right away. And so, I really appreciate that. And then another thing it does is give me data. If I if I want to sit down, I can. I can get the data from Kahoot. I can get it from Pear Deck. I can get it from Quill.org. Even that's another one that we use where we can see in real time what the students are putting down answering.”</p>

**Table 57**

*Frequency: Interview Question #2: What do you feel are the benefits of formative assessment to your students? (n=20)*

Responses	Frequency
Understanding of concepts	17
Practice	5
Life Skills	3

Highlights of participants' one-on-one interview responses when asked, *What do you feel are the benefits of formative assessment to your students?* are reflected below. For complete interview responses, see Appendix G.

**Table 58**

*Interview Question #2 Response: What do you feel are the benefits of formative assessment to your students? (n=20)*

Teacher Responses <i>n</i> = 20
"It allows them to get a good, clear understanding of where they are at so that they're not left in the dark."
"On the student? And I think really formative assessment is almost another way of practice for them and is another way for them to gauge their own understanding, as well as allowing me to gauge their understanding. I like to do just quick. Ok, give me a one, two or three. A one if this is easy for you, a two, if you need a little bit of help or a three if you don't get this at all, like if you're like Miss Teacher, I need all of your help. I don't get this at all. And so when I see that and they're gauging their own understanding, it allows me to help those students who need the help. And again, it allows them to review the skill on their own and to reflect on what they need help with."
"Gives the students a sense of where they are in the learning and what they still need to work on. That feedback is essential because if they don't have feedback, they don't know how they're doing. And they can't respond effectively, either."
"Their benefits is to know what, what the holes that they need to close. Where you have to have the teacher actually teach to be able to cover those holes because they're not going to come over and ask for the help, but. At the end, if the teacher sees it, the teacher covers the holes, that would be the benefit at the end for the student."

**Table 59**

*Frequency: Interview Question #3a: How often do you give student feedback and what does it look like? (n=20)*

Responses	Frequency
Everyday	4
Often	8
Regularly	5
Occasionally	3

**Table 60**

*Frequency: Interview Question #3b: How often do you give student feedback and what does it look like? (n=20)*

Responses	Frequency
One-on-one	12
Whole class based	9
Through Technology	3
Rubric	1

Highlights of participants' one-on-one interview responses when asked, *How often do you give student feedback and what does it look like?* are reflected below. For complete interview responses, see Appendix G.

**Table 61**

*Interview Question #3 Response: How often do you give student feedback and what does it look like? (n=20)*

Teacher Responses <i>n</i> = 20
<p>"I give constant feedback, walking around the room, watching students work, and on Pear Deck, I scroll through their answers in real time and give kind of constant feedback. But as far as outside of walking around the classroom, that is an area that I don't do as much on grading work and writing feedback on the work and give it back to them. I do a lot of in the moment, feedback in class."</p>
<p>"I give verbal feedback pretty often, especially when we're engaged in those kinds of activities. I always give written feedback on things that I consider to be more summative. I guess you could say. But. Yeah. How often? Well, I guess some handful of kids feedback every single day. But I don't know if I, that's probably something I do intermittently and I'm not sure I have the best."</p>
<p>"Every single day. Pretty much every single. I mean, gosh, if you want me to get technical about it, I mean, I give feedback pretty much once every fifteen to twenty-five seconds. I mean, because just so like this morning, we started new Christmas music because we just finished marching season. So we go through and we're playing OK, and then I can always tell when a majority of the class is lost. So I stop and I'm like, OK, this is what you're doing wrong. This is what you're doing wrong. Let's try it again. And then we go back through and we do it again. But I mean, it's a constant feedback. All day, every day, that's all I do. Sometimes I feel like is give feedback."</p>
<p>"I try to give students feedback with every assignment, and so we do homework assignment, probably like every day, Monday through Thursday at least. And I try to give feedback so that they can better understand."</p>

**Table 62**

*Frequency: Interview Question #4: How often does formative assessment drive instructional decisions in your classroom? (n=20)*

Responses	Frequency
Everyday	9
Often	3
Regularly	5
Occasionally	3

Highlights of participants' one-on-one interview responses when asked, *How often does formative assessment drive instructional decisions in your classroom?* are reflected below. For complete interview responses, see Appendix G.

**Table 63**

*Interview Question #4 Response: How often does formative assessment drive instructional decisions in your classroom? (n=20)*

Teacher Responses <i>n</i> = 20
<p>"Every week, for sure. Just now, actually, just today, something happened, and I thought, Oh my gosh, they don't understand that concept. I can tell from what they're saying. And so I need to reteach it not just happened today and I'm going to reteach it tomorrow. So all the time."</p> <p>"Almost like one hundred percent of the time, I do feel that, like I said, I am constantly doing checks for understanding. I do written formative assessments, mostly verbal. But again, if I am, if I have a plan and a lesson that I want to teach, I am more than willing to hold off on the next activity to focus on a skill that's not being met or to reteach and reteach it in a way that they'll understand it. Because if I have a lesson and students because I have to make accommodations for my students every single day, I have students who are great at technology and I have students who are horrible at technology."</p> <p>"Well, quite often, because it literally even just that over the shoulder of a notebook check for today's learning target, I can instantly see and stop and say, Hey, everyone is only answering this part. All right. But I want you to do that instantly gives me the feedback that I need to either go further with my instructions or encourage them if I keep saying maybe even the wrong answer. Whoa, whoa, you got the wrong answer. And then the next row where you wouldn't have been looking at the person next to you for the wrong answer, copied it like, Oh my gosh, and then I'll go check the kid. Like, with a high A, it'll be like, Oh, you're a little off, too, OK? So sometimes it helps me, like maybe I wasn't clear enough for the assignment that I thought was there just. I love those things."</p>

Open-ended responses were also received from administrators related to formative assessment practices at their site. Specifically, administrators were asked about what formative assessment practices (technological or non-technological) could they identify as being used on their campus. A pattern that emerged was that administrators know of multiple different formative assessment practices that are being used on their campus, with some technology based. Table 64 will highlight these patterns in more detail.

**Table 64**

*Likert Survey Open-Ended Question Responses: Which formative assessment tools (technological or non-technological) are currently used at your site? (n=5)*

Administrator Responses <i>n</i> = 5
“Pre-write, post-write, IXL, Edmentum, Pear Deck, Google Forms/Classroom, Canvas, paper assessments, exit tickets, Illuminate assessments, informal questioning of students, etc.”
“Quizzes, Exit Slips, KWL Charts, In-class discussion, Pear Deck, group work, What Did You Learn today question, think-pair-share, Kahoot.”
“Pear Deck, Kahoot, Quizlet, Nearpod, Edpuzzle, Exit Tickets, Summary Writing.”
“We have a ton. Canvas, Illuminate, Pear Deck, Kahoot, Google Forms, Padlet, Flipgrid, Mentimeter, Clickers, Quizizz, Etc...etc...etc...”
“Canvas Quiz, Kahoot, Flipgrid, Pear Deck, Ed Puzzle, NewsELA, Google Forms, Jamboard, Padlet, Mentimeter, Parlay, Quizizz, Quizlet.”

Interviews were also conducted with administrators during the research study to operationalize the relationship between formative assessment practices and instructional decisions. For the third hypothesis, the following questions were asked: 1) *Describe how formative assessment helps you, as an administrator, as you work with your teachers.* 2) *What do you feel are the benefits of formative assessment to your teachers?* and 3) *When you observe teachers, how often do you see student feedback and what does it look like?* The interviews were recorded via an online program called Zoom. The researcher transcribed the interviews and

forwarded the transcriptions to each participant for their approval, to add validity to the qualitative data.

Complete interview responses reflect significant trends (see Table 65, Table 66, and Table 67). One trend that emerged through the study was that administration has the expectation that formative assessments are going to be used to elicit student thinking and engagement. There is an expectation that formative assessments will be used at various times to plan for future instruction. Highlights of participants' one-on-one interview responses when asked, *Describe how formative assessment help you, as an administrator, as you work with your teachers...* are reflected below. For complete interview responses, see Appendix G.

**Table 65**

*Interview Question #1 Response: Describe how formative assessment helps you, as an administrator, as you work with your teachers. (n=3)*

Administrator Responses <i>n</i> = 3
<p>"I would say, yes, every single evaluation I look for that in every single observation evaluation I've made it very clear is, you know, what's an exit ticket look like. A meaningful exit ticket so you can gauge student learning for the day and teacher effectiveness regarding their instructional approach. And I even include that with all of the teachers that I have evaluated, and I know Teacher 1 probably has it in there. But that's probably the two biggest things that I look for is check for understanding and exit tickets and closing out your activity for the day and all that as well."</p>
<p>"Well, I think it's for me, it's less about numbers than it is about process, right? So when you look at our individual learning teams, it is, do they have one, an assessment structure, even if it's in progress, right? Do we have some sort of collaborative structure? And then do you have the commitment from all of those team members to stay kind of in the pace and conduct with fidelity, the assessments? And then the last piece, which is the toughest is getting that data back and sharing it out with student samples. So it's just that I'm looking more in the professional team for that process. And is there a commitment from all the members to be a part of that team and to have real conversations about student learning and how we can then change our instructional practices after we've had those collaborative conversations? And it's that that gap, I think, where I think we look at a lot of data, I don't know that it that it really informs and changes our instructional practice as much as it probably should."</p>
<p>"That's a good question, because really content doesn't touch my realm too often as a dean, but definitely the evaluative portion of my job working with teachers to create those formative assessments, see how their classroom runs. That's the relationship I have right now, but it's very limited."</p>

Highlights of participants' one-on-one interview responses when asked, *What do you feel are the benefits of formative assessment to your teachers?* are reflected below. For complete interview responses, see Appendix G.

**Table 66**

*Interview Question #2 Response: What do you feel are the benefits of formative assessment to your teachers? (n=3)*

Administrator Responses <i>n</i> = 3
<p>"I think the biggest thing is that I see it as an administrator as if I'm lecturing 30, for 30 minutes, and there's no checks for understanding or anything like that, there's no formative assessments intertwined within that. Then it just becomes boring and kids are disengaged and all that stuff. One teacher, new teacher, she had a and I don't know where she got it, but she had it in the midst of her. She would have knowledge checks after like two slides and all this check just to keep them, you know, seeing that they're paying attention doing. That's a great idea to have that in there. So, I think the big benefit is just to keep the learning continually going and there's no lull or disengagement that's taking place."</p> <p>"They going to be a lens into the student learning if we're if we're truly focused on learning for all students and we have to really understand where they are at, where their gaps of knowledge are, where their gaps and processing are for each segment or each piece of content that we teach. And we need to do that in context. And the best way to do that in the moment in context is with a simple, formative assessment that is non, it doesn't raise the effective filter, right, doesn't raise anxiety of the student. It's it becomes part of your, the classroom structure, coming back to the evaluations. What I look for, teachers and incorporate formative assessments daily to parent. It's not happenstance chance, right? It's planned, it's structured. It's even the questioning techniques. Whether you use a random technique, it is a structured way to view student learning and to inform the educational process. We don't know where students are at any given point in time. We have no ability to benchmark where we can take them and if we're just kind of shooting stuff out there. Shotgun approach without truly understanding where our kids are at, we're not being very efficient in our practice."</p> <p>"I think the benefit is, are the students understanding the material? You know, you can teach all you want, but if your students aren't getting it, there's something that needs to happen in order to make sure your students are successful."</p>

Highlights of participants' one-on-one interview responses when asked, *When you observe teachers, how often do you see student feedback and what does it look like?* are reflected below. For complete interview responses, see Appendix G.



**Table 67**

*Interview Question #3 Response: When you observe teachers, how often do you see student feedback and what does it look like? (n=3)*

Administrator Responses <i>n</i> = 3
<p>“So I see, when I see teacher feedback, I see teachers that are effective, pacing the classroom, effectively being able to engage with students and provide that feedback that goes on there. Sometimes I'll ask the kid is like, How is this class going? What are you learning today? I'll ask him specifically those questions, even though the objective's right on the board. But I want to see what they know kind of right away to look at. So, I think the other thing that I observed with teachers is, are they effectively monitoring and pacing the classroom?”</p> <p>“Um, to be honest, it comes in various forms. I think one of the fascinating things about a campus that has over a hundred teachers is you have very spurious states of expertise and various states of familiarity with technology. You have, you know, teachers that live in a very traditional space, which is fine, and you have teachers that live in a very tech savvy space, which is fine. I think, you know, coming back to the question. It's about repetition, it's about seeing it as part of an overall structure that student feedback and that student feedback could be very traditional in nature, that traditional warm up or that traditional five paragraph or write a paragraph on this and then you do a close read on it, you know, it could be a very traditional paper-based product. But kids are engaged doing it, and then it leads to the next activity of collective discussion about it. And with examples and having a discussion and bringing in their input. And it comes from the kids.”</p> <p>“The observation process has been skewed the last few years, especially with the shutdowns. So... Really, it's just trying to understand if the student is engaged, if the student is working, if there's some kind of mastery of the subject. I often see it when you're walking in, especially the unannounced, because the announced visit is a little dog and pony show. But really talking to the kids one on one and saying, Hey, why are you learning this? What? How are you going to apply it? And having these one-on-one conversations with the students after the class.”</p>

## Findings for Hypothesis Four: Relationship of External Factors That Influence the Effectiveness of School Leadership to Implement Technology-Based Formative Assessments

### Statistical Findings

The fourth hypothesis stated that there would be no relationship between external factors that influence the effectiveness of school leadership to implement technology-based formative assessments. A Likert scale was first analyzed using descriptive statistics.

Seven questions on the online survey completed by teachers that were related to the first hypothesis were sorted by mean, with the highest responses being first and the lowest being last.

The ratings are based on a 5-point scale with four questions using: 1=Completely Disagree, 2=Disagree, 3=Sometimes, 4=Agree, 5=Completely Agree, and three questions using: 1=Not at All, 2=Little Impact, 3=Some Impact, 4=Moderate Impact, and 5=Impacts Greatly. The highest rated questions were question 17, “I feel like I need more training in formative assessment and would participate in a workshop or training if it was available ( $M=3.97$ )” and question 16, “Professional development in formative assessment is effective towards implementation in the classroom ( $M=3.87$ )”. The lowest rated question was question 21, “How much does budgeting play an impact in adopting technology-based formative assessment practices? ( $M=3.29$ )”. Mean and standard deviation data related to external factors and effectiveness in implementing technology-based formative assessments is depicted in Table 68.

**Table 68***(M) Means and (SD) Standard Deviations of the 7 Survey Questions for Teachers (n=31)*

Teachers Responses <i>n</i> = 31	<i>M</i>	<i>SD</i>
Q17. I feel like I need more training in formative assessment and would participate in a workshop or training if it was available.	3.97	1.02
Q16. Professional development in formative assessment is effective towards implementation in the classroom.	3.87	0.77
Q23. How much does the culture of the school affect the implementation of technology-based formative assessment in your classroom?	3.76	0.85
Q22. What role does the district office/leadership play in adopting technology-based formative assessment practices?	3.60	1.00
Q20. I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom.	3.47	0.96
Q19. Professional development has helped me implement formative assessment strategies in my classroom.	3.45	0.68
Q21. How much does budgeting play an impact in adopting technology-based formative assessment practices?	3.29	1.16

As shown in Table 69, and Table 70, the percentages of teacher responses ranged based on the type of question that was asked. The highest level of positive feelings (completely agree and agree) were found on two questions. The first was on the question relating professional development and its effectiveness in implementing formative assessment, with 51.6% stating agree, and 22.6% stating completely agree. The second was on the question relating formative assessment and the need for more training, with 29% stating agree, and 38.7% stating completely agree. On one question regarding the impact of school culture and the implementation of technology-based formative assessments, 35.5% stated a moderate impact, and 22.6% stated school culture impacts greatly.

**Table 69***Frequency - Likert Survey: Hypothesis Four (n=31)*

Likert Item	Completely Agree		Agree		Sometimes		Disagree		Completely Disagree	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Professional development in formative assessment is effective towards implementation in the classroom.	7	22.6	16	51.6	9	29	1	3.2	0	0
I feel like I need more training in formative assessment and would participate in a workshop or training if it was available.	12	38.7	9	29	7	22.6	3	9.7	0	0
Professional development has helped me implement formative assessment strategies in my classroom.	0	0	18	58.1	10	32.3	4	12.9	0	0
I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom.	3	9.7	15	48.4	9	29	4	12.9	1	3.2

**Table 70***Frequency - Likert Survey: Hypothesis Four (n=31)*

Likert Item	Not at All		Little Impact		Some Impact		Moderate Impact		Impacts Greatly	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
How much does budgeting play an impact in adopting technology-based formative assessment practices?	2	6.5	6	19.4	9	29	9	29	5	16.1
What role does the district office/leadership play in adopting technology-based formative assessment practices?	0	0	5	16.1	11	35.5	9	29	7	22.6
How much does the culture of the school affect the implementation of technology-based formative assessment in your classroom?	0	0	1	3.2	13	41.9	11	35.5	7	22.6

A Cronbach's Alpha analysis was run to determine a scale of reliability (see Table 71).

Generally speaking, reliability between 0.60 and 0.80 is considered acceptable, and it was determined that for this hypothesis the Likert survey questions were reliable a .634.

**Table 71**

*Cronbach's Alpha: Likert Survey - Hypothesis Four (Teachers)*

Cronbach's Alpha	N of Items
.634	7

Values for the seven questions were converted from ordinal data to interval data to facilitate the use of a Pearson  $r$  correlational test to determine if any significant relationship was found for the fourth hypothesis. A moderate, positive correlation was found between responses to four sets of variables, and a strong, positive correlation was found between responses in one variable. The relationship between the Likert item, *Professional development in formative assessment is effective towards implementation in the classroom* and *I feel like I need more training in formative assessment and would participate in a workshop or training if it was available* had a moderate, positive correlation ( $r(29) = .503, p < .01$ ), indicating a significant linear relationship between the two variables. Therefore, approximately 25% of the variance in teachers' responses toward the belief that professional development with formative assessment is effective with implementation is accounted for by the variance in teacher's belief that more training is needed, and teachers would participate if it was available. Teachers that have beliefs that professional development helps implement formative assessment are more likely to believe in more training and will attend more training if it is available.

The relationship between the Likert item, *Professional development in formative assessment is effective towards implementation in the classroom* and *I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom* had a moderate, positive correlation ( $r(29) = .444, p < .05$ ), indicating a significant relationship between the two variables. Therefore, approximately 20% of the

variance in teachers' responses towards the effectiveness of professional development and the implementation of formative assessment is accounted for by the variance in teacher's belief that professional development should be spread over time to help teachers feel comfortable with formative assessment. Teachers that believe that professional development is effective at implementing formative assessment are more likely to believe that professional development spread over time will help with the use and comfort of formative assessments.

The relationship between the Likert item, *What role does the district office/leadership play in adopting technology-based formative assessment practices* and *Professional development has helped me to implement formative assessment strategies in my classroom* had a moderate, positive correlation ( $r(29) = .376, p < .05$ ), indicating a significant relationship between the two variables. Therefore, approximately 14% of the variance in teachers' responses towards the role of the district office/leadership is accounted for by the variance in teacher's belief that professional development has helped teachers implement formative assessment. Teachers that believe that the district leadership has a role are more likely to believe that professional development will help with the implementation of formative assessments.

The relationship between the Likert item, *What role does the district office/leadership play in adopting technology-based formative assessment practices* and *Professional development in formative assessment is effective towards implementation in the classroom* had a moderate, positive correlation ( $r(29) = .360, p < .05$ ), indicating a significant relationship between the two variables. Therefore, approximately 13% of the variance in teachers' responses towards the role of the district office/leadership is accounted for by the variance in teacher's belief that professional development helps teachers implement formative assessment. Teachers that believe that the district leadership has a role are more likely to believe that professional development

will help with the implementation of formative assessments.

Finally, the relationship between the Likert item, *I feel like I need more training in formative assessment and would participate in a workshop or training if it was available and I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom* had a strong, positive correlation ( $r(29) = .685$ ,  $p < .01$ ), indicating a significant relationship between the two variables. Therefore, approximately 47% of the variance in teachers' responses toward the belief that more training in formative assessment is needed is accounted for by the variance in teacher's belief that professional development needs to be spread over time. Teachers that feel like they need more training are more likely to believe that professional development spread over time is more effective with implementing formative assessment. Table 72 will show all of the values for each variable including those that are significant.



**Table 72***Pearson r Correlations Likert Scale: Hypothesis Four (Teachers)*

Variable	<i>n</i>	1	2	3	4	5	6	7
1. PD and effective implementation of FA.	31	—						
2. Individual need for more PD for FA	31	.50**	—					
3. PD and individual implementation of FA	31	.34	.07	—				
4. PD over time for FA	31	.44**	.68**	.15	—			
5. Effect of budget for FA	31	.12	-.05	-.04	-.16	—		
6. Effect of district leadership and FA	31	.36*	.31	.37*	.20	.15	—	
7. Effect of culture and FA	31	.09	.24	.02	.25	.09	.31	—

\* $p < .05$ . \*\* $p < .01$ .

Six questions on the online survey completed by administrators that were related to the fourth hypothesis were sorted by mean, with the highest responses being first and the lowest being last. The ratings are based on a 5-point scale with three questions using: 1=Completely Disagree, 2=Disagree, 3=Sometimes, 4=Agree, 5=Completely Agree, and three questions using: 1=Not at All, 2=Little Impact, 3=Some Impact, 4=Moderate Impact, and 5=Impacts Greatly. The highest rated question was question 17, “I feel like my teachers need more training in formative assessment and would participate in a training if it was available ( $M=4.4$ )”. The lowest rated question was question 22, “What role does the district office/leadership play in adopting

technology-based formative assessments? ( $M=3.2$ )". Mean and standard deviation data related to external factors and effectiveness in implementing technology-based formative assessments is depicted in Table 73.

**Table 73**

*(M) Means and (SD) Standard Deviations of the 6 Survey Questions for Administrators (n=5)*

Administrators Responses <i>n = 5</i>	<i>M</i>	<i>SD</i>
Q20. Teachers need professional development spread over time to feel comfortable using technology-based formative assessment practices in their classrooms.	4.4	0.55
Q16. Professional development in formative assessment is effective towards implementation in the classroom.	3.8	0.45
Q17. I feel like my teachers need more training in formative assessment and would participate in a workshop or training if it was available.	3.8	0.84
Q23. How much does the culture of the school affect the implementation of technology-based formative assessment practices?	3.8	0.84
Q21. How much does the budget play an impact in adopting technology-based formative assessment practices?	3.6	1.14
Q22. What role does the district office/leadership play in adopting technology-based formative assessment practices?	3.2	0.84

As shown in Table 74, and Table 75, the percentages of administrator responses ranged based on the type of question that was asked. The highest level of positive feelings (completely agree and agree) was found on one question. This was on the question relating needing more time for professional development and its effectiveness in implementing formative assessment, with 60% stating agree, and 40% stating completely agree. On one question regarding the impact of school culture and the implementation of technology-based formative assessments, 40% stated a moderate impact, and 20% stated school culture impacts greatly.

**Table 74***Frequency - Likert Survey: Hypothesis Four (n=5)*

Likert Item	Completely Agree		Agree		Sometimes		Disagree		Completely Disagree	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Professional development in formative assessment is effective towards implementation in the classroom.	0	0	4	80	1	20	0	0	0	0
I feel like my teachers need more training in formative assessment and would participate in a workshop or training if it was available.	1	20	2	40	2	40	0	0	0	0
Teachers need professional development spread over time to feel comfortable using technology-based formative assessment practices in their classrooms.	2	40	3	60	0	0	0	0	0	0

**Table 75***Frequency - Likert Survey: Hypothesis Four (n=5)*

Likert Item	Not at All		Little Impact		Some Impact		Moderate Impact		Impacts Greatly	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
How much does the budget play an impact in adopting technology-based formative assessment practices?	0	0	1	20	1	20	2	40	1	20
What role does the district office/leadership play in adopting technology-based formative assessment practices?	0	0	1	20	2	40	2	40	0	0
How much does the culture of the school affect the implementation of technology-based formative assessment practices?	0	0	0	0	2	40	2	40	1	20

Values for the six questions answered by administrators were converted from ordinal data to interval data to facilitate the use of a Pearson r correlational test to determine if any significant relationship was found for the second hypothesis. Unfortunately, there were no significant

relationships found. Table 76 will show all of the values for each variable.

**Table 76**

*Pearson  $r$  Correlations Likert Scale: Hypothesis Four (Administrators)*

Variable	$n$	1	2	3	4	5	6
1. PD of FA is effective for implementation	5	—					
2. More PD for teachers for FA	5	.53	—				
3. More time for PD for FA	5	-.61	.22	—			
4. Impact on budget for FA	5	.78	.68	-.08	—		
5. Impact of district leadership on FA	5	-.53	-.64	-.22	-.68	—	
6. Impact of school culture on FA	5	-.80	-.43	.76	-.37	.07	—

\* $p < .05$ . \*\* $p < .01$ .

### Non-Statistical Findings

Interviews were also conducted with administrators during the research study to operationalize the relationship between external factors and formative assessment technology and professional development decisions. For the fourth hypothesis, the following question was asked: *What issues do you find that influence the purchase of technology or professional development for formative assessment?* The interviews were recorded via an online program called Zoom. The researcher transcribed the interviews and forwarded the transcriptions to each participant for their approval, to add validity to the qualitative data.

Complete interview responses reflect significant trends (see Table 77). One trend that

emerged through the study was that administration currently has the resources to purchase technology, but due to the pandemic, professional development time is limited. Another trend concerned the utility of using the money for formative assessments versus social emotional learning during this time. Highlights of participants' one-on-one interview responses when asked, *What issues do you find that influence the purchase of technology or professional development for formative assessment?* are reflected below. For complete interview responses, see Appendix G.

**Table 77**

*Interview Question Response: What issues do you find that influence the purchase of technology or professional development for formative assessment? (n=3)*

Administrator Responses <i>n</i> = 3
<p>"So right now, I'll say this coming back off of, coming back off of a pandemic year has probably been the most difficult year from a behavioral standpoint that we ever look at, and I just... I think that's a big issue is having to deal with behavior, and we're trying to find the balance as administrators is, do we spend money on the formative assessment piece or do we spend money on SEL training so that our teachers can connect with kids first?"</p> <p>"A willingness for people to try new things and approach me with it. I'm very open and I'll buy anything if it looks like it's going to be used and there's a collective commitment to use it. Is, you know, we want to get bang for our buck. You want to go with the proven product, but it's really just approaching me and seeing if we have the money to do it. I can. I can, you know, think of the IXL that we purchased. But even before that, for social studies, you know, we've committed to TCI, which is a Stanford based curriculum that has a lot of those assessment strategies built in. So and there was a collective commitment by the department at that time, they really wanted to use it. We've since phased it out because they weren't using it as much as they thought they were going to use it."</p> <p>"That's really not my realm. I don't understand the budget too much, but especially with the COVID money I've seen Admin 1 grant a lot of technology lately because we've had to. So that's my limited knowledge of the tech budget."</p>

### Un-hypothesized Findings

During the analysis of the online survey, it was determined that there were variables that showed significant correlation that were not connected to a specific hypothesis. A moderate, positive correlation was found between responses to two sets of variables, and a moderate,

inverse correlation was found between responses in three variables. The relationship between the Likert item, *Professional development has helped me to implement formative assessment strategies in my classroom* and *I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject* had a moderate, positive correlation ( $r(29) = .416, p < .05$ ), indicating a significant linear relationship between the two variables. Therefore, approximately 17% of the variance in teachers' responses toward the belief that professional development with formative assessment is effective with implementation is accounted for by the variance in teacher's belief that their opinion is known regarding new formative assessment practices. Teachers that hold beliefs that professional development helps implement formative assessment are more likely to believe they will be consulted by leadership on new formative assessment practices.

The relationship between the Likert item, *What role does the district office/leadership play in adopting technology-based formative assessment practices?* and *I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site* had a moderate, positive correlation ( $r(29) = .379, p < .05$ ), indicating a significant relationship between the two variables. Therefore, approximately 14% of the variance in teachers' responses towards the role of district leadership and the implementation of formative assessment is accounted for by the variance in teacher's confidence in leading a workshop on formative assessment. Teachers that believe that district leadership plays a role in the implementation of formative assessment are more likely to believe that they feel comfortable in leading a workshop or training on formative assessment.

The relationship between the Likert item, *I feel like I need more training in formative assessment and would participate in a workshop or training if it was available* and *Technology-*

*based formative assessment is something I currently feel confident using in my classroom* had a moderate, inverse correlation ( $r(29) = -.520, p < .01$ ), indicating a significant relationship between the two variables. Therefore, approximately 27% of the variance in teachers' responses towards the need for more training is accounted for by the variance in teacher's belief that they are comfortable with formative assessment. Teachers that believe that they need more training with formative assessment are more likely to be less confident with formative assessment in the classroom.

The relationship between the Likert item, *Technology-based formative assessment is something I currently feel confident using in my classroom* and *I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom* had a moderate, inverse correlation ( $r(29) = -.431, p < .05$ ), indicating a significant relationship between the two variables. Therefore, approximately 19% of the variance in teachers' responses towards their confidence with technology-based formative assessment is accounted for by the variance in teacher's belief that professional development over time helps teachers implement formative assessment. Teachers that believe that they are confident with technology-based formative assessment are more likely to believe that professional development over time will not help with the implementation of formative assessments.

Finally, the relationship between the Likert item, *How much does budgeting plays an impact in adopting technology-based formative assessment practices?* and *The administration communicates with me about formative assessment in the classroom* had a moderate, inverse correlation ( $r(29) = -.384, p < .05$ ), indicating a significant relationship between the two variables. Therefore, approximately 15% of the variance in teachers' responses toward the budget is a factor in adopting technology-based formative assessment is accounted for by the



variance in teacher's belief that administration communicates about formative assessment.

Teachers that feel that the budget plays an impact in adopting formative assessment practices are more likely to believe that the administration does not communicate about formative assessment in the classroom.

### **Summary**

This correlational case study sought to examine the relationship of school leadership as it related to the implementation, professional development, instructional decisions, and external factors of technology-based formative assessments. The study results were triangulated through the use of qualitative and quantitative data. The quantitative data was analyzed using SPSS and the results were explained. Descriptive and inferential statistics were calculated to analyze the quantitative data collected through the study. Descriptive statistics provided frequency distribution percentages, measures of central tendency including mean, and measures of dispersion including standard deviation. Pearson  $r$  correlations were conducted to determine significant relationships. Relationships between variables were analyzed to determine associations to make predictions. Correlations with an absolute value over .70 were considered strong, and correlations between .30 and .70 were considered moderate. The qualitative data was analyzed from transcripts and open-ended responses. The researcher read through and coded the data utilizing axial coding procedures. Qualitative data provided themes and patterns through the use of domain analysis. The subsequent chapter provides a summary of the findings related to whether a significant relationship was found between school leadership, professional development for technology-based formative assessments, the implementation of technology-based formative assessments, instructional decisions, and external factors. The findings will be shared to create awareness of the potential educational benefits of understanding the role of

school leadership with technology-based formative assessments.

## CHAPTER 5: DISCUSSION

Formative assessment is essential to understanding where a student is within the educational process, as well as for the instructor to decide on the next instructional steps. Emergent technologies are working to make the formative assessment process easier for both student and teacher. In order to meet the needs of students and educators, we need to look at the role that educational leaders have with the implementation and professional development of technology-based formative assessments.

Educational leaders have a unique role within the educational system in that they can be the key decision makers when looking to adopting new technologies for formative assessment and making available the professional development needed for effective and sustained implementation. In order to examine the relationship of school leadership to professional development and successful implementation of technology-based formative assessments, this study used a correlational research design. The use of a correlational research design was to determine the relationship between the variables. Random sampling was not possible for this study; the study was conducted with one 9-12 high school in Central California. The participants included teachers and administrators from the aforementioned high school. The study sought to answer the questions of the relationship of school leadership related to the successful implementation of technology-based formative assessments, the relationship of professional development related to the successful implementation of technology-based formative assessments, the relationship of formative assessments related to instructional decisions made by teachers, and the relationship of external factors related to the effectiveness of school leadership to implement technology-based formative assessments. Quantitative and qualitative instruments were used for triangulation of the data and to enhance validity and reliability. This research study

occurred during eight weeks of instruction during the fall semester.

### **Hypothesized Conclusions**

#### **Hypothesis One**

The first hypothesis stated that there is no relationship between school leadership and the successful implementation of technology-based formative assessment.

At the end of the eight-week study, the null hypothesis was accepted. A significant relationship was not evident between school leadership and the successful implementation of technology-based formative assessments (see Table 9 and Table 15). However, while the hypothesis was accepted from a statistical standpoint, the survey responses reflected moderate, positive relationships within teachers' beliefs that the communication they received from school leadership regarding formative assessment were also more likely to believe that formative assessment is required by school leadership. They are also more likely to believe that formative assessment is a part of the evaluation process. The teachers also feel that as part of the requirement of formative assessment, school leadership needs to demonstrate the effective use of formative assessments for their teaching practice. The frequency findings from the Likert survey supported a high level of positive feelings from teachers that school leadership requires the use of formative assessment as part of teaching practices with 19.4% stating strongly agree and 51.6% stating agree (see Table 5).

Additionally, there was a strong, positive relationship found with school leadership responses related to their confidence with respect to formative assessment practices and their perceived ability to demonstrate formative assessment practices effectively. Conversely, there was a strong, inverse relationship between school leadership's requirement of the use of formative assessment and whether school leadership's opinion on new formative assessment

practices is asked for. The frequency findings from the Likert survey supported a high level of positive feelings from school leadership that they require or encourage the use for formative assessment practices for their teachers with 60% stating strongly agree and 40% stating agree (see Table 11).

These findings are supported by the studies conducted by Davies et al. (2014) which reflect that school leadership needs to understand the pedagogical use of formative assessments and be able to demonstrate how to use them before they can be used effectively within the classroom. The importance of school culture and leadership towards formative assessment is supported by Arbabi and Mehdinezhad (2015), who believe that cooperative leadership and strategic planning can increase the effectiveness of the implementation of formative assessments. The frequency findings from the Likert survey supported the belief from teachers that school culture has an impact of the implementation of formative assessments with 22.6% stating impacts greatly, and 35.5% stating moderately impacts.

Finally, regarding hypothesis one, which stated that there would be no relationship between school leadership and the successful implementation of technology-based formative assessments, there were relevant findings from a non-statistical standpoint. Many teachers responded with how school leadership could help with the successful implementation of technology-based formative assessments. Highlights of quotes supporting this are included below.



## Hypothesis Two

The second hypothesis stated that there would be no relationship between professional development and the successful implementation of technology-based formative assessments.

At the end of the eight-week study, the null hypothesis was accepted. A significant relationship was not evident between professional development and the effective implementation of technology-based formative assessments (see Table 25, and Table 28). However, while the hypothesis was accepted from a statistical standpoint, the survey responses reflected moderate, positive relationships with teachers who felt that more professional development with formative assessment was more likely to have a positive effect on the implementation of formative assessment practices. Additional moderate, positive relationships were found with teachers who felt that professional development with formative assessment over time had a positive effect on implementation as well as those who needed more professional development also felt the need for it to spread over time for effective implementation. The frequency findings from the Likert survey supported a high level of positive feelings from teachers that professional development with formative assessment is effective with implementing the practices in the classroom with 22.6% stating completely agree, and 51.6% stating agree. The frequency findings from the Likert survey also supported a high level of positive feelings from administrators that professional development with formative assessment over time is effective toward implementation with 40% stating completely agree, and 60% stating agree (see Table 23, and Table 27).

Interviews were conducted, and the patterns that emerged also were found to support the studies conducted by Andersson and Palm (2017a, 2017b) related to professional development and the implementation of formative assessments. Their studies showed that professional development helped teachers evaluate their assessment skills which translated into higher student

understanding and better pedagogical knowledge for these teachers. A significant trend that emerged was that professional development trainings would have formative assessment embedded within a larger focus of the training, making it hard to implement after the training. Another significant trend was that professional development helped to emphasize the importance of feedback with formative assessment for both teacher and student. Additionally, another significant trend was the need for more time for training, and specific examples of formative assessment for subjects or courses. Quotes to support these themes are included below.

**Table 79**

*Hypothesis Two: Responses to professional development and successful implementation of technology-based formative assessments. (n=3)*

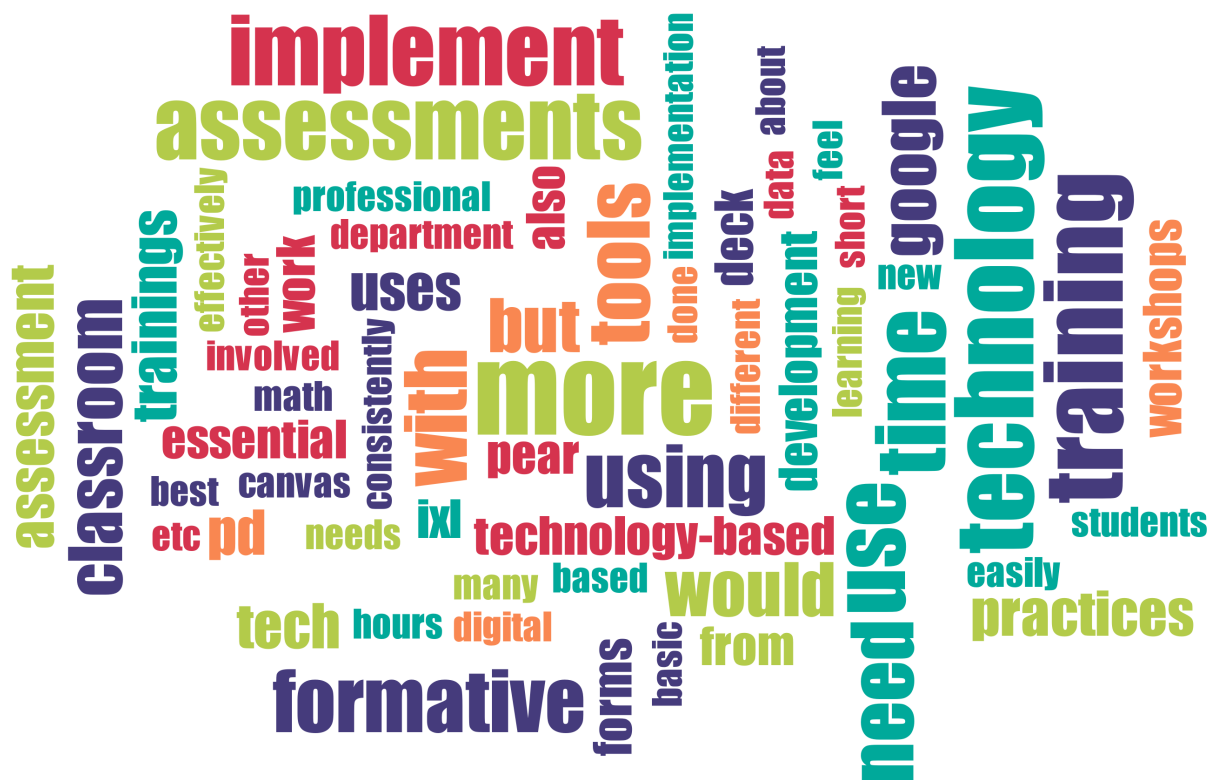
Teacher Responses <i>n</i> = 3
<p>“Yes. Kind of. Not that have been focused on formative assessments, but I've been to various trainings that are about writing or about reading and ways that we can give formative assessments within those trainings, but never a training that was focused primarily on giving assessments.”</p> <p>“I think it makes...it's made me more intentional in designing formative assessments rather than just kind of on the cuff, having like a quick little check. That's not to say I don't still do those things. I do still in the moment, you know, like, doing a lesson today, I did a simple check for, you know, and how well were kids understanding the writing prompt that we had just taken some time to dissect together and it was a simple, you know, in front of their chests, thumbs up, thumbs down or thumb sideways, you know, and we kind of defined what a thumbs up mean, what is thumb sideways mean versus what is thumbs down mean? And again, it's not me looking in that situation. It wasn't me looking at something on their paper. But it does still give me feedback to help me understand. Do I need to break this down further? Do I need to provide more models? Do I need to teach this when we get back on Monday?”</p> <p>“I would like to see different tools put into motion, so I guess an example done in class with the trainees to show us how to implement it because a lot of trainings are great that I've been going to. But not many are great for mathematics, so I'd like to see how they're implemented. For a math class and some, some tangible examples.”</p>

The pattern that emerged from the open-ended survey question regarding what the essential professional development needs for effective implementation of technology-based formative assessments was the need for more training, time, technology, and workshops (see Figure 4).



**Figure 4**

*Word Cloud: Likert Survey Open-Ended Question Two*



### **Hypothesis Three**

The third hypothesis stated there would be no relationship between formative assessments and instructional decisions made by teachers.

At the end of the eight-week study the null hypothesis was accepted. A significant relationship was not evident between formative assessments and instructional decisions made by teachers (see Table 49). However, while the hypothesis was accepted from a statistical standpoint, the survey responses reflected moderate, positive relationships as teachers who used formative assessment data to drive their instructional decisions were also more likely to be asked their opinion on new formative assessment practices. Moderate, positive relationships were found with those teachers who are confident using formative assessments and those who are

asked for their opinion on new formative assessment practices were more likely to have a higher level of comfort on leading professional development with formative assessment.

The frequency findings from the Likert survey supported a high level of positive feelings from teachers that formative assessment drives the instructional decisions in the classroom with 25.8% stating completely agree and 51.6% stating agree. Additionally, the frequency findings from the Likert survey supported a high level of positive feelings from teachers that formative assessment is a fast and effective way of identifying student strengths and weaknesses with 45.2% stating completely agree and 38.7% stating agree. Lastly, the frequency findings from the Likert survey supported a high level of positive feelings from teachers that their individual technological knowledge plays an impact on adopting technology-based formative assessment practices within their classroom with 51.6% stating impacts greatly and 35.5% stating moderate impact.

Interviews were conducted, and the patterns that emerged support the studies of Andersson and Palm (2017a, 2017b) regarding formative assessment and instructional decisions made by teachers. Their studies showed that professional development helped teachers evaluate their assessment skills which translated into higher student understanding and better pedagogical knowledge for these teachers. One pattern that emerged was that formative assessment helps the teachers see where students are struggling or excelling and helps to inform what instructional decisions need to be made as a result. Another pattern that emerged was that formative assessment also helps the student to see where they are at within the educational process to help with monitoring their progress and learning. Quotes to support these patterns are included below.

**Table 80**

*Hypothesis Three: Responses to formative assessment and instructional decisions made by teachers. (n=2)*

Teacher Responses <i>n</i> = 2
<p>“Almost like one hundred percent of the time, I do feel that, like I said, I am constantly doing checks for understanding. I do written formative assessments, mostly verbal. But again, if I am, if I have a plan and a lesson that I want to teach, I am more than willing to hold off on the next activity to focus on a skill that's not being met or to reteach and reteach it in a way that they'll understand it. Because if I have a lesson and students because I have to make accommodations for my students every single day, I have students who are great at technology, and I have students who are horrible at technology. And so maybe I'll have like an activity plan before the Chromebook on Canvas and I'm just seeing my students struggling. They're not able to get this whole tech aspect down. Then I will switch gears and do something on paper along the same lines, but sometimes I will switch it up to allow them to be comfortable in doing it. So I definitely I use it constantly.”</p> <p>“It gives them some confirmation of learning or allows them to develop questions, which definitely is a great tool for them. When if I ask a question and they're still struggling with how to answer it and they can ask me questions, at least I know which direction they're trying to go. But I think that would be the biggest thing that allows them to know if they understand it or not. And if they, if I give a bunch of formative questions, lets them identify what they're still struggling with now.”</p>

### **Hypothesis Four**

The fourth hypothesis stated that there is no relationship of external factors that influence the effectiveness of school leadership to implement technology-based formative assessments.

At the end of the eight-week study, the null hypothesis was accepted. A significant relationship was not evident between external factors and the effectiveness of school leadership to implement technology-based formative assessments (see Table 72). However, while the hypothesis was accepted from a statistical standpoint, the survey responses reflected moderate, positive relationships as teachers were more likely to view professional development and the effective implementation of formative assessment with the role of district leadership in the process. Additionally, a moderate, positive relationship was found by teachers with professional development and individual implementation of formative assessment practices and the role of district leadership in the process.

Interviews with administrators were conducted and the pattern that emerged was that external factors were less of an issue during this time, but worldwide events have shaped how school leadership addresses implementing technology-based formative assessments. Quotes to support this theme are included below.

**Table 81**

*Hypothesis Four: Responses to the impact of external factors to implementing technology-based formative assessments. (n=2)*

Administrator Responses <i>n</i> = 2
<p>“So right now, I'll say this coming back off of, coming back off of a pandemic year has probably been the most difficult year from a behavioral standpoint that we ever look at, and I just... I think that's a big issue is having to deal with behavior, and we're trying to find the balance as administrators is, do we spend money on the formative assessment piece or do we spend money on SEL training so that our teachers can connect with kids first?”</p> <p>“That's really not my realm. I don't understand the budget too much, but especially with the COVID money I've seen Admin 1 grant a lot of technology lately because we've had to. So that's my limited knowledge of the tech budget.”</p>

### Limitations

Several limitations affected the reliability and validity of the study. The main limitation involved sampling. This study used a purposive sample; therefore, it was not a random sample. All of the teachers and administrators used in this study were from the same 9-12 school; therefore, there was a limit on securing additional participants. A random sample with additional schools, including those from K-8, would provide more valid data for causal conclusions. Additionally, the sample for the administrators was limited to the number of potential administrators at the school site. Additional school sites would presumably increase the number of administrators to participate which would provide more valid data to use.

## **Recommendations**

To replicate the study, the recommendations that follow have the potential to increase reliability and validity. The first recommendation is to conduct a correlational research design using a larger random sample with additional groups. Including a large sample representing more participants would provide more generalizable data to look at the relationship of school leadership to implementation and professional development of technology-based formative assessments. Additional groups would include more 9-12 schools, as well as K-8 schools.

Another recommendation involves timing. A longer time frame provided for the study would also provide additional reliable and valid data. By providing a longer timeline for data collection, more subjects could be contacted to allow for more patterns would emerge.

One last recommendation would be to analyze student grades in relation to the implementation of technology-based formative assessments within the classroom and look for any correlations in data. Differentiating between age groups and subjects could provide a basis to see where formative assessment is having the greatest impact and could provide insights into possible new strategies and technologies that could be used for student success.

Future research could also look at how the Covid-19 pandemic has influenced the purchase of technology and technology-based formative assessments. The use of school budgets during this time period could be analyzed to see how it is utilized, and the effect of teacher adoption, as well as how students have used it during this time. Teacher preparation programs have also been affected due to the pandemic, and a study into how technology has affected their preparation and formative assessment would be something to look at and see if more new teachers are entering the profession with a better or worse basis in formative assessment practices. Lastly, as schools return to a sense of normalcy, future research could look into which

technology-based formative assessment strategies continue to be utilized, and what additional professional development is needed for greater facilitation.

### **Summary**

The purpose of this study was to examine the relationship of school leadership to implementation and professional development of technology-based formative assessments. As the focus was on the relationship of the independent and dependent variables in this study, a correlational research design was chosen for this study. The results of the study were triangulated through the use of quantitative and qualitative methods and data. The statistical findings within the study did not reflect strong, positive relationships to reject the four null hypotheses; therefore, each of the hypothesis was accepted. However, the non-statistical findings reflected a positive relationship between school leadership as it related to the implementation and professional development of technology-based formative assessments.

Technology-based formative assessments provide school leadership and teachers with tools to enhance student learning. This study will positively impact the effectiveness of school leadership as it relates to the implementation and professional development of technology-based formative assessments. As positive results were evident from a non-statistical perspective, the research will serve to encourage school leadership to look for ways to successfully implement and provide effective professional development for technology-based formative assessments.

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## APPENDICES

### Appendix A: Informed Consent

#### INFORMED CONSENT

##### EXAMINING THE RELATIONSHIP OF SCHOOL LEADERSHIP WITH IMPLEMENTATION OF TECHNOLOGY-BASED FORMATIVE ASSESSMENTS AND PROFESSIONAL DEVELOPMENT

The study in which you are being asked to participate is designed to investigate the relationship of technology-based formative assessment, professional development, and school leadership to student academic achievement and progress. This study is being conducted by Mr. David Agapito Gago under the supervision of Dr. Rebecca Spady, Dissertation Chair, Concordia University, Irvine. This study has been approved by the Institutional Review Board, Concordia University Irvine, in Irvine, CA.

**PURPOSE:** The purpose of this mixed-methods case theory study is to understand the connection between student achievement, implementation of technology-based formative assessments, and targeted professional development for teachers in a K-12 setting. At this stage in the research this connection of the three concepts will generally be defined as implementation of technology-based formative assessments. This case study informs educational leaders who are looking to improve student achievement and should look towards prioritizing technology-based formative assessments and professional development as a way to improve teacher efficacy towards academic goals. Therefore the purpose of this study is to determine the relationship of technology-based formative assessments, professional development, and school leadership to student academic achievement and progress.

**DESCRIPTION:** As a participant, you will be asked to complete an online survey through Google Forms, which will include both multiple choice and open ended questions. At the end of the online survey, you will be invited to participate in a follow-up interview or focus group meeting.

**PARTICIPATION:** Participation in this study is completely voluntary. You may decide to discontinue your participation at any time throughout the study.

**CONFIDENTIALITY OR ANONYMITY:** Confidentiality of all participants (teachers and administrators) will be maintained through this study. All documents and data related to this study will be maintained in the researcher's computer, which is password protected, and any written documents will be placed in a locked file cabinet that only the researcher will have access to for a period of five years. After this time, the documents and data will be destroyed, which will occur on or about June 1, 2026.

**DURATION:** This study will take place over an eight-week timeframe beginning September 15, 2021 and ending by November 10, 2021. The survey will take 15-20 minutes to complete online, the interview will last no longer than 30 minutes, and the focus group meetings will last no longer than 45 minutes. All of these measures will be completed at separate times.

**RISKS:** There are no major risks involved in this study. Potential risks to participants in this study will be minimal. You may experience concern related to responding to questions about current teaching practices being conducted as part of your duties. You may also feel time constraints from participation in the surveys, and interviews as you are already busy with your duties and responsibilities. However, as all data will be collected through online electronic mediums, you can schedule a time that will best fit your schedule. Additionally, there will be no retribution for your responses as confidentiality will be maintained.

**BENEFITS:** Currently the researcher is a teacher using technology-based formative assessment as part of his practice. Therefore, there is prior knowledge about the benefits of utilizing formative assessment in the classroom in a technological and non-technological format. Formative assessment has been proven to be a research-based best practice in traditional brick and mortar settings and further research is being conducted to support the use of formative assessment with technology. There are potential benefits to teachers and administrators to learn about the effectiveness of technology-based formative assessments for increased student academic achievement and progress.

**VIDEO/AUDIO/PHOTOGRAPH:** All interviews and focus groups will be conducted and recorded through an online platform called Zoom. A separate consent form will be provided to participants who accept the invitation to participate.

**CONTACT:** At any time, you may contact Dr. Rebecca Spady, Dissertation Chair, (714)-904-4815, rebecca.spady@cui.edu or David Agapito Gago, Doctoral Student, david.gago@eagles.cui.edu if you have any questions related to participation in this research study.

**RESULTS:** Results of the study can be obtained from Concordia University Irvine at the address provided below.

Concordia University Irvine  
1530 Concordia West  
Irvine, CA 92612

**CONFIRMATION STATEMENT:**

I have read the information above and agree to participate in your study.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name: \_\_\_\_\_

A copy of your consent will be provided to you via email.

## Appendix B: Interview Video/Audio Use – Informed Consent

## INTERVIEW AND FOCUS GROUP VIDEO/AUDIO USE -INFORMED CONSENT

### EXAMINING THE RELATIONSHIP OF SCHOOL LEADERSHIP WITH IMPLEMENTATION OF TECHNOLOGY-BASED FORMATIVE ASSESSMENTS AND PROFESSIONAL DEVELOPMENT

#### INTERVIEW AND FOCUS GROUP VIDEO/AUDIO USE

As part of this research project, we will be making a videotape/audiotape recording of you during your participation in the interview and/or focus group meeting. All videotape/audiotape recordings will be made through an online program called Zoom. Please indicate what uses of this photograph/videotape/audiotape you are willing to consent to by initialing below. You are free to initial any number of spaces from zero to all of the spaces, and your recording will no way affect your participation. The videotape/audiotapes will only be used in way that you agree to. Confidentiality will be maintained with any use of these videotapes/audiotapes.

**Please indicate the type of informed consent.**

The videotape/audiotape can be studied by the research team for use in the research project. Please initial \_\_\_\_\_

The videotape/audiotape can be used for scientific publications. Please initial \_\_\_\_\_

The videotape/audiotape can be shown/played in classrooms to committee members from the university. Please initial \_\_\_\_\_

*I have read the above description and give my consent for the use of the photograph/videotape/audiotape as indicated above.*

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name: \_\_\_\_\_

A copy of your consent will be provided to you via email.

## Appendix C: Formative Assessment Initial Survey for Teachers

## Formative Assessment Initial Survey for Teachers

Formative assessment is any activity to determine what the student understands and why, so that teaching and learning may be optimized. Formative assessment can be formal or informal ways to gain information about student understanding (Aschbacher & Alonzo, 2006).

### 1. Gender

*Mark only one oval.*

Female

Male

Prefer not to say

Other:

### 2. Subject Taught (as a teacher):

*Mark only one oval.*

English

Math

Science

Social Studies

Foreign Language

Fine Arts

Physical Education

Other:



3.Years completed as a teacher:

*Mark only one oval.*

Less than 1

1-5

6-10

11-15

20+

4.Ethnicity

*Mark only one oval.*

White/Caucasian

Hispanic/Latino

Black/African American

Native American/American Indian

Asian/Pacific Islander

Other:

5. Education (Highest degree):

*Mark only one oval.*

Bachelor's Degree (BA/BS)

Master's Degree (MA/MS)

Doctorate (PhD/EdD)

6. Formative assessment is something I currently use in my class \_\_\_\_ times a week.

*Mark only one oval.*

Rarely

1-3

4-6

6-9

10+

N/A

7. Formative assessment data drives instructional decisions in my classroom.

*Check all that apply.*

Completely disagree

Disagree

Neutral

Agree

Completely agree

8. Technology-based formative assessment is something I currently feel confident using in my classroom.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

9. Formative assessment can be a fast and effective way to learn about my students' strengths and weaknesses.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

10. Technology-based formative assessment is something that my colleagues currently use.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

11. The administration communicates with me about formative assessment in the classroom.

*Check all that apply.*

Never

Occasionally

Sometimes

Often

Always

12. Formative assessment is something that my administration encourages or requires the use of.

*Check all that apply.*

Completely Disagree

Disagree

Neutral

Agree

Completely Agree

13. Formative assessment practices are considered as part of the evaluation of my teaching practice.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

14. Administrators can demonstrate the use of technology-based formative assessments and data effectively.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

15. I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject.\*

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

16. Professional development in formative assessment is effective towards implementation in the classroom.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

17. I feel like I need more training in formative assessment and would participate in a workshop or training if it was available.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

18. I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

19. Professional development has helped me to implement formative assessment strategies in my classroom.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

20. I need professional development spread over time to feel comfortable using technology-based formative assessment practices in my classroom.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

21. How much does budgeting plays an impact in adopting technology-based formative assessment practices?

*Check all that apply.*

Not at all

Little Impact

Some Impact

Moderate Impact

Impacts Greatly

22. What role does the district office/leadership play in adopting technology-based formative assessment practices?

*Check all that apply.*

Not at all

Little Impact

Some Impact

Moderate Impact

Impacts Greatly

23. How much does the culture of the school affect the implementation of technology-based formative assessment in your own classroom?

*Check all that apply.*

Not at all

Little Impact

Some Impact

Moderate Impact

Impacts Greatly



24. Does your individual technological knowledge play an impact on adopting technology-based formative assessment practices?

*Check all that apply.*

Not at all

Little Impact

Some Impact

Moderate Impact

Impacts Greatly

25. Which formative assessment tools (technological or non-technological) do you use currently in your classroom? (Please list as many as you can)

26. Which professional development needs are essential to implement technology-based formative assessment practices for your classroom to use them more effectively?

27. What are some things that the administration can do to encourage the use of formative assessment practices in the classroom?

28. If you would be willing to help out with a personal interview or focus group to elaborate on formative assessment, please enter your email below, and you will be contacted to schedule an

interview or focus group meeting. If you participate, you will be entered into a drawing for one of 4 \$25 gift cards at the completion of the study.

## Appendix D: Formative Assessment Initial Survey for Administrators

## Formative Assessment Initial Survey for Administrators

Formative assessment is any activity to determine what the student understands and why, so that teaching and learning may be optimized. Formative assessment can be formal or informal ways to gain information about student understanding (Aschbacher & Alonzo, 2006).

### 1. Gender

*Mark only one oval.*

Female

Male

Prefer not to say

Other:

### 2. Subject Taught (as a teacher):

*Mark only one oval.*

English

Math

Science

Social Studies

Foreign Language

Fine Arts

Physical Education

Other:

3. Years as an administrator:

*Mark only one oval.*

Less than 1

1-5

6-10

11-15

20+

4. Ethnicity

*Mark only one oval.*

White/Caucasian

Hispanic/Latino

Black/African American

Native American/American Indian

Asian/Pacific Islander

Other:

5. Education (Highest degree):

*Mark only one oval.*

Bachelor's Degree (BA/BS)

Master's Degree (MA/MS)

Doctorate (PhD/EdD)

6. Formative assessment is something I currently look for as part of my teacher evaluations.

*Check all that apply.*

Completely disagree

Disagree

Sometimes

Agree

Completely agree

7. Formative assessment data drives instructional decisions in the classrooms I observe.

*Check all that apply.*

Completely disagree

Disagree

Neutral

Agree

Completely agree

8. Technology-based formative assessment practices is something I currently feel confident demonstrating to teachers.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

9. Formative assessment can be a fast and effective way to learn about students' strengths and weaknesses.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

10. Technology-based formative assessment is something that my teachers currently use.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

11. Teachers communicate with me about formative assessment in the classroom.

*Check all that apply.*

Never

Occasionally

Sometimes

Often

Always

12. Formative assessment is something that as an administrator I encourage or require of my classroom teachers.

*Check all that apply.*

Completely Disagree

Disagree

Neutral

Agree

Completely Agree

13. Formative assessment practices is considered as part of the teacher evaluation process.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

14. I can demonstrate the use of technology-based formative assessments and the use of data from them effectively.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

15. I am asked or my opinion is known about new technology-based formative assessment practices that could potentially be used at my site/grade level/subject.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

16. Professional development in formative assessment is effective towards implementation in the classroom.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree



Completely Agree

17. I feel like my teachers need more training in formative assessment and would participate in a workshop or training if it was available.\*

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

18. I would feel comfortable leading a workshop or teacher training for technology-based formative assessment at my site.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

19. Professional development has helped to implement formative assessment strategies at my site.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

20. Teachers need professional development spread over time to feel comfortable using technology-based formative assessment practices in their classrooms.

*Check all that apply.*

Completely Disagree

Disagree

Sometimes

Agree

Completely Agree

21. How much does the budget play an impact in adopting technology-based formative assessment practices?

*Check all that apply.*

Not at all

Little Impact

Some Impact

Moderate Impact

Impacts Greatly

22. What role does the district office/leadership play in adopting technology-based formative assessment practices?

*Check all that apply.*

Not at all

Little Impact

Some Impact

Moderate Impact

Impacts Greatly

23. How much does the culture of the school affect the implementation of technology-based formative assessment practices?

*Check all that apply.*

Not at all

Little Impact

Some Impact

Moderate Impact

Impacts Greatly

24. My individual technological knowledge plays an impact on adopting technology-based formative assessment practices.

*Check all that apply.*

Not at all

Little Impact

Some Impact

Moderate Impact

Impacts Greatly

25. Which formative assessment tools (technological or non-technological) are currently used at your site? (Please list as many as you can)

26. What professional development needs are essential to implement technology-based formative assessment practices at your school or to use them more effectively?

27. What are some things that teachers can do to become more proficient with formative assessment practices in the classroom?

28. If you would be willing to help out with a personal interview or focus group to elaborate on formative assessment, please enter your email below, and you will be contacted to schedule an interview or focus group meeting. If you participate, you will be entered into a drawing for one of 4 \$25 gift cards at the completion of the study.

## Appendix E: Semi-structured Interview Questions (Teachers)

### Semi-structured Interview Questions (Teachers)

1. How long have you been teaching?
2. What is the subject you teach primarily?
3. What is your definition of formative assessment?
4. Has your definition of formative assessment changed over time?
  - a. If so, what was your initial definition of formative assessment, and how does it compare to your current one?
  - b. What has caused the shift in your definition of formative assessment?
5. Have you participated in any formative assessment trainings or workshops?
  - a. What did you gain from those?
  - b. How did they affect your teaching practice?
  - c. Did the workshops provide enough training to implement new practices?
  - d. What do you want from trainings/workshops to help with formative assessment?
6. Describe how formative assessment helps you, as the instructor, as you work with your students?
7. What do you feel are the benefits of formative assessment to your students?
8. How do your students learn best?
9. How do you know when your students understand?
10. How do you know when learning is occurring in the classroom?
11. How often do you give student feedback and what does it look like?
12. How does admin promote formative assessment for your teaching practice?
13. How often does formative assessment drive instructional decisions in your classroom?

## Appendix F: Semi-structured Interview Questions (Administrators)

### Semi-structured Interview Questions (Administrators)

1. How long have you been working in an administrative role?
2. What is the subject you taught primarily when you were a teacher?
3. What is your definition of formative assessment?
4. Has your definition of formative assessment changed over time?
  - a. If so, what was your initial definition of formative assessment, and how does it compare to your current one?
  - b. What has caused the shift in your definition of formative assessment?
5. Have you participated in any formative assessment trainings or workshops?
  - a. What did you gain from those?
  - b. How did they affect your teacher evaluation practice?
  - c. Did the workshops provide enough training for teachers to implement new practices?
  - d. What do you want from trainings/workshops to help teachers with formative assessment?
  - e. Do you feel that professional development helps teachers to use technology-based formative assessments in the classroom?
6. Describe how formative assessment helps you, as an administrator, as you work with your teachers?
7. What do you feel are the benefits of formative assessment to your teachers?
8. How do students learn best, and do you see it happening?
9. When you observe teachers, how do you know when students are understanding?

10. How do you know when learning is occurring in the classroom?
11. When you observe teachers, how often do you see student feedback and what does it look like?
12. Where do you see good formative assessment practices at this site?
13. What issues do you find that influence the purchase of technology or professional development for formative assessment?

## Appendix G: Interview Responses

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Question: *How does administration promote formative assessment for your practice?(Teachers) (n=20)*

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“By providing, I guess by providing workshops.”

“They have provided trainings for things like Pear Deck. That's the first and only one that I've noticed for formative assessment. So the Pear Deck one was a was the one example I can think of.”

“Um, there it's kind of different. I have to keep the students like on track focused severely, so I'm always assessing, I'm always standing next to them, always be going over, so they're more like wanting us to keep around the room and keep checking constantly, if it's like an exit ticket or asking questions or conversation. So that's how I get promoted about formative assessment.”

“Um, I well, you know, we have good support for our PLT process, but I wish that it was more formalized and more accountable because I think that we're all professionals. But the benefit of a good PLT process, you almost have to be in one to know what you're missing, essentially, and I was in a really good one. So I would say the framework is there and the support for the framework is there. But I, and they've provided trainings, their trainings and things. So it's pretty. In existence. But it's like most of the staff here on this campus anyway, a lot of the staff might need a little more push, and I think also we have some staff that aren't sure what formative assessment. They haven't wrapped their head around it and put it into practice in their own classroom, yet, you kind of need to see it happening. We've had trainings like the Pear Deck training and I know we have colleagues that are embracing Pear Deck and they may not even know they're doing it in the moment I have a feeling so yeah.”

“They promote it by telling me to do it, but not exactly how to do it.”

“Oof... I mean, you know, I know that they offer like trainings and stuff, I mean, I get emails about a, you know, there's this training that's available and... But... Other than that and then, of course, the, you know, the once a year, you know, like the observation. But even then, like the last observation, I didn't get any feedback on anything. It



was just like, OK, cool. And I was like, OK, great. Yeah.”

“I think the emphasis like, you know, and to be quite frank, a comment to my PLT has never been particularly good at looking at data. We have common units that we develop, we have assignments within it. And then teachers also formatively assess within their classroom on their own with additional practices and additional ways. But I think that their intention with emphasizing common formative assessments is working with your PLT and looking at the data and letting the data help drive those decisions that you're making. Sometimes that's not always timely. Sometimes it seems kind of impractical and, I think this year, too, and last year, I mean, we're just so overwhelmed. So like, I feel I hear less and less. It seems like coming out about formative assessment and more and more just about D and F rates.”

“Well, you get a hour a week. Yay. So, they have been big proponents of like wanting us to have PLT time. I get a lot of feedback from at least the department chairs in terms of PLT time or, you know, common assessments or what we're doing. That way, I get some feedback from our TOSA weekly.”

“Oh, well, obviously they want learning targets on the board. They want you to be focusing on that. They want some kind of a review mechanism or assessment mechanism attached to each lesson. That way, you can tell what students have learned and have not learned from a particular subject.”

“I want to say that they definitely want to see it if they come into observe your class. They are going to ask you, how are you formally assessing your kids? So that's probably one way they encourage it. I don't want to, I don't want to say negative things, but I don't think that they're giving us tools completely. I mean, yeah, there's Pear Deck and there's trainings for Pear Deck, but I don't think that they're, I guess they're encouraging it, but they're not enforcing it. And so as a result, not everyone's using it. Does that make sense?”

“That's a good question. I don't know. I don't know. Ok, I know they're all for it.”

“All I can think is from, like last year, my admin supervisor, he was very like formative assessment and he really

helped me with exit tickets and understanding them. And that is probably why now this year I'm comfortable with giving exit tickets because I know how to. This year, my admin or in general, they are helpful, but there's not enough, I don't think information and whatnot."

"Good thing is not going to admin. I haven't felt any support."

"Our admin, I think they give it lip service, but do they really check to see if it's happening? I don't know. I have no idea, I mean, I guess I'm just a person that I always try to make sure I'm doing what I'm supposed to do. Um. But I honestly don't know how important they find it. I'm also at a point in my teaching career where I only get evaluated every five years, so it's been a while since I've been evaluated. I'm sure it's coming up in the next year or so. But yeah, I don't know. I've never been told in an evaluation that it's important that they see formative assessment."

"Well, the administration at our school site promotes formative assessment through CFAs. They'll tell you again and again. We will look at the CFA results. We want to see where the departments are at. I think what they're most interested in is looking at making sure all the department members are on the same page roughly. Ultimately, though, I don't see too much follow up from the administration in that regard. Not like they don't care, but I think I think like I said earlier, one of the biggest things we need to work on is not just the CFA's being done and implemented in the in the class one time, but actually following through with the formative aspect of it and repeating the test and making more time for that. What I could see not necessarily so, so much from the administrative side, but maybe from the district and school board side is maybe giving more time for teachers to follow through with some of these basic ideas. Instead of rushing ahead to the to the next topic or to the next content block, maybe just cut back a little bit. Hey, you know what? What's more important, the learning or getting through all this content, if it's just a matter of getting to all this content? You know, we could race through it and be done with it. Or should we focus on the learning that's going on? Should we teach them to learn? And that's where the formative aspect comes in. Or are we just racing to it and getting to as much content as we can? Sometimes I feel that way, especially as a history teacher, we're given an objective get to X point in history by X date. Well, sometimes that's not very beneficial to us because. Yes, we may get stuck on one topic, but is there

quality learning that's going on within that content that they could actually take and move on to something else with, you know, apply that the learning how to learn and maybe the formative assessments can really do that. But really, what I think we need to be given is a little bit more time on building these formative assessments and allowing for them to be repeated again and again.”

“If I'm being honest, I don't think I've ever had admin tell me anything about formative assessment. In our PLCs, we will sometimes hear something like from one of our assistant principals saying that we need to be on a similar page with our common like having common summative assessments. But I haven't really heard a whole lot about formative assessments, and that's actually kind of changed because the first couple of years I was teaching here it was, we were really, really strongly enforcing common formative assessments. I actually kind of disagree with common formative assessments, I don't feel like that, I feel like that's too much data at that point, I feel like that the data for formative assessments more useful for an individual classroom, not even like I couldn't compare my periods there. They're completely different animals. And so I really don't think having something being the same across the board is actually that useful. And I really think that's the same that that is even more true going across teachers, I feel like having common formative assessments is actually a weakness and not a strength of the class or PLC.”

“Well, in the Special ED department, we have to collect data and document it, and an administration is pretty...they want us to do that, and if it's not done, then and something happens, they'll know. So, in Special ED, we have our service logs, so every interaction we have with the student we document on the program we use to make IEPs and we select the student and we type down what we did. And then that kind of tracks what we're doing. And it can be a little bit frustrating sometimes to keep on top of that because there's a lot of different things. I mean, if you have 20 different interactions in a day and it takes a while to track those, but that's something that helps prevent potential litigation or abuse. Like, if you don't do something, then it's like, how can you prove you did it? So it's always something that they want us to document. That's as far as the services being provided. They want us to be specific on what was being done, not just help student with any task they needed if they want. Well, what did you do exactly? So that's how we do it for the special ED services. And then that's both the special ED office and then our the principals at the school for the special ED department. They want us to do our assessments,

our academic assessments, but those aren't done all the time. They're every three years for the more in-depth one. And then every year we do, we can do a sit down one on those things. I mean, it can be four because we want to track what they want to do for their careers. We have to document where they are with that. They have a transition to adult life plan. So we have to do a few things for that. So I mean, it's mostly, I believe, to make sure the students are being supported the proper way because it kind of creates that accountability too. But then it's also because it prevents any legal issues from arising. So I mean, there there's that. So there's more, maybe. But I write all those things down, but something happens and then it involves me. I'll find out. Then they want that done, I'm sure."

"Ok. Yeah, for our area. I can't recall. I mean, does... I can't recall, like what exactly they've told us for Hey, for you, Spanish department, maybe they have. I mean, I'm sorry if, if, if it totally went over my head, but I can't recall that they've said, Hey for you, Spanish department or foreign language department, you guys need to work on this or something. I can't recall that."

"I'm not sure."

"So my teaching practice, I do, I do feel that it is very promoted. On the level of coming from admin to the PLT leaders. For me personally, I have never. Well, I have like in my one-on-one evaluation, my observations with my admin. They've discussed my formative assessments and what they like, my strengths and my weaknesses on that and how obviously I use formative assessments and they tell me how I use them and how I can improve on them or what they liked. But on a day to day, every day, weekly, monthly, the like. When it comes from admin, it's usually coming from admin to PLT leaders to me as a participant in the group. And so, obviously, as a participant in the group, I hear from my leader saying, yeah, admin wants us to do this, admin wants to see the scores, admin wants to see what's going on here. So, I do see from that level, admin does want to see, how are our students improving, how are they improving in reading? How are they improving on test scores? How are they improving on the understanding of skills? So, I do hear that on a monthly basis, just not directly from admin."

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Question: *Describe how formative assessment helps you, as an administrator, as you work with your teachers?(Administrators) (n=3)*

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“So if I’m looking at formative assessment, which is a little bit... You know, and this could completely contradict what I said earlier, but now that I’m thinking more in the old jargon, the memory a little bit, but I do part of my if I’m using formative assessment as those checks for understanding those exit tickets, all that stuff very much. And you could talk with your colleagues and all that stuff very much part of my observational notes in my evaluation. When I do that, it’s very, very important is how do you do frequent checks for understanding within the scope and if that is a formative assessment that’s going on there, I think that aligns up with it. So for example, I often use in there is Pear Deck. I think Pear Deck is a great way that you can measure student understanding that’s going through there. And I often reference Pear Deck use in the right functional sense, not just having students reply, but a teacher. That’s why I think math department has it the best because you guys have your Surface and you can walk around and you can see the dashboard of all the student responses that are going in. And I think that is the best way to check for student understanding more often than not, and that’s following my formative assessment piece that’s going on there. I would say, yes, every single evaluation I look for that in every single observation evaluation I’ve made it very clear is, you know, what’s an exit ticket look like. A meaningful exit ticket so you can gauge student learning for the day and teacher effectiveness regarding their instructional approach. And I even include that with all of the teachers that I have evaluated, and I know Teacher 1 probably has it in there. But that’s probably the two biggest things that I look for is check for understanding and exit tickets and closing out your activity for the day and all that as well.”

“Well, I think it’s for me, it’s less about numbers than it is about process, right? So when you look at our individual learning teams, it is, do they have one, an assessment structure, even if it’s in progress, right? Do we have some sort of collaborative structure? And then do you have the commitment from all of those team members to stay kind of in the pace and conduct with fidelity, the assessments? And then the last piece, which is the toughest is getting that data back and sharing it out with student samples. So it’s just that I’m looking more in the professional team for that process. And is there a commitment from all the members to be a part of that team and to have real conversations about student learning and how we can then change our instructional practices after we’ve had those collaborative conversations? And it’s that that gap, I think, where I think we look at a lot of data, I don’t know that

it that it really informs and changes our instructional practice as much as it probably should. But yeah, I'm very interested in that process and monitoring that process for each learning.”

“That's a good question, because really content doesn't touch my realm too often as a dean, but definitely the evaluative portion of my job working with teachers to create those formative assessments, see how their classroom runs. That's the relationship I have right now, but it's very limited.”

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Question: *Have you participated in any formative assessment training or workshops?(Teachers) (n=20)*

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“I want to say yes, but IXL is mostly like assessment for learning because it keeps giving or assessing the students in material that they're still not understanding, so it's important.”

“Yeah, Pear Deck training was kind of the whole point is to get more formative assessments.”

“Not for here, no. Mostly, I got it all from Point Loma.”

“So I've had the good fortune of being able to work for the National Assessment of Educational Progress or NAEP. It's known colloquially as the nation's report card, and I was part of the team to create their civics model for assessment. So, I went through a lot of training with psychometricians and assessment experts. And then they ended up hiring me to write some questions the educational testing services. And there was more, more stuff for that. We've also had district level trainings. And then here in the district, when we had benchmarks, subject area benchmarks, I was the chair. I ran the Committee for the World History Benchmarks and we were using Edusoft had an Edusoft specialist who put all of us through some training, that's going back a ways.”

“Yes, I have. I participated in a specifically named Formative Assessment Workshop. And then also we discuss formative assessment in like PLT workshops.”

“Yes. Kind of. Not that have been focused on formative assessments, but I've been to various trainings that are about writing or about reading and ways that we can give formative assessments within those trainings, but never a training that was focused primarily on giving assessments.”

“I have not.”

“Uh, yes. Don't ask me which ones, I mean, formative assessment has always been a part of or has been a part of a number of trainings, it's also been a key part of work I've done at the district with developing curriculum for the ELA team, as well as this last summer for the specifically AP language team.”

“I feel like we did quite a bit of those, especially when they were trying to push the Oh, what's the new thing? PLT, PLC, whatever the current acronym is. You know, when we would go to those PLT and PLC workshops, a lot of it was focused also on creating CFAs. So how to actually create the CFAs?”

“I've been to some of the Solution Tree stuff.”

“Yeah, I've done the Pear Deck training you provided. That's been very helpful to help me do some formative assessments, and in the past, we used to get trained on other software. So maybe PLT institutes that we have during the summer or during the school year where they send us and they talk about formative assessing students, but that's about it. I would like to see some sort of assessment tool that our school district or school can start utilizing the science campus.”

“Yeah, I believe so.”

“Yes, I'm sorry, I was trying to get back to the last few years, a couple of years, yes, I think I have.”

“Not that I recall at the moment.”

“I'm sure I have at CATE. I can't remember the names, but I'm sure I have it because a lot of my ideas and strategies have come from going to CATE.”

“Um, I have taken a couple of different assessment building type activities through the district and it has not been recently, though, that I have. So it's been some years now.”

“Um, probably, you know, probably mostly in my first couple of years teaching. I haven't had any recently. Usually, I do a lot of independent development, professional development using like my own research and websites and books.”

“Gosh. Over the years, probably. I know that we have gone over little things here and there, nothing that's really stuck with me, though. Just nothing. Nothing, really concrete. I think it was just maybe sprinkled in some somewhere at some type of meeting. There wasn't like specific devoted to different types of those assessments that I can remember. I mean, I'm not saying it never happened, but if it did, I don't remember it.”

“I can't recall that I have no OK. Usually they've been about lesson designing and things of that nature.”

“Yeah, I would say. As a new teacher, they make us do a lot of trainings, but ones that I recall. Are like the Canvas I've done, the Pear Deck I've done other trainings like Kami, where they use it as a form of assessment.”

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Question: *What did you gain from those?(Teachers) (n=12)*

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“Well, knowledge about how to use technology or for learning for the students.”

“Pear Deck is a good system for getting formative assessment in real time. And while you're walking around the class gathering data about formative assessment.”

“I think, you know, probably the big idea. Is that the understanding that teachers forget, because once we begin teaching, we're experts in our subject. So we forget very often that just covering something once didn't work for us. My first year teaching, I taught with a note outline in front of me. Pretty much my second year, I was able to teach with the Post-it Note, essentially with the main points I wanted to cover. And by the third year I could, I could do it off the top of my head. So that demonstrates that the gaining of knowledge and it being inculcated into your system, into your memory well enough to get it back out again in a new form is a process, not a one and done situation. I think the training's, not individually, but overall, the trainings helped me to get that, even though it seems like an obvious thing, we teachers forget what it's like to be students, I think. Yeah. So a training that can make you feel that way, is good.”

“I gained a better understanding of exactly what the purpose and goal is for formative assessments. But I didn't really grasp how to execute.”

“I think it makes it's made me more intentional in designing formative assessments rather than just kind of on the cuff, having like a quick little check. That's not to say I don't still do those things. I do still in the moment, you know, like, doing a lesson today, I did a simple check for, you know, and how well were kids understanding the writing prompt that we had just taken some time to dissect together and it was a simple, you know, in front of their chests, thumbs up, thumbs down or thumb sideways, you know, and we kind of defined what a thumbs up mean, what is thumb sideways mean versus what is thumbs down mean? And again, it's not me looking in that situation. It wasn't me looking at something on their paper. But it does still give me feedback to help me understand. Do I need to break this down further? Do I need to provide more models? Do I need to teach this when we get back on Monday?”

“Yes, yes. Especially when we were, you know, when I was working with other teachers on a regular basis, actually having a common assessment that we were doing like a common quiz was a rather, you know, be nice to discuss the results with them.”

“I mean, I guess the aha would be it doesn't have to be something large, it doesn't have to be a giant or a well driven or well-designed quiz. It could be a simple question that I'm going to ask at the beginning of class and by the end of the class, I want to see if they can answer that question. That's probably my aha that I've gotten about formative assessments. What I like my formative assessments to be consistent with my colleagues? That would probably be the other part that I think would be great is that making sure that the questions that we developed as a PLT are shown at each classroom and so that we bring back some data to discuss.”

“I mean, it was primarily more about different uses of technology. Which like the way that we did it or the way that I would be doing it wouldn't change what I would be getting out of it just the way I delivered it. It was really more about the delivery, I think for me.”

“Ideas of how to better use formative assessment within the classroom without the students really like realizing they're being formative assessed.”

“Sometimes it was just a renewed enthusiasm. Other times it was strategies I really felt like I could take back to the classroom and use right away. And sometimes it was like, this was kind of a waste of time.”

“Um, mostly strategies and the way to talk to students in providing feedback from a formative assessment. And I don't always give feedback because sometimes the formative assessment is for me really checking in how I did in my lesson and not really how the student is doing. But. I would say that. Um. Trying to think of specifics. It's been a long time, but yeah, I would definitely say that it's mostly in the interactions and kind of reducing that effective filter with students and getting them more involved in their learning and progress. That's probably been the biggest, the biggest things I would say. Probably standards-based learning was probably the biggest thing that I picked up from literature, mostly. There's not a lot of trainings in our district for that.”

“I think I got more of a broad understanding that I can really use any tool as an assessment tool. It’s just how am I using it? How am I going to apply it so that I know that my students are learning?”

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Question: *How did they affect your teaching practice?(Teachers) (n=4)*

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“They have been extremely helpful. Honestly, I don't know if it's just because I'm a young teacher, but I love going to trainings. I love learning from people with wisdom. I love learning from seasoned teachers. And so every single time I go to a training I take, I feel like I take so much information in and I use it. I do my best to implement it within the classroom within the next day, or at least that next week. And it's really it definitely helps a lot.”

“They're part of what convinced me to move away from the pen of paper, because that was what they really emphasized. They were all about that. And I'm like, no, kids don't like that in general want to be more creative, more expressive and demonstrating what they know as opposed to just taking another test.”

“No, not really.”

“I think they made it better because I was able to make the lesson more fun, like, hey, let's try something new and without really realizing I'm giving them a formative assessment and they're like doing something different from the normal lecture and everything.”

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Question: *Did the workshops provide enough training to implement new practices?(Teachers) (n=14)*

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“Yes, I will say yes.”

“Yes.”

“I think that one training I remember in particular, actually set us back a bit and it was very abruptly done by an administrator years ago and it was here, read this article and then discuss and it had no, it was very provocative, and I think that was their intention, but it actually provoked people to move to their extremes. And no, no good work got done and then there was no follow up. It was just here, do this. You felt very much like. The. I felt at the time this that maybe that administrator gave it so that we could check a box for them. Either a WASC process or something, the district said, because it wasn't this ongoing, the PLC process or the PLT process should be the vehicle to make that happen if it's done properly. And I, the fidelity to that process has been inconsistent. So if there's a training, then there should be the follow up and the debriefing and the try again part, and I don't always see that happening.”

“No.”

“Um. I'm trying to think of back to a specific training. I think that where things can be implemented right away is just like simple little strategies to check for understanding, like having a bell ringer or an exit ticket. An exit ticket that asks them a question about their understanding or to articulate their understanding or question to demonstrate whether or not they've got the concept for the day. Or if you run out of time to do that the day before, then to use that as a starting point with a bell ringer the next day. So some of those little strategies and techniques and kind of having a few go to structures for it, yes, is something that you can definitely turn around and take right back into the classroom. But a lot of times when you're having the conversation about formative assessments, you're having the conversation in conjunction with having a conversation about summative assessments versus formative assessments and an entire learning cycle and unit of development. And I have gone to some trainings where I've left feeling completely overwhelmed, where I feel like this is all great, well and good. But when am I going to find the 20 hours it would take to plan all this?”

“I always feel like we need more help or more time. It's a lot of work to get these things in. I mean, you understand, I imagine, but for anybody else, that's reading this transcript. You know? If you're teaching three classes and every week you're creating a brand new quiz that takes an hour to create the quiz and you're looking at creating it. And it just comes down to a time management or who has the time to do these things per say.”

“No, not general. They are very much a surface level kind of training where they then want you to either go buy their book and read it or do whatever else, and I'm not going to go buy their books.”

“Yeah. So to be honest with Pear Deck, I was really struggling at first. It didn't make sense to me and I struggled with it. I think it wasn't until distance learning that I decided, OK, we're going to do this and we'll figure it out as we go. And sure enough, it wasn't as hard as I thought. It was just very confusing from the presenting side and learner side. But once I actually created something simple and tried it out, I said, Oh, this is very, very simple, and it was doable. So that specifically for Pear Deck.”

“I think so. Yeah. They were pretty good. Yeah.”

“I would say yes, and the workshops were never, you know, they're never long enough, but they were enough, long enough and enough information for me to at least implement them. Yes.”

“Some of them no there was not enough information and you get back, or maybe it was a little too complicated the way they explain it and you get back to your classroom and you're like, What was I supposed to do? And then you just like, throw it out because it's like, I don't have time for this right now. But a lot of them, no, that the strategies they gave me, I could come right back. I could implement them right away. They were simple. They flowed with the class, you know, to throw them in here and there and just do the check and it worked out fine.”

“Oh, I'm definitely an all-in kind of guy. So if I hear something and I like it, then I tend to latch on to it and I try it immediately in my classes. I am kind of a... I'm OK with making a mess in order to figure out what works and what doesn't. So. Definitely. I definitely I definitely like to try things right away. And I typically end up putting my own spin on things within a within a couple of weeks, usually of implementation.”

“Well, I feel like I'm adequately prepared to use different things, but I would say that if I was a... Because I came to Kern High already, like after several years of teaching, so I felt like I'm able to do things, but if I was new, maybe I probably may feel a little... probably wouldn't really know different types of things you can use. So I mean, I personally feel prepared, but I mean, I can always do better and maybe other people probably don't. So I can see some benefit of maybe that. And I know it's important to for Special ED because there's the litigation component. If you're not collecting data, how do you know if a student's making progress? And is it something that's consistent? I mean, I know like the STAR test may seem like it's not the most popular thing, but it stays consistent along their time and they use it in the middle schools, too. So that's always something nice to collect. Every quarter we do them, or at least try to. I know that that's something that I like to track progress on, but there really isn't any isn't much that's been standardized across at least the Special ED department that we use other than like the IEP type. But those are more of like a standardized. I don't know how to define those, but nothing for like classroom instruction, really.”

“I would say some of them gave me stuff right away, and some of them, I'm like, I need to play with it a little bit more. Like, I want like ones that I didn't mention, like the IXL, like more like hands on. Like, try it yourself, type of things. I feel like those were easy for me to, Oh, let me see how it is from a student perspective, and I can quickly see myself using that the next day, you know? But not, not all of them. And I would say the big difference between the trainings that I was able to apply right away versus the ones that I couldn't. It had to do with that. Like the hands on that, I personally experienced learning it as a teacher and from a student perspective that made it that much easier to apply it in the classroom.”

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Question: *What do you want from trainings/workshops to help with formative assessment?(Teachers) (n=18)*

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“I would say, different, different forms of technology. So that we can apply in the classroom and that it's easy for the students to use and for the teacher.”

“I would like to see different tools put into motion, so I guess an example done in class with the trainees to show us how to implement it because a lot of trainings are great that I've been going to. But not many are great for mathematics, so I'd like to see how they're implemented. For a math class and some, some tangible examples.”

“I want to see a little bit more of like how I could do it digitally. I know Kahoot, but if there's like other ways to do that, the kids need that skill and I'm like still learning the digital world of teaching. And then also like different, possibly other ways to do it besides like simplified versions with the exit ticket. And the chin it where I get a whiteboard and they write the answer and they show it to me because they're kind of getting tired of it, I'd like a little more adventurous with them.”

“I would appreciate more real-world examples instead of big kind of academic, esoteric ideas. So, here's this class of 30 students that I had. And here's how I set up my grade book. And because what derails things is always the but only or the but for's. Teachers tend to think about the two kids or the five kids that they have who will abuse the process. Or there's a there's a justice, kind of it's not fair kind of situation. Like I remember having conversations about having test corrections. And the biggest sticking point was teachers who said it's not fair to those kids who try hard the first time. And that's true. So let's just make sure that on the test corrections, you can't get an A. Your test corrections are a B and that when we said that it was like, click, OK, that's fair, I could do that. That's still honors the kids who tried hard the first time. But it also admits the fact that for some kids it takes a second chance to the learning is going to happen in a different manner. I think also understanding that when the learning happens, how it happens is not nearly as important as that it happened. The learning happened. I don't care if it's because you... how it happened. I need you to know that thing. And the trainings don't always emphasize that, in my opinion. So that's what I would say.”

“I would like a training that deals fully on implementation, common grading, data collection and how to work with

a group to create a common formative assessment. Peacefully.”

“In terms of formative assessments? I think it would be great to have a training that just teaches on the various types of formative assessments and really focuses on how. Like, I'm trying to think of what I'm trying to say, so that once we give a formative assessment like what the next steps should be because I feel even in throughout the credential program, they don't. I mean, they talk. I remember one class on formative assessments and then the rest of it was like, kind of do your own thing, you know? And I kind of wish we spent more time understanding. Not that there's just one type of formative assessment, but there's all these various types of formative assessments that you can give to your students. And this is what you can do with the results. This is what you can do, either immediately based off of those results or this is what you can do in your planning. This is what you can do based off of what you learn. And I do feel, you know, with experience, I've been able to grasp that. But as a new teacher, just learning that from the beginning would be extremely helpful.”

“Um, I think I would want to see more of like kind of what other music teachers do because a lot of times like, I mean, like we've talked about them like in meetings and whatnot, like teacher meetings. But I feel like it's more aimed towards like just the other subject matters. So I would want to just see like, OK, like how can I flip that to make it work for my subject matter?”

“Often it's time to not just see somebody else's examples or to feel like you're being lectured at about what it is and why you need to do it, but instead, just like uninterrupted, dedicated time to sit down and create.”

“I think this is where I might be a little... I would actually like to see the if we were talking about more of like a weekly quiz, I kind of want to see the teachers step back and bring in a separate company. Almost to, like, come up with the questions, come up with a question being something that we can have access to and something that's linked to the standards that I don't think we're doing right now. So, you know, it'd be great to give a five question quiz at the end of the week on the stuff that we're covering in class on these topics. And that way, I can see who's getting what subject and what the standard is.”



“I’ve always thought the two best and I’ve been to some other trainings too, that were a little bit more student performance and engagement oriented, be it some, some of the Kagan things and this other group called Foundation for Teaching Economics. They were really powerful because they have even the We the People program for the Center for Civic Education. They would ask the teachers at the workshops to be doing the product themselves. Therefore, you’re learning the way a student would learn. A Foundation for Teaching Economics had one economics for leaders where the teachers attend, and you kind of sat in a horseshoe. And then there were 30 students who did the lessons in front of you, and you are observing and kind of taking notes. And that’s what I’ve always thought the most professional development courses misses on. We’re missing the X Factor, which is the students we have to control for. So you see what they do well, where you would make changes in your classroom. To me, that was like, you know, not even a light bulb goes off, but a lightning bolt flashes and then you’re like, Oh, that’s how you do it.”

“I guess examples. Right? What, what does, what are different forms of formative assessments when I think about like teachers who are still learning how to do formative assessments. Give me examples of what those look like. And you know, at the end of the day, I want to make sure my kids are learning, how do I check that they’re learning with a formative assessment, whether that’s a formalized one, something through Pear Deck or a quick check for understanding with thumbs up, thumbs down? I would like to be able to let my teachers know, Hey, here are different examples of them and how you can implement them into your curriculum because it just depends on what type of question you’re asking.”

“Maybe more examples of like how PLTs might collect data. And comparing use it that that wasn’t really a big focus, OK? I think collecting the knowing how to use that tool is the easy part. But then in the setting of a PLT team, how, you know, maybe a little bit better information on it.”

“I would say more opportunities. So I know some of these other workshop and trainings. They have them like every month, like SEL trainings. I kind of think formative assessment should be, you know, having more than maybe one month or every other month and an hour, maybe hour and a half and going over different ones, you know, besides in class, maybe some online ones like Kahoot and other ones and just give us more opportunity to

also do them ourselves.”

“What to do with the information? We go, we give a test, we get a grade? What do we do with it? Like I said, so that will make it that will help us understand. I'm not here to grade. I'm I here to teach.”

“Maybe more with the technology part of it, because a lot of the formative assessments I use are online. Things like Kahoot or Quizlet or even Google Forms, you know, just being able to make a better Google Form, make my questions better, that's where I struggle at. Am I asking the question the proper way to get the response that's going to be the truest for my assessment?”

“Well, I could see maybe the most improvement being in formative assessments would be in in a clear understanding of what a formative assessment is in our in our department level and what... What the administration wants us to do with our formal assessments, like the CFAs and stuff like that. That would be a nice that would be a nice, a nice clear understanding of this is what we expect from the admin. This is what we expect for you guys to do and your CFAs and then in the department level, for everyone to be on the same page of this is what a CFA is. This is what it's going to look like. This is what we're doing. And then for there actually to be a follow up with a CFA and not just give it. And here it is. And now we're going to look at where we're at in the department, but to actually follow up with the students and say, All right, here's the assessment. It's a formative assessment. We're going to learn from it. We're going to build upon it and then give it again and not just give it the one time and then call it quits. Got the data, whatever, but to give it multiple times so the students could learn from it. And so we can actually kind of get real results from this formative assessment and see what type of learning we're actually getting done, not just the one shot. We're done kind of assessment.”

“Things to help me would probably be more on the organization end. I am kind of a terrible organizer as far as like paperwork and that sort of stuff goes. I am actually much better at the engagement end of things and handling students and getting involved with students and understanding how they how they operate my classroom and things like that. But as far as like keeping track of every data point that I could probably use and being consistent with it, those sorts of those sorts of practices, I've never been very strong.”

“And also like I know there's some trainings that do it like, they overdo it when it's like too much and then it becomes overcomplicated where I feel like, well, this is too much. I forgot how to start with the basics. I would just say, like having that hands-on, just like the bare minimum basics. And then if you want a follow up course and I would say, like, break it up into a follow up course, like level two or something, because I know like some of the Oh, I forget what it's called the Geogebra. I think like some of those, I think you have to personally make the time to go and investigate one on one because some of them like they move along and it goes too fast paced like depending on the presenter. I felt like they kind of lost some people along the way like I can see, you know this, these people are in question too, and this many people are on question 10 or whatever.”

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Question: *Have you participated in any formative assessment trainings or workshops? (Administrators) (n=3)*

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“Oh, it's been a long time, but recently, no, just due to the nature of, I think, each position that I've gone through because I'm not in the instructional realm like Admin 1 is, so have been able to go to any of those trainings. And I, you know, as Dean, you don't get you don't get put into those, but I have been to the PLT stuff about, you know, I think more now is just like more checks for understanding and more like exit tickets and things like that too as well, that has been kind of ingrained, maybe not to the formal extent, but it's just been kind of intertwined within the new realm of, you know, teaching and all that too as well.”

“As an administrator, yes, and just how to facilitate that on a campus, but not as a teacher. There was never any sort of assessment workshops you just, you know, kind of went over to the unit, you covered and it was mostly after the fact, right? You didn't design a unit with assessment in mind. You designed it as kind of in chronological order. But as an administrator, yes, I you know how to foster a collaborative culture on campus. And part of that is having collaborative assessments.”

“As an administrator? No.”

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Question: *How did they affect your teacher evaluation practice?(Administrators) (n=1)*

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“It's something I look for. I look for those informal checks and it is part of the evaluation process. If you know or the form itself, you look at the five categories that are part of our evaluation. Part of that is, you know, do you question students, are you determining where they're at in their learning? And really the best way to do that is through a formalized assessment structure. And that is having built in checks for understanding as in the lesson design. So, you know, are you stopping at certain points and then in the midst of your either whether direct instruction or an activity or whatever that is, you've designed a questioning strategy on how to determine what students know. And that's all students. You know, whether that's a random you go around, you gather feedback or you do it through a technological structure, technologies and technology to get those answers. It's something I look for when I'm when I'm in any teacher's classroom.”

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Question: *Do you feel that professional development helps teachers to use technology-based formative assessments in the classroom?* (Administrators) (n=2)

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“I mean, yes. I mean, there could be, but my biggest fear with more technology stuff is, I mean, it's kind of the what I was, we were all hoping with synergy, right, like when Synergy came out, it's like we had... You don't want to have five million different programs that you have to rely on. If somehow it can be streamlined into one effective program that you can run formative assessments out of that can also do all the other things. Because I think there is a technology program fatigue, that makes any sense, you know what I mean? I think people, I think you are an example that you're a veteran enough teacher. I'm a veteran enough educator that we could probably pick up new programs. But if you're a new teacher that's having to have their head, you know, in a million different directions, it's it would be difficult to have the fatigue to go on there.”

“I don't know. I think there's been a lot of professional development on what formative assessments are. I think there's been a lack of professional development, a gap in utilizing technology to fill that need. I think we've done some things here to try to promote the use of, you know, things like Pear Deck or Google Forms or that as part of a collaborative assessment. And then if you go back, even, you know, back to the Edusoft, you the kind of top-down approach, you know, where we had these benchmarks, right, that were scan sheet and you scanned them in and all of that. So the structures have been there, but utilizing as technology advances, utilizing technology as a means to more efficiently and with fidelity, conduct formal, you know, or formative assessments over the course of the day. I don't I don't think we have.”

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Question: *Describe how formative assessment helps you, as the instructor, as you work with your students. (Teachers) (n=20)*

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“Formative assessment helps me to just understand or see if they're actually learning or if they need more help, or if we need to reteach anything.”

“Yeah, formative assessment gives me a feel for where they're at. It's everything that I need to know moving forward because it's blind if I don't have a formative assessment, tell me as a whole how they did individually, how they did. It is my guide for how to move forward from today.”

“With my moderate to severe, it helps a lot because I can assess not only what they remembered, for example, if I'm telling them do no one through 10 and maybe one two three four or five six seven eight nine 10. I could see their writing skills, their spacing skills. I could also see their order skills. And so I'm able to assess way more than just if they solve something correctly, whereas moderate severe, I just look for a specific answer to see if they understood how to solve the problem. So I get more out of it with moderate severe.”

“I think that it only helps you if you have good learning targets. If you don't know what, if you haven't answered the question for yourself and shaped your instruction around, what is it I want kids to know and be able to do. What's the skill and what's the content, depending on what you teach? Then it doesn't help you because you won't, you won't have a comparison to make, essentially. So if you have done those things and then you have a well-designed process over product, I think process over product activities are essential to what I teach. The struggle, watching the struggle is sometimes more important than the pretty thing at the end. And while you watch the process taking place and you know what you want them to be able to do in the moment, you should be able to adjust and see it is a on the fly gathering that info. Oh my gosh, they we did something yesterday in class that was so they could see the reasons for the rise of political parties in America, and they needed to feel the tension they need to feel the debate that occurred. And so we were doing that. And if there wasn't enough tension, then I would have adjusted in the moment. And that happened yesterday. Actually, they were they were coming to agreement very quickly. So I had to insert a little more tension and say, Well, what if slavery, you know? Oh, OK? And then it got the tension there, because from the tension is where the learning occurs, so you have to be able to do it in the

moment.”

“So formative assessment helps me see concepts that they struggled on. So I see out of so like out of a test of our assessment of 10 questions say it's consistent that they're getting two of them wrong and I can see the mistake that they're making. Then maybe there was maybe it was misunderstood, or I didn't explain it clearly enough. So I know that those would be concepts that I need to revisit or hit heavier the next year when I get to that point.”

“I definitely see, especially because I have such a range of students who have different reading levels, who have completely different levels of understanding and even students who are ELL students. So their early or their English Language Learners. And with me, by checking for understanding within the classroom and just during my lessons, I'm able to stop what I'm doing in that moment and to find new ways to explain to them how to do the particular skill. Or if I do, I like to do a lot of reflection based formative assessments. So the next day, when we come into class, I'll ask them like a quick review question that focuses on what we had learned the day prior, and if I notice that my students are not grasping what they were supposed to learn, I will go back and review versus move forward with the next thing. It really does help me see, are my students ready to move on and to be honest, even right now in this moment, I do want to say I am a few days behind and pacing as opposed to some of my other fellow freshmen colleagues. And it's because when I looked at some of the assess my formative assessments, my students were just not grasping a skill that I wanted them to take in. And so I've been spending the last few days just reviewing it, and then I'm going to reassess them on it. That way I can. That way, I feel comfortable to move forward.”

“Oh, well, I mean, based on the formative assessment results, that's going to tell me, OK, I need to spend this amount of time on this specific subject matter with this group of students versus if they like, if they know, OK, basic rhythms, OK, I don't need to really spend that much time on that because they already know that info so we can kind of move on and go to the next level of music theory.”



“Well, it gives me a sense of where they are and what where there are gaps in their understanding and where there is, you know, they're excelling in their understanding. That then, is information that I can take to plan for the following lesson or build out what I already have to make it more accessible to make it fill in those gaps, to give them more opportunity for practice and or just to practice or try something, a different approach or to integrate maybe a scaffolding technique that I hadn't previously used. So like to give an example. My kids have been practicing writing claims in anticipation that they are now today writing a thesis for their essay. They've worked with a graphic organizer as a scaffolding tool for creating, breaking down their claims into smaller bites and then building it to that full sentence. But looking at what they've done with that work, it's evident that that template works for a lot of kids. But there's a handful of kids that it's just not enough structure for them right now. So before we got to the thesis for the essay today, I gave them two slides, one with the template as a tool that they could use that they've already been working on. And then on the next slide, I gave alternately a couple of sentences, of a couple of sentence templates they had been given, but many hadn't been using. But instead, I gave them three frames and gave them kind of that, that structural support, and they have to. So it becomes more of a fill in for those kids who needed more than what the graphic organizer was giving. So using those practices formatively that informed how I approached the thesis for today.”

“It allows me to figure out who needs intervention most, and then I can sit down with my students on days where they may need some more intervention. It really allows me to, I guess differentiate my instruction according to what we know, according to what the kids need. I'm able to do side projects for the students that might be ahead, you know, giving them something fun to do. Meanwhile, trying to stop the kids that are falling behind. Now I also feel like they're also on their cell phones, which might be a reason why they're behind, too. But you know, that's a different problem. So I like to use like my daily assessments. Ok, where are we at? Where are we doing? Where are the kids at? Whose turned in assignments? All that is part of how I assess my students.”

“It does. It gives you a measuring point again for their understanding level. And that's what I mean, you can tell from multiple choice stuff, but they got what they mastered this and that. But again, it gives me the measurement even when we're doing practices in class, excuse me, interactive activities that I can see them and their comprehension. And then also, as they're talking about it and discussing it or performing it, I can stop the students

and add to their skills further and say, Hey, it seems like you guys were way off track on this part. Let's bring it back over here to the standard where you're supposed to be.”

“So formative assessment will let me know, Hey, they didn't get that. I need to go back and reteach it. Or what part of the lesson did they not understand that is missing for them to be able to move forward? And it gives me that opportunity to change my lessons for the next day, improve it for the next day. I might even change it from period to period because it's not working. So, it's why it's important to formally assess your kids.”

“A lot, because my primary way I like to do it is maybe an exit ticket or just look over their shoulder on like paper. What we're doing in class, I like to say, you know, do we know how to add the fractions yet? All right. Well, show me that you know how to add the fractions because I can tell within a couple of seconds of them how they start that problem, whether they do or not. So I like to see their written work and really watch them do it. And I think I like the exit ticket because I can ask a couple quick questions like, you know, maybe one or two, depending on the concept, maybe three, but again, I can see, judge from that, like, where were we not understanding it? Is it the same part or step or that kind of thing? So I like the exit ticket a lot.”

“Ok, so it helps me as an instructor by... Well, that's a tough one. It helps me to see how the students are doing with the material, if I need to slow it down and go over it again in a different way, or if I can continue on, if they're like, No, I got this, you know? Of course, I have to go with the majority. And so if the majority are doing well, then I'll continue. And those who aren't doing well, I'll try to do some one on one or offer them tutoring and... But does this helps me gauge how they're doing.”

“Helps me find out what I need to cover if are there certain topics that I have not been able to cover or having covered as well as I would like to? So, it helps me create their homework. I. The cool thing that because homework is digital, I can change it on the go. And I've done it as far as last week. Actually, I change homework assignments based on formative assessments.”

“Well, the fastest thing it does is allow me to reteach or go back over something if I notice that quite a few of the kids are like off base. I can do it right there in the moment. Ok, now remember, let's go back and review this because I said this earlier, but that's not what I'm seeing. And then we can get that reteaching done right away. And so, I really appreciate that. And then another thing it does is give me data. If I if I want to sit down, I can. I can get the data from Kahoot. I can get it from Pear Deck. I can get it from Quill.org. Even that's another one that we use where we can see in real time what the students are putting down answering.”

“Well, there's different types of formative assessment. Some of the some of the most basic is just class discussion and, you know, follow up with students. I personally will use examples of that in my classroom where, I just. Hey, what do you think this and, you know, just to kind of get an idea of like, OK, this person is at this point, what corrective action do I need to make now on the board for them to get to the objective goal?”

“So I typically my typical structure is I try and do three kind of, for me, on my end of things, three, like hard checks for formative assessment before I give them a summative and at least three, and I typically use the first one to make sure that my messaging is coming across like the instructions are clear. I try and make sure that students are getting to a point where they're able to kind of independently suss through their assignments. The second one is typically, I'm at that point now. I'm looking more at the student and I'm trying to see. Is there extensions that I need to provide for a student who's doing really well? Are there adaptations that I need to make for a student who's not who's struggling? So I really try and formulate a little bit using that second one and then the third one is kind of just an affirmation at that point. I'm trying to see like again, did I did it work that the changes work for those students? So, you know, there's it's very malleable. I really like formative assessment.”

“Well, I want this year a lot, a lot easier, because I just emphasize working with the students in math, so I do have like a handful of students, maybe 30 percent that aren't enrolled in a general education math class. So I have to see how they're doing on certain things, and some of them are quite low. So, I want to see how they do things without being told, like how to do them because I don't see that as a mastering something. There has to be some level of improvement, so there's different ways you can gauge it. I like to see, well, how much help do they need? I mean, there's a million different things you can use when you're doing it, like picking like a random types of problems or

like if it's some sort of like behavior thing you want to do. If they're improving on a behavior goal, you can have the time like where you just pick, you have set times that you see if there are they on task at this moment in time or things like that. So, I am emphasizing math this year, so I like to see if they're actually doing things more independently. And it's not necessarily, it has to be one specific skill, but I mean, I am with a handful of students. I mean, they don't know how to do multiplication, for example. So I'm trying to see how they can do with less help and whatnot. So it helps to see if we can move on or make things a little bit different or more challenging, or if it's just not working. I mean, it's something we're doing again and again isn't working, and I'm like, OK, well, let's try something else. I mean, I like to do that because it's not working.”

“Well, I mean, a lot of what I do, they're not necessarily well, I mean, I do give quizzes, but what I like to do is I just like to ask questions in Spanish. You know, my end goal is for students to be able to, you know, I mean, we have the modalities to listening, speaking, the writing and reading. But my focus is I would really like to see students be able to have enough speaking ability so that they're comfortable with the language so that they can put it on a resume, that they speak Spanish. So, a lot of what I do is asking questions just every day, you know, I'll take a few students at a time. It's part of a warm up or as a as an ending activity where I'm just asking questions based on everything we've been learning over the last few days and everything we've been learning from the beginning of the year. They're just random questions. And when they can answer those questions, then that lets me know that yes, they are understanding and that they're learning because they could still answer these questions that are just asked randomly.”

“It helped me make on the spot decisions of like, Wait a minute, let me back up and rephrase what I just said or let me reteach something, or it gives me insight on gaps in my own instruction or gaps in their learning. So... On the spot, but also planning ahead. How can are my students ready? Do they need a review? Or am I ready to do some type of enrichment activity with them?”

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Question: *What do you feel are the benefits of formative assessment to your students?(Teachers) (n=20)*

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“For the benefits of formative for students, I think it's just being able to practice what we're learning before we do a summative assessment.”

“It allows them to get a good, clear understanding of where they are at so that they're not left in the dark.”

“It's hard to tell with moderate severe, because I have some that don't even speak and I can't really tell all the time what they get out of it. I know they get excited showing me any response they have, so they feel good about being able to turn something in. But I don't think they all understand what it exactly does.”

“So I think it is a magical thing for students to recognize and not every student, there are students who will take advantage. That's absolutely true, but it's that's negative thinking, in my opinion. But when a student actually gets it on their second or third try, it is a magical thing that gives them a life lesson because this is what it's what it's like. This is what life is like in my personal opinion, and I think it sends them the appropriate message that you shouldn't give up. You should have, you should have strategies that you can use. And here are this. I think there's a lot of teachable life skills involved in formative assessment. Shows them there's more than one way to learn something or to know to have cognitive understanding of something. All of those things are very, very good skills, I think.”

“The benefits from the student side, they get a grade for it. It should help them understand like how they're doing throughout that unit. So, if they see that they have scored poorly on a formative assessment, then they know, OK, maybe I don't understand this unit as good as I thought I did, so maybe I should attend tutoring and seek other resources for getting help on the on this material.”

“On the student? And I think really formative assessment is almost another way of practice for them and is another way for them to gauge their own understanding, as well as allowing me to gauge their understanding. I like to do just quick. Ok, give me a one, two or three. A one if this is easy for you, a two, if you need a little bit of help or a three if you don't get this at all, like if you're like Miss Teacher, I need all of your help. I don't get this at all. And

so when I see that and they're gauging their own understanding, it allows me to help those students who need the help. And again, it allows them to review the skill on their own and to reflect on what they need help with."

"Well, from the student standpoint, I think that they have a more concrete idea of where they stand. So like, OK, like now I know like, OK, I got to be on this theory test or whatever type of test, whether it's math, science, English. So I think for them, it's like, OK, like they know, OK, I do understand this material. Or maybe I don't, like I probably need some more help. Maybe I need to go in for some one-on-one tutoring."

"Gives the students a sense of where they are in the learning and what they still need to work on. That feedback is essential because if they don't have feedback, they don't know how they're doing. And they can't respond effectively, either."

"A feedback on what they're learning. Students need feedback just like we do, and the faster you get that feedback back to the students, the better the students do and the better for everybody."

"From their perspective, I don't know if all the time they recognize the benefits of some of it and some of it just depends, is it going to be a typical the same old, same old? Yeah, you've got to learn skills because they're always going to be tests to take in life. I mean, we didn't get a teaching credential without passing some tests somewhere. But the study skills and other things you pick up, then other performance tasks you do. We also didn't get this credential and last 14 years in this career by only knowing A, B, C and D and then which one is the best answer, we had to learn and be formative on our own toes. What worked well, what didn't work well? I think students do get that. Like, what did I understand and what do I not understand? And when I didn't understand it, what was the reason? Why was that something we went over very well in class? Or was it something I put on the study guide said, We didn't have time. You're going to kind of do this on your own. A recent AP test we just took in my gov course, it's my first year teaching the AP gov course. I noticed that the activity-based stuff that I did in class with them in Unit one, their multiple choice scores were very high on that stuff. And then the couple that they struggled on with stuff we didn't cover as in detail and in depth. And I kind of knew that. So I was like, Well, OK, OK."

“It gives them some confirmation of learning or allows them to develop questions, which definitely is a great tool for them. When if I ask a question and they're still struggling with how to answer it and they can ask me questions, at least I know which direction they're trying to go. But I think that would be the biggest thing that allows them to know if they understand it or not. And if they, if I give a bunch of formative questions, lets them identify what they're still struggling with now.”

“I think it, I don't want to say put them on the spot, but its performance, you know, I kind of refer to it like being on a team like a basketball or soccer or whatever team, you know, we go through these drills, we go through these drills and game day. How good are you at the drills? You know, learning of the concepts are kind of like our drills, but then we apply them to something that's kind of like game day. How well are we doing that if we don't know our drills very well, then come game day, we're not going to do very well. So I kind of associate it with that, OK?”

“I think some of the benefits are they... I hate repeating myself that they get us to see how they're doing with the material and they get to see in a different way again instead of me just teaching it, they get to see it as a warm up or a quick exit ticket or a Pear Deck activity. They can see it in a different light and maybe seeing it differently, it'll click in their head of, Oh, that makes more sense, and they understand the material.”

“Their benefits is to know what, what the holes that they need to close. Where you have to have the teacher actually teach to be able to cover those holes because they're not going to come over and ask for the help, but. At the end, if the teacher sees it, the teacher covers the holes, that would be the benefit at the end for the student.”

“So they can see right there in real time what they're missing or what they might not have understood completely, then that gives them a chance to ask questions for clarification to make sure that they're doing something right or that they're understanding what they're supposed to understand. For the ones that are paying attention anyway.”

“Well, when carried out? And its original format where the way it's supposed to be done, from my knowledge, from my understanding of it. A formative assessment is a benefit to a student because it's a type of assessment that doesn't necessarily damage their grade. It just gives them a snapshot of where they're at. And then I could help

them with that to get them to that objective state, wherever it might be at.”

“If a teacher is really solidly using formative assessment, then and they're and they're actually providing feedback to the student, then the student has more buy in for their own learning. If the teacher kind of keeps that stuff behind the curtain and they're just giving them a score or just giving them a grade, then the student doesn't really know what's going on. And oftentimes they tend to just do things for points and they don't fully understand what they're learning in class. They're not really growing. They're just turning in work and seeing what sticks. So really strong formative assessment practices can, is what learning we're learning happens. It's like where you where you see students starting to actually engage with their own learning in school. So I think that's probably the biggest benefit.”

“Well, you can make it a little bit better for them, I mean, I think usually if you just pick some sort of standard that's grade level and presented, I mean, you're going to get maybe the majority of the class, but then you're going to have the students that really don't know anything better than the ones that already know it. So you're only targeting like maybe it, maybe it is a majority of the class, but you're not really helping the students most of the time, the ones that really need the help in there. Year after year, they're just kind of like, they're not getting it and they're not they're not doing well. And I can see in a general ed type setting, I mean, you're going to have the handful of students that are failing. But I mean, it just gives you some, some better data to work with. And then you have the students that may really know it. And it's boring for them and you want to challenge them and you're like, OK, well, they can move on. They know this stuff. Let's maybe give them something that's a little bit more challenging or entertaining or reward them for their efforts. So, there's a million different things you can kind of use with it. But the students benefit because it's going to be a little bit more tailored to their ability level, and there's always a way to figure that out. I mean. I know it can be difficult when you have like, gosh, like some of those like 40 students and then dear God, I was actually looking at the roster today.”



“Uh, well, I would think it holds them accountable and they're thinking, you know, they're in the mind, they're like, OK, I got to remember this, so maybe they might brush up on their on the phrases or vocabulary or certain grammar that we're going over. You know, the assignments that we do are very helpful with that as well. So, they might review their work. And, you know, they might just it's going to get them to be more on top of everything.”

“From a student point of view, like verbal responses, I think it helps them get to the reasoning part. You know, especially in math, we want them to reason them for themselves and understand why a certain theorem or something works rather than just here, memorize this, and it's just because, you know, so I think they get a deeper understanding. And then too, they get immediate feedback, whether it's verbal or whether it's like something that's graded with a score. They know where they're at and how they're doing and what they specifically need to go back and review.”

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Question: *How often do you give student feedback and what does it look like?(Teachers) (n=20)*

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“Of feedback, I say, like every not every day. In certain assessments, I do, I write comments or if we're using Pear Deck, I'll send comments through Pear Deck or just verbally walking around. I'll give them feedback about what they're doing.”

“I give constant feedback, walking around the room, watching students work, and on Pear Deck, I scroll through their answers in real time and give kind of constant feedback. But as far as outside of walking around the classroom, that is an area that I don't do as much on grading work and writing feedback on the work and give it back to them. I do a lot of in the moment, feedback in class.”

“I give student feedback constantly, so if they, if I ask for like, say, who knows the answer and then they start shouting. I'm like close, but you're counting a little too fast or slower, and then they'll redo it. If they get it right, I'll be like, Good job, you got it right and then I'll move on to the next one and I'll be like, Do you agree with them? Or if someone says an answer in the wrong, I'll be like, OK, we're going to be popcorn, and I'll talk to someone else and say, Do you agree with them? And they'll say, no, and then I'll talk to someone else, OK, who do you agree with? And then they'll say, I agree with the no, and then I'll go take count again. Let's check again. And then they give another answer and I go back. Do you agree with that answer and then ask for a third confirmation? Do you agree with that?”

“I give verbal feedback pretty often, especially when we're engaged in those kind of activities. I always give written feedback on things that I consider to be more summative. I guess you could say. But. Yeah. How often? Well, I guess some handful of kids feedback every single day. But I don't know if I, that's probably something I do intermittently and I'm not sure I have the best. Years ago, I would do notebooks and stamp things, and I just thought it felt very inauthentic, and I'd rather say we just did something today with annotations in one student had a very good strategy, and so I pointed that out. And another student didn't. They had a strategy that will leave them stranded in college, and I pointed that out. So yeah, that's feedback. I guess I do it all the time.”

“Um, when I do a formative assessment with my Applied Geometry students, I return it back to them. If all is well,

the next day and I discuss what questions were most frequently gotten wrong and I do some of those examples on the board and I walk them through those problems step by step to see where the complication was happening. And I just kind of ask them, OK, as I do these problems, where were you getting stuck? Or do you see what you did wrong to get your answer versus my answer?"

"A lot of the time, I give a lot of verbal students or feedback, like in those formative assessment instances, like if I ask a question and they answer it correctly. Great job. Like, I love that you said this. I like to take parts of their answers and really focus, even if they if it's not necessarily the right answer, I'll take parts of their answer and be like, Oh, I really like that. You said this, but let's see what we can work on with this, or I'll use it as an example. I'll put it up on the board and I'm like, How can we expand this? How can we make this better? So in those instances, I like to do that with written formative assessments. I do note on there and I try to give feedback within a week whenever we do have written formative assessments. If I can, I'll give instant feedback if the class plan allows for it. So if it's like a quick write and they're just quickly writing a CER for me and I notice, Oh, well, your evidence needs a citation like I'll just I'll either verbally tell them instantly or I'll note it on Canvas in their notes. It just depends on the lesson at that time. And what is the structure for the assignment."

"Every single day. Pretty much every single. I mean, gosh, if you want me to get technical about it, I mean, I give feedback pretty much once every fifteen to twenty-five seconds. I mean, because just so like this morning, we started new Christmas music because we just finished marching season. So we go through and we're playing OK, and then I can always tell when a majority of the class is lost. So I stop and I'm like, OK, this is what you're doing wrong. This is what you're doing wrong. Let's try it again. And then we go back through and we do it again. But I mean, it's a constant feedback. All day, every day, that's all I do. Sometimes I feel like is give feedback."

“So I try to give feedback as promptly as I can. Shorter assignments, it happens faster. Essays are the bear that are always on my back. Rubrics are essential to giving feedback because a rubric can give more feedback quicker than I can, just completely on my own. And if we’ve been looking at examples and then we use that same rubric as a tool to assess those examples, I think it helps kids better understand what it is, what success at varying levels looks like in their own work too. So then they can also become more proficient at self-evaluating their own work to. Um, I do a lot with my AP kids where we will look at model essays and we will assess those model essays using the rubric and discuss why they would score the way that they would score. And then they will write, and they will use that same rubric to justify and write justifications for why they would give their thesis the score. It gets their evidence and commentary and whether or not it has sophistication. And then I have them turn that in as like a cover page on their writing and then their rubric is at the back.”

“So this actually varies a lot because of just the different classes that I teach. You know, you try to give them the general feedback like today in my physics class, where we’re discussing some AP style questions, old free response questions. And so I gave the students time to, you know, work on them with partners. And then afterwards I put the answers on the board, just the answers. I didn’t solve anything. I said, OK, now spend the next 10 minutes with your partners trying to fix and figure out what happened. And then as far as feedback, then I go over like, you know, how I kind of looked at the problem and go around the room and talk to students and let them see kind of maybe my thought process behind it. For my engineering classes, we do journals weekly, you know, the daily journals. They have to fill in a daily journal with me and then I’ll actually end up reading through their journals and giving them a little critique back, you know, little, either through a rubric or a little note back on there. Whatever we’re currently working on with the Google and Canvas systems, I’m able to give them, you know, little blurb on, Hey, you need a check number three out, double check this, you know, just a little comment, you know, which is rather nice for those classes. On exams, I’m able to circle things and have them pay me to double check this little part here. You know, some sort of written feedback that way. I’m trying to think for any other class, for physics, same thing, you know, it’s on a written test to be able to write out a little comment there, like something to double check. So, the question was on feedback, right, right?”

“Uh, regularly, there’s regular student feedback every day, whether it be I’m just peeking over your shoulder like

looking at what you're writing or what you're assessing. But I'm telling you, Hey, you know, you need to elaborate more on that concept for, you know, like on today's learning target I had on the board in class for econ. A lot of them got the basic answer down. I wanted them to define human capital, explain what it means, and then what is your human capital? Give me some examples, and most of them didn't write anything down. I'm like, guys, I want to know what skills and abilities you have. Oh, I'm like, so what can you do? Do you come every day? Yeah, I have good attendance. Do you do your work? How are your grades? I have good grades, so that tells me reliability, accountability. Those are strong points of. Oh, I said, that's human capital, you are describing that which is good for you. Oh, OK.”

“So student feedback through the power of Canvas has been great. We can annotate on Kami, give comments directly onto the assignment, whatever it might be missing or right now, you know. I will tell you, science has changed in the way we teach it. We are focused more on skills now versus content. Content is still our delivery, but we have skills. And so every day we're focused on some sort of science and engineering practice skill. And this is a good opportunity for them. For example, the one I'm bringing I'm going to bring up is analyzing graphs. When they look at the graph, can they identify those parts? And I'll select their name or select that part and say, But you didn't, you didn't identify what the what the independent variable this graph is or you wrote the prediction. You wrote the sentence frame. I predict this will happen, but you didn't tell me why you didn't, why that is happening on the trend of the graph, right? So I'll give feedback in that form and that that really has changed our approach in science because now we can have conversations that we can come back to in our PLTs. And if this is relevant or not in your present, your questionnaire, your data. But before we talk about the content, but then by the following week, we already finished talking about cells, why are we still talking about cells? But if we focus on a skill of the following week, it doesn't matter what the content is. We can focus on the skill. And so that feedback is now not just for our students, but also good for our teachers and developing the skills that our science classes teach.”

“Um that's intermittent, I think more so. I try to do it on the spot as much as possible, again, like looking over their shoulders every day as best I can, asking questions when I give them time to work on homework in class and then the exit tickets, I think, is the way that I do it. If we, I go over every test with them or quiz, and I make sure we go through those problems so they understand, okay? And I allow them to ask a lot of questions. I really encourage them to ask questions.”

“I try to give students feedback with every assignment, and so we do homework assignment, probably like every day, Monday through Thursday at least. And I try to give feedback so that they can better understand. And the feedback is like, Hey, don't forget decimals, or don't forget your labels for measurements, for the most part. It's just the smaller things that I want them to get used to doing because I know that they'll need to do that in the higher up classes.”

“Mainly, I tell them, I talk to them, I may come up, I wait for them at the at the beginning of class outside. I've been looking at their scores, so the media feedback or the feedback that I give them personally before they walk into classes like, Hey, I've been noticing that you're not doing so well in your homework, what's going on? Or I notice that you've been doing your homework. You've been keeping it up there. And just by it starting something like that, they do tell me, Oh yeah, I get this, or, oh no, I didn't do it, cause I don't understand it or this, so they tell me. So we start a little conversation before the class. I know the thing to that because the homework gets graded automatically as soon as they submit it. They see how many questions are right questions, how many questions are wrong. So if they got a lot of them wrong, they know they don't get it. So, they can either ask me or if I see it, if I see their score like I know they're not getting it, either. They come to me or I go to them, and then they're but if not, actually I do catch them before class. I hope you know that they do come by on their own. I pick a few students here and there. I pick a few students and I hope they're walking by themselves when they come in so we can have that conversation if I see them walking in with someone, I let the conversation go.”

“If it's a formative assessment, I give them the feedback right away. And I don't put anybody on the spot really to say, Oh, you're way wrong and this person's right, I just kind of say, OK, for those of you that answered this, that's correct. You know, for those of you that didn't then think about it this way, and then I try to get them around to so

they can understand why the answer is what it's supposed to be. Know, maybe you thought it was this, but remember this point up here that's going to change how the outcome is or, you know, think about where the character did this and see, does that change your mind about, you know, I just try to kind of lead them around and but without I don't like I said, I'll never put them on the spot like that.”

“Well, unfortunately, feedback oftentimes comes in the form of a grade. That's how a lot of students in my class get their feedback. Did I do good or not do good when working in class on an assignment? I will do my best to move between students to look at different examples. What are you doing? What's going on? Give them direct feedback right then and there. Hey, that's wrong. Or that needs a little bit work or hey, you're doing good and that's on track. Continue with this. So sometimes the best feedback is the immediate response, something we're still in the formative area where it's correctable, but oftentimes, oftentimes they get more of a summative look in the form of a grade.”

“I try to give feedback in like a two-week cycle, and sometimes I'm better than other. Some weeks are better than others, but usually what it is I walk around the room. My kids are situated in tables of four and I will walk around the room and I will talk to each individual student, usually with either my Surface Pro in hand or I'll look at their Chromebook with them and they'll say, like, what are we looking at right now? And we'll look at like, claims. We're doing claims right now. And so I'll look at what claims sentences they wrote and provide feedback based on what I see. Sometimes they'll ask, they'll say things like, read that out loud to yourself and tell me if you think it sounds right. I kind of go by a philosophy as an English teacher that are speaking and listening English is always better than reading and writing English. And so typically, when they hear it out loud, they can catch a lot of the mistakes that they make on their own. And it's that sort of stuff that helps them a lot. And those little kind of like little tricks that they end up picking up through those that feedback, those kind of feedback moments. And I usually keep track of it in either a folder or my Surface Pro or after I've talked to the students that might come back to my desk and make a note. I try not to have something between me and them very often. I feel like there's a little bit of a disconnect if I end up looking at my own screen while they're looking at a screen. It's like there's not really much interaction happening, which might sound funny being a big tech guy like I am. But you know, I think that they need that. That relationship that rapport that happens, and I think that putting a binder, even a binder or a clipboard between you and them can kind of break that down a little bit. So usually I try and save my feedback for after I've spoken. Because as far as keeping track...”

“Well, they get feedback on a, not every day, but at least three times a week. I give them feedback because we do our mandatory checks on their grades in their math class, and we, I check their how they organize things. If they're in the class with me, I like them to stay organized. I give them feedback on a bunch of different things and they have a really disorganized backpack. It's not good because then they lose everything. So there's different things that I can give them feedback on. But it predominantly really is on their grades because I always I mean, maybe that's not always the case, but most of the time, if they are doing well, A or B level, it shows that they're making some sort of effort.”

“Well. I would say sometimes when I mean, well, I mean, it's hard to say. Maybe that's one I'm not too diligent on, when they're turning in their assignments and they're done correctly. I mean, you know, if they're done incorrectly,



then I may write a comment on there and say, Oh, you know, number five should say this or something like that. But during the class, like I said, you know, we try to work on the speaking part a lot. And if they say something incorrectly, then I'll correct them on that part. But usually, they either know how to say it or they don't know how to say it. So, if they don't, then I have to give an example and say, like, OK, well, do you remember when we studied this? And they're like, Oh yeah, OK, well, try saying this, and then that's your answer."

"Um, so my day-to-day feedback, I would say, is my exit ticket, and that's just a score, and they know like it's the same, so it's two questions on the same topic. So, I take it if they got one wrong, they somewhat understood. If they got all wrong, they did not understand. If they got all right, fully understand. Then on quizzes, whether it's on paper or online, I provide them feedback by doing test corrections and showing, Hey, I noticed that as a class we missed question number six or something. And then I go over it and dive a little bit deeper. Break it down. Try to reteach it in a different way. And even with unit assessments, I also take the time to go back and fix mistakes."

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Question: *How often does formative assessment drive instructional decisions in your classroom?(Teachers) (n=20)*

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"I would say a lot just by the warmup or the exit ticket. If I see that they're not ready for the next topic, then we won't go to next topic."

"I would say, again, using Pear Deck that real time formative assessment is constantly driving my decision. So every day to the next day, I'm using the Pear Deck and real time formative assessment. Every day it's driving my decisions. But again, I don't have enough data yet built up to drive my decisions going into the next year. And even for a lot of these students in here, I'm realizing I don't have enough data to drive my instruction this year yet."

"It's all the time, so if I taught something today and I do a review question tomorrow and it makes no sense, I got to go back like, it's always, I'm always going to go back at one point. It's never just like they got it all the way-ish. But with mod-severe, it's kind of rough."

“Every week, for sure. Just now, actually, just today, something happened, and I thought, Oh my gosh, they don't understand that concept. I can tell from what they're saying. And so I need to reteach it not just happened today and I'm going to reteach it tomorrow. So all the time.”

“It should drive my decisions more, but lack of time makes it difficult. If we had more time for planning, more time in our schedule to reteach topics while not having to cut out other topics later on down the line, just time everything seems like it's more time.”

“Almost like one hundred percent of the time, I do feel that, like I said, I am constantly doing checks for understanding. I do written formative assessments, mostly verbal. But again, if I am, if I have a plan and a lesson that I want to teach, I am more than willing to hold off on the next activity to focus on a skill that's not being met or to reteach and reteach it in a way that they'll understand it. Because if I have a lesson and students because I have to make accommodations for my students every single day, I have students who are great at technology and I have students who are horrible at technology. And so maybe I'll have like an activity plan before the Chromebook on Canvas and I'm just seeing my students struggling. They're not able to get this whole tech aspect down. Then I will switch gears and do something on paper along the same lines, but sometimes I will switch it up to allow them to be comfortable in doing it. So I definitely I use it constantly.”

“Um, well, I would say on a pretty regular basis, because if you want to get technical about it, I mean, like at the end of class, let's say I'm like, OK, let's run through this piece, this piece of music, so we run through it. Based at the end of that. I'm like, All right. So the trumpets were messing up here. My saxophones were messing up here. That's where I'm going to start the next day so that we can go so we can start with the stuff that we were messing up on first and then hopefully fix it and then go back and add it in. So I mean, yeah, that's, I mean, on a daily basis, I use the overall assessment at the end of the class to determine what we're going to do and what we're going to start with, in the next school day.”

“Every day. I mean, whether it's more formally or informally, I mean, if the kids aren't ready to move on, then we

slow down, we come back, we build in more practice, try to look at it through a new a new angle, try to practice a skill in a different way. So I mean, every day, formative assessment is happening. You know, sometimes it's more I mean, like my AP kids today, they were practicing vocab, they had the white boards out. We were formatively assessing what it became very clear that they don't know three particular terms, you know, and it was very clear in two classes. I suspect it's going to be the same next period, too. We'll see. But that whiteboard is instant feedback for both them and for me about what ones are they struggling to understand conceptually. So which ones do I need to start bringing in some examples of or pointing out in the context of their reading more?"

"Oh, I mean, besides the I, mean, my unit plan, this is what I have for my whole unit, I have my general idea on what my notes are going to look like. But on a day-to-day basis, I'm judging a lot on the feedback I'm getting from students. You know, I mean, are they engaged or not? I mean, I had to cut a lecture out today by 20 minutes, just finished it because the kids just weren't engaged today. And then you figure out what's happening, et cetera. But they weren't they weren't feeling the lecture. I said, OK, we're going to stop here. We're going to have some time to do some work. And then I was able to meet with students a little bit more, one on one. But I'd say that I would say besides my unit planning and my general pacing, I mean, I'm very flexible in terms of how we're getting the feedback and using the feedback from the feedback I'm getting from my students to influence what I'm doing on a day to day, week to week basis. I mean, hell minute by minute basis, we find out that the students haven't ever seen synthetic division in pre-calculus. You got to put a stop there and teach them synthetic division, you know? And that happened. None of my students had seen or half of my students had seen synthetic division. We're doing that today in class. Like, how does this work? So, all right. Well, we got to come up with some extra problems and now we need to create a little intervention assignment for my students. So a couple extra questions for them. So, they didn't know what they were doing. So, we hopefully fix that problem, hopefully."

"Well, quite often, because it literally even just that over the shoulder of a notebook check for today's learning target, I can instantly see and stop and say, Hey, everyone is only answering this part. All right. But I want you to do that instantly gives me the feedback that I need to either go further with my instructions or encourage them if I keep saying maybe even the wrong answer. Whoa, whoa, you got the wrong answer. And then the next row where you wouldn't have been looking at the person next to you for the wrong answer, copied it like, Oh my gosh, and

then I'll go check the kid. Like, with a high A, it'll be like, Oh, you're a little off, too, OK? So sometimes it helps me, like maybe I wasn't clear enough for the assignment that I thought was there just. I love those things.”

“It drives my instruction every day if I ask them a question and they didn't get it, I guess I'm changing my lesson the next day, which is hilarious to hear people or they have their lesson plan and they're going to follow it like, No, do I change it by second period? It's already changed because if you're formerly truly assessing, you know that you're going to have to change something you cannot fix it or you can't have it right the first time and then you make it better for everybody else. And for first period, they got to hang in there. But I think that if there's anything to plan is, what are you going to ask to see if they understand if there's anything you're doing in your classroom setting is making sure that you have a plan to ask a question, you're not just delivering content.”

“I think, I mean, pretty much every day. I mean, I try to do that every day that we're doing a concept. We've talked about functions and relations and how to identify them, giving them a table of values versus a little diagram of values versus a graph independent dependent variable that I could tell just by the looks on their faces. You know, forty-five minutes, that's going to be quite long enough. So I try to do it every day.”

“I think it makes a small impact. You know, without formative assessments, I'll just kind of continue on with my lessons. And if I don't know, they're struggling. So using formative assessment, it really does help me to see how they're doing if I need to slow it down and cover it, maybe again or in a different way. So it does drive my lessons.”

“Weekly. Weekly at least once a week.”

“Every day, every day, I've got to check and see, do they understand I've got to figure out a way to get them to tell me what they know. That's why I have such a long list of different things, and I'm always looking for other things that I can use. You know because there's only so much Kahoot you can play before they're like Kahoot? You know, so you've got to keep it fresh every day. So, yeah, every day you've got to find out what they know that drives everything. If they don't know something, if there's no schema for what you want to move on to, then you're

wasting your time. I've got to have some type of foundation and you just keep adding to that and they keep moving, hopefully. You know, I joke with them a lot about my dream teaching world. You know, in my dream teaching world, this would be happening now, you know, and sometimes it gets their attention and they're like, Oh, OK, well, let's try to, you know?"

"Well, I'm not going to lie. They should more so, they don't as much where I'm kind of stuck, where I just kind of talked on just a minute ago where I kind of got stuck is the fact that I have to I have to reach objectives by X dates in order to keep up with my peers and my department. So sometimes I, as far as like formative assessments, driving instruction, I would say that unfortunately, it's not necessarily. What drives instruction to my classroom is the fact that I have to meet. X dates on X times in order to be on par with my peers, and that to me is a little bit limiting because I'm stuck with. Having to be, well, I mean, a team member, it's all, you know, we're all in this as a team, but. You know, some classes are moving ahead faster or further than others."

"Oh, all the time for sure. You know, if I'm doing a formative assessment and I'm seeing that the lesson isn't sticking, then that means the unit I am teaching, I might have re teaching moments. I might provide optional units for students that provide the same assessments that I want, but with different content in my classroom, I call them quests. They're completely optional, make up assignments that typically are more fun than what we do in our general or general course, but they are more challenging because they don't always precisely fit. So students have to work a little bit harder to get the things out of. Like an example would be my poetry unit that we did at the beginning of the year. Poetry is difficult for kids. So, one of the quests that I developed for that one was actually letting them use music to do it. But music doesn't do the same things as poetry, and there's actually another element, which is the actual music. It's not just lyrics, it's there's a song behind it. And so, when they're talking about things like tone, they have to include while the music sounds and..."

"It's a good question. Well, I do for my whole class instruction, at least, I do things that are with the entire group of students. So it doesn't necessarily I mean, I can use their work samples and what they've done in previous classes or previous goals and stuff to use that. But when I work with the students individually, especially for the ones that don't have another math class, I do use the...what I use my folders I have behind me, I collect, I have my. Of

course, the student doesn't have anything, and I swear they're not all like that, but I collect the stuff that they do. And then I kind of say, OK, well, you know, they need to, they need to step it up or I need to do something different. So I mean, are you saying like how often or...does that change?"

"Well, you know, that's a tough one also, I mean, because I've got material that I want to get through. So, I don't like to delay. I mean, I have a good handful of students that are always ready for more. And I don't want to delay everything because of them. But at the same time, if I'm, you know, asking questions and people aren't understanding or giving an assignment and students aren't understanding every three, three or four days, and maybe then I'm seeing what's going on, then I could think, OK, I got to go. Throw in another assignment that has to do with this concept again or something. So maybe once a week it'll I'll look at something that'll say, you know what? We better talk about this because actually, like about two or three weeks ago, I had already planned a test and there was another concept that was coming up and I thought, OK, well, they should be able to get it. But when they did it, I was like, no, you know, don't you guys? I'm going to push the test back because we need to work on this a little bit more. So just things like that, not so much. Usually, I mean, the level I teach, it's usually pretty. It's understandable, the instructions are good that students usually understand the concept, except for the ones that that don't do anything. You know, that's another challenge alone. But generally speaking, level one Spanish is not that difficult now for my Spanish speakers who already speak Spanish. So they have that advantage primarily in there. It's primarily learning vocabulary and learning to write better. And for the most part, they seem to. As long as we are doing written assignments and I'm giving them a, you know, we're doing examples with vocabulary how to use these new words and sentences. Then in that area, they seem to understand it pretty good."

"I think that goes back to what I said earlier. Just any like any and all feedback that I get, whether it's verbal body language or some assessment score, I use that to drive and plan my day to day on the spot or a future planning for the course."

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Question: *Describe how formative assessment helps you, as an administrator, as you work with your teachers.* (Administrators) (n=3)

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“I would say, yes, every single evaluation I look for that in every single observation evaluation I've made it very clear is, you know, what's an exit ticket look like. A meaningful exit ticket so you can gauge student learning for the day and teacher effectiveness regarding their instructional approach. And I even include that with all of the teachers that I have evaluated, and I know Teacher 1 probably has it in there. But that's probably the two biggest things that I look for is check for understanding and exit tickets and closing out your activity for the day and all that as well.”

“Well, I think it's for me, it's less about numbers than it is about process, right? So when you look at our individual learning teams, it is, do they have one, an assessment structure, even if it's in progress, right? Do we have some sort of collaborative structure? And then do you have the commitment from all of those team members to stay kind of in the pace and conduct with fidelity, the assessments? And then the last piece, which is the toughest is getting that data back and sharing it out with student samples. So it's just that I'm looking more in the professional team for that process. And is there a commitment from all the members to be a part of that team and to have real conversations about student learning and how we can then change our instructional practices after we've had those collaborative conversations? And it's that that gap, I think, where I think we look at a lot of data, I don't know that it that it really informs and changes our instructional practice as much as it probably should. But yeah, I'm very interested in that process and monitoring that process for each learning.”

“That's a good question, because really content doesn't touch my realm too often as a dean, but definitely the evaluative portion of my job working with teachers to create those formative assessments, see how their classroom runs. That's the relationship I have right now, but it's very limited.”

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Question: *What do you feel are the benefits of formative assessment to your teachers?(Administrators) (n=3)*

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“I think the biggest thing is that I see it as an administrator as if I'm lecturing 30, for 30 minutes, and there's no checks for understanding or anything like that, there's no formative assessments intertwined within that. Then it just becomes boring and kids are disengaged and all that stuff. One teacher, a new teacher, she had a and I don't know where she got it, but she had it in the midst of her. She would have knowledge checks after like two slides and all this check just to keep them, you know, seeing that they're paying attention doing. That's a great idea to have that in there. So, I think the big benefit is just to keep the learning continually going and there's no lull or disengagement that's taking place.”

“They going to be a lens into the student learning if we're if we're truly focused on learning for all students and we have to really understand where they are at, where their gaps of knowledge are, where their gaps and processing are for each segment or each piece of content that we teach. And we need to do that in context. And the best way to do that in the moment in context is with a simple, formative assessment that is non, it doesn't raise the effective filter, right, doesn't raise anxiety of the student. It's it becomes part of your, the classroom structure, coming back to the evaluations. What I look for, teachers and incorporate formative assessments daily to parent. It's not happenstance chance, right? It's planned, it's structured. It's even the questioning techniques. Whether you use a random technique, it is a structured way to view student learning and to inform the educational process. We don't know where students are at any given point in time. We have no ability to benchmark where we can take them and if we're just kind of shooting stuff out there. Shotgun approach without truly understanding where our kids are at, we're not being very efficient in our practice.”

“I think the benefit is, are the students understanding the material? You know, you can teach all you want, but if your students aren't getting it, there's something that needs to happen in order to make sure your students are successful.”

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Question: *When you observe teachers, how often do you see student feedback and what does it look*

*like?(Administrators) (n=3)*

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“So I see, when I see teacher feedback, I see teachers that are effective, pacing the classroom, effectively being able to engage with students and provide that feedback that goes on there. Sometimes I'll ask the kid is like, How is this class going? What are you learning today? I'll ask him specifically those questions, even though the objective's right on the board. But I want to see what they know kind of right away to look at. So, I think the other thing that I observed with teachers is, are they effectively monitoring and pacing the classroom?”

“Um, to be honest, it comes in various forms. I think one of the fascinating things about a campus that has over a hundred teachers is you have very spurious states of expertise and various states of familiarity with technology. You have, you know, teachers that live in a very traditional space, which is fine, and you have teachers that live in a very tech savvy space, which is fine. I think, you know, coming back to the question. It's about repetition, it's about seeing it as part of an overall structure that student feedback and that student feedback could be very traditional in nature, that traditional warm up or that traditional five paragraph or write a paragraph on this and then you do a close read on it, you know, it could be a very traditional paper-based product. But kids are engaged doing it, and then it leads to the next activity of collective discussion about it. And with examples and having a discussion and bringing in their input. And it comes from the kids. In technology, and you know, I can think of something like your class and a few others that use the product extensively writing and students are engaged in that contact with the direct instruction and are able to respond, and it then becomes part of the next activity, which is a discussion about that problem, where you can go wrong, et cetera. So it's once again that embedded constant questioning product and it's well planned out. And so, yeah, when you talk about seeing different teachers, I see the gamut from it runs fully embedded in technology to that traditional, you know, do this problem and then we'll work it out. It's just fine. It's the process. It's the process of engaging students and being reflective about their work and having a culture of questioning, both from the teacher and then back from the student and having that dialogue. I think that's that active engagement where students are really in the mix.”

“The observation process has been skewed the last few years, especially with the shutdowns. So... Really, it's just trying to understand if the student is engaged, if the student is working, if there's some kind of mastery of the

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subject. I often see it when you're walking in, especially the unannounced, because the announced visit is a little dog and pony show. But really talking to the kids one on one and saying, Hey, why are you learning this? What? How are you going to apply it? And having these one-on-one conversations with the students after the class.”

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Question: *What issues do you find that influence the purchase of technology or professional development for formative assessment?(Administrators) (n=3)*

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“So right now, I'll say this coming back off of, coming back off of a pandemic year has probably been the most difficult year from a behavioral standpoint that we ever look at, and I just... I think that's a big issue is having to deal with behavior, and we're trying to find the balance as administrators is, do we spend money on the formative assessment piece or do we spend money on SEL training so that our teachers can connect with kids first?”

“A willingness for people to try new things and approach me with it. I'm very open and I'll buy anything if it looks like it's going to be used and there's a collective commitment to use it. Is, you know, we want to get bang for our buck. You want to go with the proven product, but it's really just approaching me and seeing if we have the money to do it. I can. I can, you know, think of the IXL that we purchased. But even before that, for social studies, you know, we've committed to TCI, which is a Stanford based curriculum that has a lot of those assessment strategies built in. So and there was a collective commitment by the department at that time, they really wanted to use it. We've since phased it out because they weren't using it as much as they thought they were going to use it.”

“That's really not my realm. I don't understand the budget too much, but especially with the COVID money I've seen Admin 1 grant a lot of technology lately because we've had to. So that's my limited knowledge of the tech budget.”

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