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FORMATIVE ASSESSMENT KNOWLEDGE, BELIEFS, AND PRACTICES DURING ONLINE TEACHING AND THEIR EFFICACY AS PERCEIVED BY LEBANESE MIDDLE SCHOOL TEACHERS

by
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A thesis
submitted in partial fulfillment of the requirements
for the degree of Master of Arts
to the Department of Education
of the Faculty of Arts and Sciences
at the American University of Beirut

Beirut, Lebanon
January 2022

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ACKNOWLEDGEMENTS

Throughout the writing of this thesis, I have received a great deal of support and assistance.

I would first like to thank my thesis advisor, Dr. Karma El Hassan, for always pushing me to do better in my work. I will forever be appreciative for everything I have learned while being your student. Thank you for your patience, encouragement, and for providing me with the tools I needed for this research.

I would also like to thank Dr. Jurdak and Dr. Al-Hroub for their expertise, valuable feedback, and time.

I am grateful for my parents and brothers for their continuous support and love throughout this journey. Moreover, I would like to thank my puppies for being my emotional support throughout the stressful writing stages.

Furthermore, I would like to thank my friends who provided an open ear for my ideas. For the teachers who participated in my study, thank you, without each one of you this research could not have happened.

I dedicate this thesis to my mother. Thank you for believing in me. I love you.

ABSTRACT

OF THE THESIS OF

Zainab Ismail El Sibai for Master of Arts
Major: Educational Psychology –Tests and Measurement

Title: Formative Assessment Knowledge, Beliefs, and Practices during Online Teaching and their Efficacy as Perceived by Lebanese Middle School Teachers

Formative assessment is a valuable tool for teaching and learning. The application of formative assessments in classrooms depends on teachers' beliefs along with their practices. Due to the current pandemic, schools had to resort to adopting hybrid and online learning. One main concern is how teachers are using assessment during these times, specifically formative assessment, to assist student learning. The goal of this study was to describe and understand Lebanese middle school teachers' formative assessment knowledge, beliefs, and practices during online teaching and the efficacy of this use. The target population was 31 Lebanese middle school teachers that teach at English-Language private schools. A mixed-method approach was implemented for this study. First, a survey was distributed online with both open and close-ended questions. Afterwards, an interview was done with nine teachers for follow-up and clarification of identified themes. The results showed that teachers are knowledgeable of the majority of the purposes of formative assessment. The majority of teachers also believed that formative assessment improves student learning, motivation, and interest during online learning. Although some believe it is easy to implement, others disagreed. The most common practices used by teachers was providing immediate feedback, usually to the group. Moreover, the most commonly used formative assessment tools were oral feedback, classroom exercises, and homework. The majority of teachers reported that formative assessment improves teaching effectiveness, though there were concerns related to practicality and challenges arising with online learning. This study recommends conducting further research related to the school's inclusion of formative assessment in the curriculum, especially during online teaching.

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CHAPTER 1

INTRODUCTION

Background Information

COVID-19 has had an impact on all sectors of the world, specifically the education sector. Students all around the world were confined to their homes unable to attend in-person classes. As a result, hybrid or online education had to be implemented without proper adequate training for teachers. In order not to disrupt learning during the pandemic, a real classroom had to be replaced with a virtual classroom (Kaup et al., 2020). It is possible that school closure will have negative effects and lead to greater problems (Esposito & Principi, 2020). While online learning was being implemented, many large-scale educational assessments had to be either suspended or postponed (Su, 2020). This transformation in the educational environment required changes in assessment procedures, teaching, learning, and methods (Khan & Jawaid, 2020). The main question with online learning is how are teachers using and implementing formative assessment in their online classes and how are results being used?

Assessment is an essential part of teaching and learning as it provides a measure of learning a student has acquired (Khan & Jawaid, 2020). Conceptions that teachers hold regarding assessment can influence their teaching actions (Pastore et al., 2019). In education, the purpose of assessment is to support learning (Black & William, 2006; Yan & Cheng, 2015). The most used forms of assessments are summative assessments and formative assessments. Summative assessments are a measure of a student's end product (Perera-Diltz & Moe, 2014). Using summative assessments teacher's document students' learning achievements through tasks in which they demonstrate their mastery and knowledge of the content (Guadu & Boersma, 2018). This results in grades and

rankings and usually provides evidence of student achievement and communicates the criteria for success (Black & William, 2009). On the other hand, formative assessment is evaluating student learning in an ongoing fashion during the formation of learning (Perera-Diltz & Moe, 2014). These assessments tend to facilitate learning and support students to better understand the subject matter (Weurlander et al., 2012). They are used to modify teaching instruction and act as a tool (assessment) to enhance learning. This type of assessment determines what students have already acquired and where their gaps lie (Guadu & Boersma, 2018). An advantage of formative assessment is that it enables students to reflect and monitor their progress. This also allows teachers to obtain information that will guide their instructional decisions.

During online learning, there has been a switch of focus from summative assessments to formative assessments (Bozkurt et al., 2020). Teachers were not able to rely on only summative assessment, accordingly, formative assessment was the solution in providing students with the opportunity to be involved with learning thus making the learning process more student-centered (Robiasih & Lestari, 2020). There is a need for formative assessment to be able to understand whether students are acquiring the content being delivered or not (Liberman et al., 2020). During online learning, frequent formative assessment increases engagement, learning, and allows students to not fall behind (Abdul Rahim, 2020). Due to these interactions, constructive feedback becomes more important. Formative assessment can be applied during hybrid or online teaching and learning when teachers become familiar with different tools that can be used in their practices. Technological advances have supported the use of formative assessment with online learning. Preparing for online formative assessments entails both digital and assessment literacy. One example is that teachers must carefully design, monitor, and

communicate feedback to students in an acceptable time frame (Rovai, et al., 2006; Perera-Diltz & Moe, 2014). This calls for teachers to receive appropriate training.

Researchers have established three formative assessment steps in the teaching and learning process. These steps involve recognizing where students are, where they are going, and what needs to be done to get there (Black & William, 2009). The framework requires that teachers, peers, and students be involved in the processes. The framework provided by Black and William (2009) suggests that first learning intentions and criteria for success should be identified and shared. Then, evidence of student understanding, where they are, is elicited through effective classroom discussion and learning tools. Feedback is then provided to identify what needs to be done and to move learners forward in their learning (Black & William, 2019). Following that, students act as instructional means for one another, which paves the way to peer-tutoring and peer-feedback. Towards the end of the process, students become active owners of their own learning. This framework can be translated into activities during online sessions.

In Lebanon, from my experience in schools during both in-person and online learning, teachers are using the results of formative assessment as an additional grade rather than as a tool for learning. Moreover, due to several constraints such as electricity and internet connection the quality of teaching and assessment is varied extensively among learners. In addition, schools were unprepared for online learning, more specifically for conducting the formative assessment. During online learning from my observations as a special educator, it was clear that teachers were not prepared for assessing learners formatively. This could be due to a lack of both assessment and digital literacy which are crucial for having an effective course evaluation system.

Purpose

The purpose of this study is to describe and understand Lebanese middle school teachers' formative assessment knowledge, beliefs, and practices, and their efficacy in using formative assessment in online teaching during the pandemic.

Research Questions

This proposed study attempts to find answers to the following questions:

- What are teachers' knowledge and beliefs regarding formative assessment during online learning?
- What are the formative assessment practices used by middle school teachers in their online teaching during the pandemic, specifically tools used?
- How do teachers perceive the efficacy of these formative assessment practices?

Building on Previous Research

When formative assessment is used properly in learning, a continuous loop of knowledge and processing is implemented (Brink & Bartz, 2017). This loop is between teacher and student, where students answer questions raised by teachers; teachers analyze results and provide feedback, therefore guiding student development. Teachers' beliefs have a powerful influence on their practice (Guadu & Boersma, 2018). Research has shown that the adoption of formative assessment in the classroom depends on the beliefs of teachers (Pastore et al., 2019; Büyükkarcı, 2014; Guadu & Boersma, 2018). Therefore, the use of formative assessment in the classroom whether in person or online depends on teacher practices. Büyükkarcı, (2014) sought to find whether there are differences between teachers' opinions and applications of formative assessment. He found that teachers believed the basic principles of formative assessment such as providing feedback, implementing peer and self-assessment, as well as sharing learning

goals should be applied in classrooms (Büyükkarcı, 2014). Now although results showed that teachers had positive beliefs and attitudes toward formative assessment, they mostly used it for summative purposes. These found differences between beliefs and practices were reported to be possibly due to crowded classrooms and heavy curriculums. Therefore, teachers resort to the use of summative assessments, as they are easier to conduct (Büyükkarcı, 2014).

A study in Italy aimed to answer what Italian teachers thought about assessment, their main aims, and whether at a theoretical level they were able to distinguish between formative assessment and summative assessment (Pastore et al., 2019). Results showed that conceptions of assessment processes follow more traditional views. Teachers in Italy were found to use the same strategies such as final exams, tests, oral/written tasks. Moreover, they focused on cognitive dimensions (focusing on lower-order thinking skills) and considered assessment as an instrument to monitor and check on students (Pastore et al., 2019). These views are more consistent with the purposes of summative assessment as in their opinion they were found to be more convenient. In addition, 20.9% of teachers rarely considered assessment as a drive to student learning (Pastore et al., 2019), hence focusing on the summative purpose. In addition, teachers found that more control can be applied to summative assessment as opposed to formative assessment. In Guadu and Boersma (2018) teachers have confessed that due to a range of challenges, the main one being time constraints, they do not have a good practice. These served to limit their implementation of formative assessment.

Another study found that the following predictors: instrumental attitude, subject norm (teachers' perception of others' opinions related to formative assessment), and self-efficacy; indicated whether teachers would use formative assessment (Yan &

Cheng, 2015). Meaning that teachers will use formative assessment if they believe it provides rewards, such as support from school personnel. In addition, teachers are more likely to implement formative assessment when confident in execution. However, there were discrepancies between teachers' reported beliefs and their observed practice of formative assessment that can be attributed to contextual factors (Guadu & Boersma, 2018). Effective implementation occurs when support from the school's administrative team is provided (Brink & Bartz, 2017).

Brink and Bartz (2017) wanted to understand the perceptions of high-school teachers on the use of formative assessment to improve student learning. Their study was conducted over a span of two years. They found that teachers' perceptions of formative assessment have changed positively over time in terms of adjusting their instruction. Moreover, this positive change was prompted by learning how to track acquired objectives, providing extremely specific feedback, adjusting instruction, using pre-set curriculum, and understanding accountability (Brink & Bartz, 2017). It was also concluded that if high school teachers effectively use formative assessment to provide feedback and individualize instruction, student learning will be enhanced (Brink & Bartz, 2017). Another study conducted by Guadu and Boersma (2018) using an open-ended questionnaire, reported that teachers had a positive belief in formative assessment. This positive belief relates to the role of formative assessment in enhancing and improving student learning and the quality of instruction. Furthermore, formative assessment is essential to identify a student's current level of performance during the process of learning. Now although teachers have positive beliefs regarding formative assessment, they may not practice it due to both internal and external factors.

Another study conducted by Young and Jackman (2014), sought to find differences between perceptions and practices of both trained and untrained teachers with regards to formative assessment. Results showed that teachers who teach grades 7 – 9 held positive perceptions about the role of formative assessment in the classroom (Young & Jackman, 2014). In addition, they wanted to learn about common formative assessment tools used. Use of formative assessment practices that were mostly used by teachers was oral feedback and the use of different questioning techniques; while the least used were journal writing and allowing students to contribute to the making of quizzes and tests (Young & Jackman, 2014). Moreover, self-assessment, peer-assessment, and use of portfolios were sometimes used.

A study in Lebanon was conducted to describe in-service and pre-service elementary mathematics teachers' concepts and practices of formative assessment along with tools used (Abi Faraj, 2011). Results showed that teachers would rather use formative assessment tools that directly resulted in grades as opposed to other strategies that may take time out of the class. Moreover, both in-service and pre-service teachers believed formative assessment was important in providing feedback to teachers and students about students' performance (Abi Faraj, 2011). A more recent study by Robiasih and Lestari (2020) sought to describe how senior vocational high school teachers conducted formative assessments during the pandemic. Results showed that teachers used platforms such as google classroom, email, YouTube, and WhatsApp when conducting the formative assessment. Skills that were assessed include reading, speaking, writing, and grammar. Moreover, researchers found that the tasks conducted varied according to the teacher. Furthermore, some of the tasks studied lacked reliability.

Rationale

Building on previous research, formative assessment is essential to student learning and teacher instruction. Currently, there is a shortage of studies regarding formative assessment during online learning, especially during the pandemic. Therefore, this research will fill the gap in research. In addition, the current research will add to the literature because of the change in teaching practices, everything is more or less online. Therefore, it is important to understand the extent of use and efficacy of formative assessment with regard to online learning during the pandemic.

Due to the long closure of schools around the world, there has been a loss of learning and formative assessment can be used to assess and close this gap. Formative assessment will continue to be important post-pandemic (Robiasih & Lestari, 2020), especially with hybrid learning. Therefore, classroom assessment will be essential with the reopening of schools, as it will provide policy-makers information regarding students' current level of performance and how to proceed with instruction. The use of formative assessment depends on teachers' knowledge and beliefs, regarding the different practices and the use of tools. Research has shown that teachers prefer summative assessment due to several factors. The proposed study is important as it will shed light on teachers' knowledge of formative assessment. Moreover, teachers' beliefs will be studied to understand their perspectives about formative assessment during online learning. Furthermore, understanding middle school teachers' practices of formative assessment during the pandemic might assist in further research regarding types of tools implemented during online learning.

Additionally, it will help understand the practices being used in Lebanon. Specifically in Lebanon, there were no studies related to teachers' knowledge beliefs

and practices of formative assessment during online learning. In October of 2019 Lebanon witnessed protests all around the country leading to the temporary closure of schools. With the spread of COVID-19 schools closed their doors from March 2020 until the end of the academic year. During this time with lockdowns being implemented, the economic situation took a turn for the worse, along with the port explosion on August 4th which led to turmoil. More people were without work, unable to pay for schools and devices needed for online learning. Distance learning was planned by several countries through digital technologies and was tough to implement in some industrialized countries (Esposito & Principi, 2020), like Lebanon. There are students in Lebanon who may have been excluded from learning. There is a digital divide between those who have access to electricity, the internet, and devices and those who do not (Bozkurt et al., 2020). With online learning in Lebanon comes issues related to electricity cuts and internet connection problems; not to mention the economic collapse along with lack of gasoline, fuel, and medications adding to the stress of teachers, students, and families. Students have different internet access, learning devices, or family support for learning (Robiasih & Lestari, 2020). Some have devices such as laptops, tablets, and smart-phones while others are unable to acquire such materials. Furthermore, this study will help highlight (in the context of Lebanon) the importance of teachers' implementation of formative assessment during online learning to account for the electricity and internet cuts to find who has missed concepts.

This study will serve as an initial investigation where results can be used to understand current implementation for later studies to identify how formative assessment can be applied for online learning to provide evidence and support learning in real-time (Bazaldua et al., 2020).

Contribution to Education

This study contributes to research and practice in the educational field, especially during and after the COVID pandemic.

Contribution to Practice

What this study does is highlight the extent of use of formative assessment, teacher perceptions regarding it, the tools they use, and formative assessments' efficacy. The results can help identify challenges faced with its use. As the rollout of vaccines in Lebanon is slow, and schools opening and closing due to active cases, the pandemic is far from over. Therefore, embedding formative assessment during online learning with technology is more apparent in classrooms, thus requiring training for both teachers and students regarding the platforms. Once the line is drawn between formative and summative purposes of assessment, there will be enhanced student learning and teacher instruction. During this time, it is crucial for formative assessment to identify these learning losses and individual students' needs as there may be a wide disparity within the same grades and between subjects (Bazaldua et al., 2020). Additionally, Teachers need to be trained on how to create assessments that support teaching and learning which allows them to look at options, select the most appropriate, and implement. Moreover, with appropriate training they can practice using results from formative assessment appropriately to assist them in modifying teaching during sessions, both online and in-person. Which will, in turn, assist in choosing appropriate tools while providing use of formative assessment during online learning.

Contribution to Research

The study contributes to research by serving as an initial study into formative assessment during online learning. This research will provide an overview of formative assessment conducted during online learning. Moreover, teachers' knowledge and beliefs will allow us to further understand their practices and tools along with its efficacy. This research will also contribute to other research being conduct. Furthermore, it could lead other researchers to observe teachers actual practices of formative assessment during online learning. In addition, it will allow researchers to further investigate the application of different formative intervention plans during online learning and evaluate their efficacy. This study could also serve to influence researchers to launch efforts, specific to applications, to improve formative assessment during online learning.

Delineation of Features of Phenomenon, Cases, and Context to be studied

This study focused on the characteristics of the different formative practices teachers' implemented during online learning. Description of the characteristics are as follows:

- Understand what middle school teachers know about formative assessments
- Understand teachers' beliefs regarding formative assessment during online learning
- Which formative assessment practices (specific tools used) middle school teachers apply in online learning
- How middle school teachers view the efficacy of formative assessment during online learning

CHAPTER 2

LITERATURE REVIEW

This literature review will discuss the following: theoretical framework, background knowledge about formative assessment, teachers' beliefs and attitudes towards the use of formative assessment, the role of feedback in formative assessment, formative assessment in the digital era, tools used during the digital formative assessment, online learning during COVID-19 pandemic, and issues of formative assessment in the online environment.

Theoretical Framework

Clark (2012) provides a diagram of layers starting from the outer coming into the inside to represent the theory of formative assessment. On the outer layer, there is the philosophical basis from which the theory of formative assessment emerges. Conceptualizations of formative assessment are rooted in a sociocultural constructivist view of learning (Heritage, 2010a; Pellegrino et al., 2001; Shepard, 2000; Trumbull & Lash, 2013) as well as social cognitive theory (Clark, 2012). Moreover, these theories relate to the objectives of assessment as learning and assessment for learning towards goals (Clark, 2012). In addition, students are viewed as actively constructing knowledge through cognitive processes building on what they already know while developing necessary metacognitive skills in order to regulate their own learning (Trumbull & Lash, 2013). Socio-cognitive and sociocultural theories involve students being active learners in their educational process (Clark, 2012) indicating the importance of metacognitive and self-efficacy components.

Therefore, moving towards the core, there are meta-cognitive components and the affective self-efficacy components. The subcomponents of these components make for the inner layers of the model. Metacognitive components relate to planning, monitoring, and reflection which support self-regulated learning (Clark, 2012). Self-efficacy components in this model refer to ambition, effort, and persistence, which are required for self-regulated learning to exist (Clark, 2012). This is important as students are able to self-reflect and peer-reflect regarding their performance, identifying their strengths and weaknesses in order to plan for progress. Thus, formative assessment supports student-centered learning (Robiasih & Lestari, 2020), preparing them with self-regulatory strategies for life-long learning (Clark, 2012). At the center of the model, feedback is located, thus indicating its importance to formative assessment. Teaching requires that the teacher serve as a mediator between the student and the goal whilst providing scaffolding in order to attain the goal (Black & Williams, 2009; Walqui & van Lier, 2010; Trumbull & Lash, 2013). In this sense, they can use the response of the student in order to provide relevant constructive feedback. It is important to note that scaffolding should be collaborative as it should happen only when there is clear evidence the learner is unable to progress without support (Clark, 2012).

Background Knowledge of Formative Assessment

An essential part of instruction in teaching and learning is the assessment of students (Özdemir-Yılmazer & Özkan, 2017). There are two main types of assessments: formative and summative; each serves different purpose. The difference between both assessments is that formative assessment focuses on how to improve learning while summative assessment on making judgments about learning (Guadu & Boersma, 2018). They also differ in timing. For example, formative assessment is done during and

throughout the unit, while summative assessment is done at the end of a unit. Many educators believe that formative assessment acts as a tool to enable teachers to provide feedback to improve student achievement. It is a process that informs both teachers and students of their understanding of knowledge at stake (Panero & Aldon, 2016). For formative assessment to be beneficial, students should be given appropriate timely feedback to learn from their mistakes. Studies have shown that formative assessment provides support between learning and instruction allowing for improvement in student achievement, inspiring students for life-long learning (Young & Jackman, 2014). Life-long learning helps create individuals who are open to learning different skills throughout their lifetime not only during schooling years.

Formative assessment is questioned for not producing reliable results as compared to summative assessment, due to teacher individuality (Özdemir-Yılmazer & Özkan, 2017) as teachers have different perceptions and attitudes regarding their pedagogy. Summative assessments are more of standard nature as opposed to formative assessments. The tools used for formative assessment depend on teachers' practices. Moreover, teachers choose the activities and feedback that they provide to students that leads to beneficial learning opportunities.

Online learning can influence the application of formative assessment. During online learning the data collected from the formative assessment can guide lessons and materials used (Smith & Mader, 2015) through providing timely feedback, adjusting where necessary, and identifying students who are excelling and those who need extra support. Moreover, it can assist when discussing the current level of performance with students and parents. Therefore, formative assessment is beneficial to all parties during online learning. However, formative assessment during online learning needs to be

valid, timely, constructive, and specific to each student's learning needs (Liberman et al., 2020). The assessment should be aligned with the content a student should have acquired. Formative assessment should be timely in which quick remedial support can be provided if necessary. It should be constructive in delivering feedback for students and for them to gain information that assists in understanding mistakes, receiving guidance on improvement, and understanding the goals (Liberman et al., 2020). Finally, it should be specific in which teachers and students are informed on whether the specified learning goals are acquired or what is needed still to acquire.

Feedback in Formative Assessment

Feedback is a critical component for successful teaching and learning (Nyland, 2018). There are two types of feedback; evaluative and descriptive feedback that teachers use. For formative assessment, teachers use descriptive feedback. Descriptive feedback allows explanation to students on whether their answer was correct or incorrect. In addition, it provides both students and teachers with information on what has or has not been achieved. Özdemir-Yılmazer and Özkan, (2017), aimed to investigate the practices of formative assessment in classes of schools teaching a foreign language. They found that instructors' primary approach to assessment was both student-centered and instructional. However, as opposed to providing constructive feedback, instructors focused on the emotions of their students during feedback. The purpose behind highlighting the emotions of students accounts for higher motivation. However, this also sheds light on the importance of the type of feedback provided to students and its importance. Formative feedback is effective when details of students' responses are discussed along with the strategies to use (Büyükkarcı, 2014), therefore improving learning. Feedback to students is one of the important success factors during

online learning (Baran et al., 2013; Bozkurt et al., 2020). Given the timing of online classes and the distractions arising from online learning, some teachers could feel that providing feedback may be difficult. However, this can be resolved by planning the type of feedback to be given and when to provide it prior to instruction. Timely feedback can allow students to correct mistakes all while assisting learning and maintaining motivation (Abdul Rahim, 2020). Furthermore, the ways of providing feedback may actually be easier to give to each student as it can be provided via email, chat, or by short meetings.

A project done by Lyon et al. (2019) aimed to determine whether educators can learn from students' mistakes using formative assessment. The findings suggested that students learn from their mistakes, however, it depends on when and how the feedback is given. Similarly, a study done on students' experience of the formative assessment indicated that students' experiences are influenced by the assessment methods they are exposed to and the timing in which they are exposed to assessment (Weurlander et. al, 2012). Therefore, a delay in feedback could jeopardize the effectiveness of the feedback in terms of improving learning and performance (Spector et al., 2016). Additionally, it was seen that individual feedback led students to study and to review on daily basis. For classroom practice to be formative, the evidence obtained should be used to make decisions about the next step (Lyon et al., 2019). Therefore, with timely feedback, the pace of lessons can be adjusted along with identifying students who will need extra support (Smith & Mader, 2015).

Teachers Beliefs and Attitudes towards Formative Assessment

Although formative assessment is known to support learning, teachers may not use these assessments for formative purposes to aid students' learning (Izci, 2016).

However, forcing teachers to use formative assessment strategies is not a solution. Personal and professional values, being internal, differ from one teacher to another. To change teachers' assessment practices and influence formative assessment adoption, one must understand the teachers' beliefs and values regarding learning, teaching, and assessment (Izci, 2016), and assist them in connecting their beliefs to the use of their formative assessment. Likewise, teachers who hold positive attitudes towards formative assessment's role in student learning are more likely to incorporate it in their practice (Lee & William, 2005; Izci, 2016).

Research shows that if teachers' beliefs and values of teaching and learning fit with student-centered and learning-oriented views, they are likely to adopt formative assessment. However, if teachers were to focus on grades and the pressure of external factors, they are more likely to adopt summative assessments (Izci, 2016). It is of concern when teachers do not have time to focus on formative aspects of assessment but instead, they focus on the summative assessments as the main assessment tool. This is of concern since students will not receive the appropriate feedback thus improving learning. A study by Panero and Aldon (2016), wanted to identify the elements of efficient formative assessment with the support of technology. Results showed that teachers were aware of formative assessment and wanted to practice it, however, would only implement certain aspects. Moreover, some teachers in the study used formative assessment more efficiently with the use of technology.

Stakeholders should motivate teachers to improve their formative assessment practices (Izci, 2016). This will allow teachers to change their conceptions that assessment is being solely used for summative purposes. With proper training regarding formative assessment purposes and tools, teachers will be able to apply these practices

to enhance student learning. Martin et al. (2016), found that professional development influenced elementary school teachers' perception of the use of internet-based formative assessment. This entails that instructors need training that involves theoretical and practical aspects of classroom assessment (Özdemir-Yılmazer & Özkan, 2017). Formative assessment requires making immediate judgments during instruction to meet students' needs (Izci, 2016). This may be difficult to apply for some teachers.

Formative Assessment in the Digital Era

Technology Development for Formative Assessment

Over the past few decades, technology development has prompted a cultural revolution affecting social habits, communication, and work processes (Vander Ark, 2011; Dalby & Swan, 2019). In the education sector, online classes could not be conducted without these technological developments. Technology's role in formative assessment is to support teachers' efforts in collecting formative assessment information and analyzing data to make instructional decisions (Martin et al., 2016). In addition, technology enables data regarding students' understanding to be collected, organized and shared in innovative ways (Panero & Aldon, 2016). Without this technology, we would not be able to conduct a formative assessment in an online environment. There are different formats of delivery to online formative assessment such as multiple-choice, one-minute papers, e-portfolios, and web tools (McLaughlin & Yan, 2017). Multiple choice is the preferred method as it is easy to use. Teachers can create online formative assessments using only multiple-choice questions, in which the answers include additional feedback or links to the topic. E-portfolios are used in online environments since they create connections between students. An e-portfolio is an electronic collection of students' works, which is used to demonstrate student knowledge,

progress, and development (McLaughlin & Yan, 2017). There is a range of technology tools that can assist with implementing formative assessment strategies (Vásquez et al., 2017). Likewise, these strategies can be used with the assistance of technological devices such as PC and tablets. It is important to note that certain devices are better suited depending on the activity. Similarly, tablets are easy to use and provide interaction with other learners. The use of such devices impacts learning when aligned with the objectives of the teaching strategy in response to students' needs.

Digital assessment allows for rapid timely feedback and tracking of students learning which usually contributes to formative assessment (Dalby & Swan, 2019). There are two types of technology-enhanced formative assessment systems machine-scored data and activity stream data. Machine-scored systems objectively score assessment items where there is only a finite number of possible answers. On the other hand, activity stream data follows a process: (1) Student's current level of performance is understood, (2) a model for automated feedback is applied, (3) given the results, recommendations are made for those students who are in need for remediation, (4) all data is represented to both students and teachers (Nyland, 2018). This should assist teachers with respect to distributing, grading, and analyzing data from such assessments. The immediate feedback used in online formative assessment has the potential to improve student learning across levels (McLaughlin & Yan, 2017). This can also assist in the development of higher-order cognitive dimensions. In a digital environment, connectivity and feedback can assist teachers in making timely formative interpretations (Panero & Aldon, 2016), providing great assistance during online learning in the pandemic.

Contextual Factors related to use of Digital Formative Assessment

The use of digital tools is influenced by the school culture and the school's ability to purchase programs or to provide training regarding tools. Likewise, the use of formative classroom assessment depends on contextual factors such as school context, school support, and students' attitudes (Izci, 2016). Students should be taught how to use and apply tools. If schools have embedded technology in classrooms (such as the use of iPads, computer labs, internet services), this increases the likelihood of using digital tools for formative assessment. When using online formative assessment tools, the more sophisticated the software and interactive response system, the better quality of feedback (Dalby & Swan, 2019). For example, in some systems students would receive questions electronically from teachers, they use their devices to record methods and share with other students (peer-feedback). In another more sophisticated system, students' responses are recorded, and technology provides feedback to students at intervals (Dalby & Swan, 2019). Each next question – whether easier or harder – is adapted based on students' responses, after which a summary is provided to the teacher. However, an issue with this type of device is that there is no interaction between the teacher and student; now the interaction is between student and technology. Therefore, the sophistication of these software's depends on the resources from the school.

Practices and Uses of Tools during Digital Formative Assessment

Dalby and Swan (2019), explored how iPads are used with formative assessment processes in mathematics. Lessons were designed keeping in mind interactions between teachers, students, and iPad Technology. Once lessons were designed, teachers ensured that they are aligned with practices of formative assessment. They found that the use of digital formative assessment could enable collecting and analyzing data at a higher

speed than traditional formative assessments. A quasi-experiment was conducted with Iranian intermediate female students who learned English as a Foreign Language. A placement test was conducted along with an intervention. The experimental group used a web-based text where they read a text answered questions and feedback were automatically provided. Results showed that online formative assessment intervention improved scores on reading comprehension exams (Peyghambarian et al., 2014). Questions were also raised on whether reading comprehension scores increased due to automatic feedback provided to students or whether the assessment was conducted online.

Vásquez et al. (2017) described how the use of technology in teaching spelling can assist formative assessment to impact learning. They used self-paced learning where teachers provided review sessions after results were released. Moreover, when comparing using tablets or IPC, they found that the use of tablets was more beneficial. In terms of convenience, iPads are easy to carry, and students are familiar with features. Therefore, student notebooks and paper-pencil environments can be replaced with the use of tablets. In conclusion, different studies found using online formative assessment is advantageous with the use of the appropriate tools. This can be an issue with respect to school resources as many schools may not have the funding to adopt such sophisticated online tools. Good formative assessment also relies on observations of the student learning process, which can be difficult when done in a computer-aided environment (Nyland, 2018). This can be an issue with online learning, as the teacher is explaining, they may be unable to observe students' reactions. However, the information collected from online tools, such as Poll Everywhere, Kahoot, Socrates, and Nearpod, can assist instructors. Many of the tools allow for interactive learning and

assessment. For example, google forms is a free and easy way to distribute formative assessments online. Kahoot on the other hand, is more of an interactive quiz game that can be used at a group level. In Nearpod, the lessons are interactive and formative assessment is already embedded into the lesson. Some tools allow for teachers to collect data on a group level while others collect based on the individual level. In addition, some are game-like polls while others are interactive question slides used in PowerPoint. Concerning the current pandemic, schools did not have enough time to prepare for online learning. Therefore, they may not have access or are aware of available tools. In addition, using formative assessment tools online requires teachers to be trained and with adequate experience.

Online Learning during COVID-19 Pandemic

Formative assessment purpose is suitable for online learning (Dennick et al., 2009; Abdul Rahim, 2020). In Pakistan, researchers explored the perceptions of teachers and students during the pandemic regarding online learning advantages, limitations, and recommendations (Mukhtar et al., 2020). Advantages found were related to flexibility and student-centered learning. The flexibility of online learning ensured that there are no disruptions in learning during the pandemic. Teachers and parents were shown to be more accessible for any clarification regarding instruction and feedback. Remote learning can offer social care and establish communication during the closure of schools (Tuah & Naing, 2020) where learning must continue even at home. However, this also entails that parents have the time to work and monitor their children to also become a part of learning. Learners are more active thus making them self-learners (Mukhtar et al., 2020). This is positive as it allows students to take responsibility for their learning. This is especially important for all students, especially

middle school students who should learn how to study and complete assignments on their own, thus becoming independent learners.

In times of the pandemic, formative assessment has been done through distance learning (Bozkurt et al., 2020) delivered either asynchronously or synchronously. Asynchronous assessment is not done in real-time where there are assignments and portfolios (Khan & Jawaid, 2020). Synchronous assessment is when teacher and student are working together at the same time. Typical online tools for formative assessment used in higher education are feedback, self-test quiz, and discussion forums (Tuan & Naing, 2020). Due to a wide variety of freely available online tools, there are cost savings related to printing costs and examination spaces (Tuan & Naing, 2020). Schools do not have to worry about printing formative assessments, making copies, and distributing them among learners. In addition, they will not have to collect the assessments and hand them out to students after grading. With the use of online platforms school administration, teachers, parents, and students can have a digital copy of their formative assessment results with feedback. This can allow any stakeholder to review comments even after the assessment.

The recommendation for successful online learning during the COVID era is to place importance on assessment. Abdul Rahim (2020) compiled nine guidelines for online assessment to apply during remote learning, which can be applied to formative assessment. First, prerequisites should be evaluated prior to implementing online assessments to ensure that students already have those skills. For example, are students able to use specific tools, submit the quiz, answer essay questions, and view comments from teachers. Next, the assessment activities should be aligned with the stated learning objectives (Abdul Rahim, 2020). Third, the teacher or school must address the diversity

of students' abilities; meaning differentiated assessment should be applied where necessary. Fourth, there should be a balance between different types of assessment (formative and summative assessment.) Fifth, it is important to stimulate student learning with online assessment (Abdul Rahim, 2020). Formative assessment for example can be embedded in the learning process to motivate students to learn. Sixth, the scheduling and timing of the tests should be considered in accordance with other subjects in order to not overwhelm students. Seventh, it is crucial to establish clear communication with students regarding assessment matters (Abdul Rahim, 2020). This will allow students to feel more at ease and not overwhelmed regarding the assessment process. Next, it is important to ensure that students receive high-quality feedback. Finally, one should address any validity threats related to assessment. A problem that will arise with teacher-made tests and assessments being conducted online is in relation to integrity. Moreover, teachers should be assessment literate to be able to create assessments that are both reliable and valid.

Issues associated with Formative Assessment in Online Environments

Based on cross-cultural comparison during online learning, Su (2020) raised issues with formative assessments. The first is related to the quality and origin of the test questions in addition to the parameter values on items. Item banks with test questions can be found however, one must ensure the quality of items, their difficulty, and their relation to concepts being tested. Another problem in online assessments revolves around legal and ethical concerns. Students cheat whilst taking exams which results in unreliable results. During assignments, students tend to copy and paste from the web as opposed to creating their own work (Mukhtar et al., 2020). Different proctoring systems that have been adapted to control for cheating and academic

dishonesty. (Bozkurt et al., 2020). In addition, the assessment tools used and their responses could leak. Furthermore, there could be an invasion of privacy, calling for the need for better cyber security (Bozkurt et al., 2020). Recommendations for the age of online assessment during the pandemic require developing innovative assessment techniques (Su, 2020) like using web-based assessment. Creating a reliable and valid formative assessment online may be difficult (Kaup et al., 2002). According to Perera-Diltz and Moe (2014), creating a meaningful and effective assessment is possible after acquiring a deep knowledge of the tools available and their use, although there might still be reliability and validity concerns.

Although digital formative assessments are beneficial, teachers find difficulty implementing them. The following are some issues related to implementation: time constraint, meeting objectives, balancing different types of instructions, and recognizing individual students' needs (Martin et al., 2016). There is a time constraint with developing formative assessments, grading, and analyzing the results as information to assist with student learning through providing feedback. Teachers must conduct assessments while also teaching lessons and creating lesson plans. They may not focus on finding ways to embed formative assistance while balancing different types of instruction. Moreover, teachers may be more concerned with meeting objectives to prepare for external exams. Therefore, they may find it more difficult to balance instruction whilst meeting objectives.

Limitations observed by participants in a study done by Mukhtar et al., (2020) included inefficiency and maintaining academic integrity. Certain skills cannot be taught remotely, as hands-on learning is needed and this is difficult to apply in online learning. In addition, there is a lack of student feedback, limited attention span, and lack

of attentiveness (Mukhtar et al., 2020). Since online learning has been implemented during the pandemic students may not realize that learning has continued even if it is remote. Therefore, they may not pay attention to lectures, as they will be easily distracted from what is going on around them at home. Hence, it is important that parents create a setting at home like that in school with minimal distractions. However, it is also important to mention that families may not have appropriate gadgets to participate in classes.

The above review of literature provides support to the purpose of the present study. Based on the literature, teachers' beliefs, practices, and professional development influence the use of online formative assessments and the way they use them. This is important to note given the current pandemic and the influences it has on teachers' practices during online learning.

CHAPTER 3

METHODOLOGY

The following section describes the research design, sampling procedures, data collection tools, administration procedures, and data analysis applied for the study.

Research Design

The purpose of this study was to describe and understand Lebanese middle school teachers' formative assessment knowledge, beliefs, and practices and their efficacy in online teaching during the pandemic. A mixed-methods study was implemented. For the quantitative part of the study, the most appropriate type of reporting was descriptive statistics. First, an online survey with open and close-ended questions was used. Through the use of the survey, teachers answered questions related to their knowledge of formative assessment during online learning, as well as their beliefs regarding their use. Moreover, questions related to their practices of formative assessment during online learning and their efficacy were asked. For the qualitative part of the study, a structured interview was appropriate to further describe and understand the questions investigated. Accordingly, online interviews were conducted with selected teachers for follow-up and clarification of identified themes. The goal of the interviews was to understand teachers' perspectives and to collect further information regarding their practices during online classes.

Participants

Population

The targeted population for the study was Lebanese Middle School teachers from schools using English as the language of instruction located in Greater Beirut who has taught online classes during the pandemic.

Sample and Sampling Procedures

The researcher generated a list of private schools in Lebanon that use English as the language of instruction. For ease of access, the Greater Beirut area was selected. Fourteen schools were contacted, of which nine schools agreed to participate in the study based on their use of online learning and the consent of the principals. The principals were contacted via email or phone and were provided with invitation letters to teachers. As per the Institutional Review Board (IRB) guidelines, schools contacted the teachers and provided them with the invitation and consent forms to fill for those who were interested to participate and these were asked to contact the researcher. Teachers who teach classes in English (Mathematics, Science, English) were clustered into groups based on grade level taught. The goal was to have ten teachers from each grade level and about 3-5 teachers from each selected school. Therefore, the final sample of the survey consisted of 31 middle school teachers. The reason for choosing middle school teachers for the study is that formative assessment was observed to be largely used with these grade levels during online learning. For interview purposes, teachers were contacted by email based on their responses to the survey and who meet the following criterion: Teachers had to be familiar with the purposes of formative assessment, had applied formative assessment frequently during online learning, and had used different tools during the implementation of formative assessment. Due to the

relatively low response rate of the survey, all teachers who provided their emails were sent an invitation to the interviews and the final sample consisted of nine teachers.

Data Collection Tools

Survey/Questionnaire

The online survey questionnaire consisted of both open-ended and close-ended questions. Teachers were asked to complete the survey online via LimeSurvey. The survey (See Appendix A) was developed based on work done by Brown (2006), Yan and Cheng (2015), and Guadu and Boersma (2018). The scales from which the items were developed/adapted showed acceptable reliability. Brown (2006) reported scale reliability of $\alpha = .85$ for the whole survey (Brown, 2002; Brown, 2006), while Rasch person/item reliability for all scales in Yan and Cheng (2015) was $\alpha = .80$. Internal consistency of Cronbach's alpha $\alpha = .78$ was reported by Guadu & Boersma, (2018). Demographic information was collected regarding the subjects and grade levels they teach, and years of teaching experience. This information was used to provide a profile for the teachers' partaking in the study.

The survey consisted of four sections:(1) Knowledge: questions related to formative assessment purposes, timing, and processes. (2) Beliefs: questions related to their beliefs of the uses of formative assessment during online learning. (3) Practices: teachers were asked specific questions related to how they used formative assessment during online learning along with what tools, if any, were used. (4) Efficacy: teachers were asked questions related to how they are using results from formative assessment to modify their teaching and whether each student is being given feedback regarding their work. Furthermore, they were asked about the efficacy of using formative assessment during online sessions in terms of enhanced student learning, practicality, usefulness,

challenges, etc. The initial list of items was subjected to expert review where two educational psychologists reviewed them for relevance to survey purpose, adequate coverage, and clarity of items. Then, a draft survey was piloted on two teachers for further validation of the tool.

Interview

Following the survey, data were analyzed, and then online interviews (See Appendix B) were conducted with nine teachers according to specified criteria previously mentioned to further probe and validate the findings of the study.

Data Collection Procedures

Survey/Questionnaire

Due to COVID-19, the questionnaire was distributed online via Lime Survey. The survey was expected to take about 20 to 30 minutes. Results collected were analyzed using SPSS.

Interviews

The follow-up online interviews took place on Zoom and took about 10 – 25 minutes. The interviews were recorded and transcribed to use for later analysis.

Data Analysis Procedures

Regarding the survey, close-ended questions were inputted and analyzed into the Statistical Package for the Social Sciences (SPSS) program using descriptive statistics and frequency, percentage, means and standard deviations were reported. Additionally, open-ended items were analyzed through descriptive thematic categorization. Qualitative data analysis (QDA) was used to analyze the interview data. All data were coded and clustered into groups. Then, themes were identified as a result of using

interpretational and reflexive analysis to describe the use of formative assessment during online learning.

CHAPTER 4

RESULTS

The results of this study are divided into two sections. The first section presents the results from the data collected from middle school teachers' responses to the questionnaire. The second section presents categories from interviews that were done to further validate results from the questionnaire.

Results: Questionnaire

The results of the questionnaire were divided into four parts: (1) Teacher's Knowledge of Formative Assessment, (2) Teachers' Beliefs of Formative Assessment during online learning, (3) Teachers' Practices and Tools used during online learning, and (4) Efficacy regarding formative assessment during online learning, along with their frequency tables.

Demographics

As mentioned previously 31 middle school teachers took part in the study from 9 private schools in Beirut. Thirty-eight percent (38%) of teachers teach grade 6, 31% of teachers teach grade 7, and 31% of teachers teach grade 8. The subjects taught by teachers were the English Language (32%), Mathematics (23%), Science (35%), and Mathematics and Science (10%). Table 1 shows the percentage of each subject according to grade level. Out of the 38% of teachers who teach grade 6; 35% teach English, 18% teach Mathematics, 29% teach Science, and 18% teach both Math and Science. Moreover, of the teachers who teach grade 7; 14% teach English, 29% teach Mathematics, 36% teach Science, and 21% teach Math and Science. Furthermore, from the teachers who teach grade 8; 29% teach English, 21% teach Mathematics, 50% teach

Science, and 0% teach Math and Science. The average years of experience was 12.7 years with a range of 23 years. In addition, the most frequently reported years of experience are 10 years and 17 years. Table two shows the years of experience mean, mode, and range with respect to both grade level and subject area.

Table 1
Demographics: grade level with regards to the subject

	Subject Area			
Grade Level	English (32%)	Math (23%)	Science (35%)	Math/Science (10%)
6 (38%)	35%	18%	29%	18%
7 (31%)	14%	29%	36%	21%
8 (31%)	29%	21%	50%	0%

Table 2
Years of Experience

By grade level	Mean	Mode	Range
Grade 6	12.5	10, 17	20
Grade 7	11.9	3, 7, 10, 15	23
Grade 8	12.1	8, 10, 17	22

By subject	Mean	Mode	Range
English	15.5	17	16
Math	16.1	17	17
Science	8.7	7, 10	15
Math and Science	9.3	3, 10, 15	12

Teachers' Knowledge of Formative Assessment

Based on responses, teachers expressed their familiarity with formative assessment (M=4.7/5.0). Moreover, 97% of them claim that they have been using it. In addition, of those who use formative assessment, 97% use it in both online and in-person learning while 3% use it in online learning only. Five teachers (16%) reported that they have been using formative assessment since they started teaching. Eight teachers (26%) have used it for 15 years or more. In addition, five (16%) teachers have been using it for five years or less, while six teachers (19%) have been using it for 6 to 10 years related to their teaching experience, as they have not been teaching long. Two teachers (6%) have used it for 12 and 13 years. One teacher also reported using it for a long time, while another one reported using it all the time. Finally, two teachers did not respond.

Table 3 shows the frequency, percentage, mean, and standard deviation of teachers' responses to items related to their knowledge regarding formative assessment. The rating scales were 1-strongly disagree (SD), 2-disagree (D), 3-agree (A), and 4-strongly agree (SA). All items listed in the table are from highest to lowest mean. Teachers' either agreed or strongly agreed that it is essential to use formative assessment in instructional improvements (M=3.7), this item showed the lowest variability in responses (SD=.46). There was also high agreement (M=3.6) regarding formative assessment improving the quality of teaching and learning and formative assessment being used to monitor learning (M=3.6). In addition, teachers highly agreed that feedback was an essential part of formative assessment (M=3.5).

Table 3
Teachers' knowledge regarding Formative Assessment

Items	1 – SD		2 – D		3 – A		4 – SA			
	F	%	F	%	F	%	F	%	M	SD
It is essential to use results of formative assessment in instructional improvements.	0	0	0	0	9	29.0	22	71.0	3.7	.46
Formative assessment improves the quality of teaching and learning.	1	3.2	0	0	10	32.3	20	64.5	3.6	.67
Formative assessment is used to monitor student learning.	1	3.2	0	0	11	35.5	19	61.3	3.6	.68
Feedback to students is an essential component of formative assessment.	2	6.5	0	0	9	29.0	20	64.5	3.5	.81
Formative assessment helps determine how much students have learned from teaching.	2	6.5	1	3.2	14	45.2	14	45.2	3.3	.82
Formative assessment involves assigning a grade or an evaluation to the student's work.	1	3.2	6	19.4	13	41.9	11	35.5	3.1	.83
Formative assessment is given at the end of a chapter unit.*	1	3.2	7	22.6	15	48.4	8	25.8	3.0	.80

* Negative item reversed.

Teachers mostly agreed that formative assessment helps to determine how much students have learned from teaching (M=3.3), however, this item showed a higher SD of .82. Meaning there is higher variability in the responses. There was high agreement and

high variability (M=3.1; SD=.83) for item 3. Moreover, most teachers were in agreement that formative assessment involves assigning a grade or an evaluation to a student's work. Finally, item 6 was reversed, showing that there was also agreement in formative assessment not being given at the end of a unit.

Teachers' Beliefs of Formative Assessment during Online Learning

Table 4 shows the frequency, percentage, mean, and standard deviation of teachers' responses to items related to their beliefs regarding formative assessment during online instruction. The rating scales were 1-strongly disagree (SD), 2-disagree (D), 3-agree (A), and 4-strongly agree (SA). All items listed in the table are from highest to lowest mean. Twenty-eight teachers were in agreement that formative assessment is essential to online learning (M=3.3) and that feedback given helps to motivate students' (M=3.3). Teachers highly expressed that instructional adaptations based on formative assessment are effective in improving student learning during online instruction (M=3.2) and makes online teaching more effective (M=3.1). This highlights the importance of formative assessment during online learning. More than half of teachers agreed that formative assessment is easier to implement than summative assessments during online learning (M=2.9) and maintains student interest in learning online (M=2.9). There was mixed agreement regarding formative assessment being easy to implement during online learning (M=2.7). The least agreed item was about feedback being difficult and time consuming to provide during to online learning (M=2.5).

Table 4
Teachers' beliefs regarding Formative Assessment

Items	1 – SD		2 – D		3 – A		4 – SA			
	F	%	F	%	F	%	F	%	M	SD
During online learning, feedback given in formative assessment helps motivate students.	0	0	3	9.7	16	51.6	12	38.7	3.3	.64
Formative assessment is essential to online learning.	1	3.2	2	6.5	14	45.2	14	45.2	3.3	.75
Instructional adaptation based on formative assessment are effective in improving student learning during online instruction.	1	3.2	3	9.7	17	54.8	10	32.3	3.2	.74
Formative assessment makes my online teaching more effective.	1	3.2	4	12.9	16	51.6	10	32.3	3.1	.76
Formative assessment helps maintain students' interest in learning online.	0	0	7	22.6	21	67.7	3	9.7	2.9	.56
In online classes, formative assessment is easier to implement than summative assessment.	0	0	9	29.0	16	51.6	6	19.4	2.9	.70
I find formative assessment easy to implement during online learning.	0	0	13	41.9	13	41.9	5	16.1	2.7	.73

I think that providing feedback during online learning is difficult and time consuming.	4	12.9	10	32.3	14	45.2	3	9.7	2.5	.85

Teachers' Practices and Use of Tools of Formative Assessment Online

Frequency of Specific Practices

Table 5 shows the frequency, percentage, the mean and standard deviation of teachers' responses to items related to their practices regarding formative assessment during online instruction. The rating scales were 1-never, 2-sometimes, 3-frequently, and 4-always. Results showed commonality in the use of immediate feedback based on formative assessment results (M=3.3). Though some disagreed on it as reported in the previous section where teachers believed that providing feedback is time-consuming and difficult during online learning. During online learning formative assessment was highly used during sessions (M=3.0) and teachers' used the results to make instructional changes (M=3.0). There's a mixed frequency of use and high variability of responses for individualizing feedback to each student (M=3.0, SD=.93). Thirteen teachers (42%) always individualize feedback, while another thirteen (42%) reported that they sometimes provided feedback. Item 4 was reversed, responses showed that teachers frequently provide general remarks to the whole class due to time constraints (M=2.5, SD=.96). The practice least used was providing students a chance to assess themselves, and their peers, and provide feedback to one another (M=1.9).

Table 5

Teachers' practices regarding Formative Assessment during online learning

Items	1 Never		2 Sometimes		3 Frequently		4 Always		M	SD
	F	%	F	%	F	%	F	%		
I give students immediate feedback based on results from formative assessment.	0	0	6	19.4	11	35.5	14	45.2	3.3	.77
I make use of formative assessment results to introduce instructional changes in my online teaching	0	0	9	29.0	12	38.7	10	32.3	3.0	.80
During online learning, I use formative assessments in my lessons.	0	0	9	29.0	12	38.7	10	32.3	3.0	.80
I individualize the feedback for each student.	0	0	13	41.9	5	16.1	13	41.9	3.0	.93
Due to time constraints, I provide general remarks to the whole class.*	7	22.6	4	12.9	17	54.8	3	9.7	2.5	.96
During online classes, I provide students the chance to assess themselves, and their peers, and provide feedback to one another.	8	25.8	18	58.1	4	12.9	1	3.2	1.9	.73

* Negative item reversed.

Preparedness and Training in Practicing Formative Assessment

Table 6 provides details regarding preparedness to the practices of formative assessment during online learning. Since responses are based on a 2-point scale, means in the table are listed from low to high. Twenty-seven teachers (87%) agreed that they can design appropriate assessment tasks for formative assessments conducted during online learning. Responses indicated that 24 teachers (77%) received training to implement formative assessment during online learning, while seven teachers (23%) did not. One-third of teachers (10 teachers) stated that they do not have sufficient supporting material to implement the formative assessment.

Table 6

Preparedness and Training regarding Formative Assessment

Items	1 – Yes		2 – No			
	F	%	F	%	M	SD
I can design appropriate assessment tasks for formative assessments conducted during online learning.	27	87	4	13	1.1	.34
I received efficient training to implement formative assessment during online learning.	24	77	7	23	1.2	.43
I have sufficient supporting material to implement formative assessments.	21	68	10	32	1.3	.48

Specific Tools used when Practicing Formative Assessment during Online Learning

Tables 7 and 8 show the frequency, percentage, the mean and standard deviation of teachers' responses to which tools they use during online learning along with their frequency of use of each item.

According to the survey, the most common and frequently used tools by teachers were the following:

- Oral Feedback
- Classroom Exercises
- Homework
- Different Questioning Techniques
- End of Unit Exams

In addition, the following tools were also commonly used by teachers, however, at a lower frequency:

- Observation
- Self-Assessment
- Web-Based Tools
- Unplanned Quizzes

The least common and frequently used tools by teachers were the following:

- Peer-Assessment
- Journal Writing
- E-Portfolio

Table 7
Types of tools used for Formative Assessment during online learning

Tools used:	1- Yes		2- No			
	F	%	F	%	M	SD
Classroom Exercises	31	100	0	0	1.0	.00
Homework	31	100	0	0	1.0	.00
Oral Feedback	31	100	0	0	1.0	.00
Different Questioning Techniques	30	96.8	1	3.2	1.0	.18
End of Unit Exams	30	96.8	1	3.2	1.0	.18
Observation	27	87.1	4	12.9	1.1	.34
Self-Assessment	24	77.4	7	22.6	1.2	.43
Web-Based Tools	22	71.0	9	29.0	1.3	.46
Unplanned Quizzes	21	67.7	10	32.3	1.3	.48
Peer-Assessment	17	54.8	14	45.2	1.5	.51
Journal Writing	9	29.0	22	71.0	1.7	.46
E-Portfolio	6	19.4	25	80.6	1.8	.40

Table 8
Frequency of tools used for Formative Assessment during online learning

	1		2		3		4			
	Never		Sometimes		Frequently		Always			
Tools:	F	%	F	%	F	%	F	%	M	SD
Classroom Exercises	0	0	3	9.7	8	25.8	20	64.5	3.6	.68
Oral Feedback	0	0	3	9.7	14	45.2	14	45.2	3.4	.66
Different Questioning Techniques	1	3.2	1	3.2	13	41.9	16	51.6	3.4	.72
Homework	0	0	4	12.9	11	35.5	16	51.6	3.4	.72
End of Unit Exams	1	3.2	5	16.1	7	22.6	18	58.1	3.4	.88
Observation	3	9.7	13	41.9	13	41.9	2	6.5	2.5	.77
Self-Assessment	6	19.4	18	58.1	6	19.4	1	3.2	2.1	.73
Web-Based Tools	9	29.0	13	41.9	6	19.4	3	9.7	2.1	.94
Unplanned Quizzes	8	25.8	18	58.1	5	16.1	0	0	1.9	.65
Peer-Assessment	14	45.2	14	45.2	3	9.7	0	0	1.7	.66
Journal Writing	22	71.0	3	9.7	2	6.5	4	12.9	1.6	1.09
E-Portfolio	24	77.4	4	12.9	1	3.2	2	6.5	1.4	.84

When asked how often teachers have implemented formative assessment during online learning 36% of teachers (11 teachers) said rarely, 48% (15 teachers) said about 2-3 times per week, and 16% (5 teachers) said almost every day. Additionally, teachers were asked to list the tools they used for formative assessment during online learning. First, answers showed that teachers mostly use quizzes on through different platforms or applications such as Microsoft forms, google forms, google docs, google sheets,

work documents, school platforms, etc. Second, teachers reported using web-based tools. The most common web-based tools used among teachers were Near Pod, Edpuzzle, Kahoot, and Quizziz. Third, teachers used different exercises and activities as tools when implementing formative assessment during online learning. For example, teachers used games such as jeopardy, PowerPoint, and implemented collaborative tasks. Finally, a small number of teachers used questioning strategies when implementing formative assessment during online learning.

Efficacy Regarding Formative Assessment during Online Learning

Five questions were asked in the survey regarding the efficacy of formative assessment during online learning. These questions were open-ended and are below:

1. In your opinion, can formative assessment improve teaching effectiveness during online learning? Explain why and how.
2. How indicative are the results of formative assessment during online learning of student learning? How useful do you find these results?
3. How do you usually provide feedback to your learners during online learning? Please provide an example.
4. How practical do you find the use of formative assessment during online learning?
5. Are there any specific challenges you have faced while providing formative assessment during online learning? Please elaborate.

Improving Teaching Effectiveness

Twenty-six out of thirty-one teachers reported that formative assessment improves teaching effectiveness during online learning. The majority of teachers expressed that formative assessment improves teaching effectiveness by monitoring

students, as well as, tracking and checking for their understanding regarding specific objectives or skills. In addition, they expressed that feedback related to formative assessment results improved their teaching as it provided information regarding understanding and misconceptions of the lesson. Furthermore, teachers expressed that feedback is valuable to both teachers and students as it provided evidence to do adjustments. One teacher stated that formative assessment "keeps students on their toes" allowing them to study daily. Other teachers mentioned that the use of formative assessment allows learners to become "self-aware", check on the "wellbeing of students", encourages their engagement, and helps them to identify their own learning gaps. In addition, one expressed that formative assessment improves instruction by "re-assessing teaching strategies and activities on a daily basis", while another expressed that they are able to "constantly explore alternative methods that work best". Indicating how useful formative assessment is for instructional methods.

Five teachers (16%) raised the concern that formative assessment does not improve teaching effectiveness due to the inability to rely on scores, especially when you "cannot limit cheating to check understanding".

Indicative and Usefulness of Results

The responses from this question can be divided into three categories (1) Indicative and Useful, (2) Somewhat indicative and (3) Not indicative or useful.

The first category, formative assessment was described by eleven teachers (36%) to be accurate, useful, effective, and satisfying. While one claimed written formative assessment to be more indicative, another claimed that oral assessment is more efficient than the written one. The majority of teachers described how indicative and useful results are for the learning process, student understanding, gaps, and

misconceptions. Specifically, one teacher expressed that “results are essential to indicate the need for re-teaching or different instruction.” In addition, another expressed that it gives “indications on the progress of almost every student.” One teacher stated that web platforms are more “reliable”, “authentic”, and “informative” for formative assessment. Another teacher reported that it “increases student engagement and motivation” which in turn enhances learning. Feedback was also described by some teachers to be easy to give to improve performance.

In the second category, thirteen teachers (42%) described it as being somewhat effective and useful in some cases. Some teachers reported low effectivity percentages; one teacher specifically said they are useful 40% of the time while another teacher claimed they are 70% indicative of what has been taught. Additionally, one teacher explained how “assessments are never 100% reliable for judging learning or understanding the lesson.” And that not all results can be trusted, while another said it was useful “if students and parents work with integrity.” Though found challenging, formative assessment was possible for many but with few concerns.

In the third category, seven teachers (27%) reported formative assessment to be not be indicative, or reliable online, and inaccurate. Teachers noted that due to external factors such as cheating, exchanging answers, plagiarism, technical problems, and help from those around them; formative assessment is not indicative or useful. Moreover, some teachers expressed that formative assessment was not enough to assess understanding during online learning. Two teachers specifically mentioned issues related to technical problems students encounter. While another explained that students are neither working nor being self-regulated.

Providing Feedback from Formative Assessment

Results were analyzed according to the type of feedback (oral feedback, written feedback) and how the feedback is administered (individual feedback, group feedback). One teacher did not respond to the question. The type of feedback more commonly provided during online learning is oral feedback as opposed to written feedback. In addition, the feedback is mostly administered to the group as opposed to individual learners.

Teachers use oral feedback by praising, providing direct feedback, pointing out mistakes on the spot and providing personalized feedback sometimes when a student has participated. In addition, four teachers provide oral feedback using asking questions. One teacher also highlights steps needed verbally during a session. On the other hand, another teacher uses the web-based tool Near Pod to provide oral feedback to the class. Now, this type of feedback is usually provided to the whole class during a class or activity with general mistakes or common misconceptions. With regards to written feedback, teachers tend to use private comments or chat. Specifically, five teachers use private comments when providing feedback. One uses the following comments "very good; I'm proud of you; you can do better; not your best." Four other teachers use direct messages or private chats on platforms such as Microsoft Teams. Only two teachers provide a written grade. Three of the teachers mentioned providing elaborate feedback regarding specific mistakes. Two teachers also use the "feedback page" at the end of the assessment to provide feedback.

Group feedback is used by most of the teachers to provide general advice, mistakes, remarks, feedback, and common misconceptions. Moreover, three teachers correct the quiz together with the class and discuss the answers. Due to time constraints,

one teacher provides group feedback to the whole class. Another teacher highlights the steps needed to follow in mathematics. Regarding individual feedback, teachers usually provide via private chat or a private call if needed.

The Practicality of Formative Assessment during Online Learning

When asked how practical teachers found the use of formative assessment during online learning 18 teachers (58%) found it to be practical while 7 teachers (23%) of teachers found it not to be practical and six teachers (19%) found formative assessment during online learning to be somewhat practical.

Teachers who found formative assessment during online learning to be practical explained it to be helpful, effective, necessary, and essential as there is no face-to-face learning. In addition, many teachers described how easy it is to implement with the use of a variety of tools and interactive apps on online platforms. It is practical to some because it can monitor the learning process, follow student understanding, and maximize instruction. Others explained that it motivates learners, creates independent and responsible students, and helps them to access technology. These are all important to "ensure students are studying." Moreover, students can provide their own "feedback about learning". One teacher expressed how it is the "only way to assess students' work." Another teacher suggested that be practical formative assessment during online learning should be "unannounced" with "short and clear objectives."

Some teachers claim that formative assessment during online learning lacks the ability to monitor students and this leads to inaccurately evaluating student progress. One teacher explained how frequent formative assessment is not practical. Moreover, teachers do not have full control over students as they might use parental help or those of a private tutor. In addition, teachers found it impractical as it is time-consuming

specifically needs preparation, scheduling, and preparing different versions of formative assessment. Finally, external limitations including electricity and the internet were mentioned by teachers.

Specific Challenges with Formative Assessment during Online Learning

Two out of thirty-one middle school teachers reported not having specific challenges with formative assessment during online teaching. The rest of the issues described by teachers can be organized into the following categories:

- Technological Issues
- Integrity Challenges
- Student Challenges
- Schools/Instruction Challenges

Sixteen teachers reported to having challenges concerning technical issues such as electricity cuts, internet disconnection, and malfunction of devices. The most common issue was the internet connection. One teacher proposed that learners tended to disconnect to cheat. Another teacher expressed that technical issues such as electricity and internet cuts “made it hard for students to keep up”. Electricity cuts are in most cases directly related to internet disconnection, as when there is no electricity there might not be any internet connection. Therefore, these two factors made it difficult for students to keep up and not be able to submit assessments or answers on time. In addition, teachers reported that there were issues related to the malfunction of computers or iPads and learners not being able to open cameras or microphones.

Eleven teachers reported challenges related to integrity. Some teachers reported that parents were intervening during students’ learning which led to inaccurate results. Moreover, one teacher reported that it was challenging to assure that submitted answers

were completed independently by the student himself without any help. In addition, cheating and plagiarism were among the challenges encountered regarding formative assessment during online learning. One teacher claimed she was on constant alert in monitoring which of the students were receiving help from outside sources. Another teacher stated that to combat cheating she has been implementing new questioning strategies to limit cheating. Moreover, she has used tools such as Flip grid where answers are recorded via video and students send videos working on the task.

Six teachers reported student-related challenges with formative assessment during online learning. One teacher explained that not all students enjoyed online learning and that they may be shy to engage with others. Two other teachers reported that many did not participate even when called on there was no response. In addition, teachers reported challenges with students submitting work late and having repetitive absences. Furthermore, there was an "absence of self-regulation for some" and others may not depend on themselves. Finally, one teacher explained that it was hard to assess students online because they could not physically see them.

Six teachers also reported challenges related to school and instruction. Regarding school platforms, some proposed that schools need to find a way to support faculty and students, as well as help in finding interactive ways. Others reported that the school platform "restrained ability to provide formative assessment" while someone else reported that google forms – what the school used – has limited question formats. Some teachers reported time challenges specifically with respect as a correction was time-consuming especially with submitted pictures as the quality of the image was blurry and took time to download. In addition, it was hectic for one teacher to "correct all assignments and provide students with feedback". Furthermore, doing make-up

assessments for those who missed was also time-consuming. Finally, one teacher proposed a question, “how do you balance real-time teaching with asynchronous learning and how do you support faculty and students along the way?”

Brief Summary of Survey Results

Teachers reported on being familiar with formative assessment. The majority of teachers have been using formative assessment since they first started teaching. Moreover, teachers agreed that formative assessment is essential for instructional improvements. Teachers appeared to know the importance of improving teaching and providing feedback through the use of formative assessment. Answers depicted that majority of teachers are knowledgeable about the purposes of formative assessment. Ninety percent of teachers agreed that formative assessment is effective in improving student learning. There was high agreement in beliefs regarding improving student learning, motivating through feedback, improving online learning, and maintaining student interest during formative assessment online. Some believed it was easy to implement while others did not believe so. This is also true for feedback being time-consuming.

General teacher practices show that most teachers provide immediate feedback, essential to formative assessment. Formative assessment was also highly used by teachers, highlighting its importance during online learning. There was a mixed frequency of use for individualized feedback for students. Results showed that more commonly, group remarks are given. Finally, teachers tended to use self-assessment and peer-assessment less frequently. An average amount of teachers has received training regarding formative assessment during online learning. The five tools reported to be most used in conducting formative assessment during online learning were oral

feedback, classroom exercises, homework, different questioning techniques, and end of unit exams. The two least commonly used tools are journal writing and e-portfolio. The frequency of use of all tools are depicted in Table 8. Furthermore, most teachers reported to having implemented formative assessment during online learning 2-3 times per week.

Table 9 shows the main themes and categories related to efficacy of formative assessment.

Table 9
Efficacy Theme Overview

Teaching Effectiveness	Usefulness of Results	Feedback	Practicality	Challenges
26 teachers believed to be effective 5 teachers believes to be ineffective	11 teachers reported indicative and useful 13 teachers reported somewhat indicative and useful 7 teachers reported not indicative and useful	Type of Feedback How feedback is provided	18 teachers found to be practical 6 teachers found to be somewhat practical 7 teachers found to be impractical	Technological Issues Integrity Challenges Student Challenges School/ Instruction Challenges

Results: Interview

The following seven questions were asked during the interview:

1. In your opinion, what is the purpose of formative assessment?
2. What does formative assessment mean to you during online instruction?
3. Give an example of how have you implemented formative assessment during online learning.
4. Did you receive any training regarding the application of formative assessment during online learning?
5. How do you use results from formative assessments during online learning?
6. Do you believe the use of formative assessment tools is practical in online learning? Why or why not?
7. Give 1 or 2 suggestions to improve the use of formative assessment in online learning.

Purpose of Formative Assessment

Results from the first question can be divided into three categories under the theme: the purpose of formative assessment. The first category is feedback. Teachers reported that formative assessment provides feedback to the teacher to evaluate the learning process to ensure it is going well. It was also expressed that it is to see if there is a need to re-explain or adjust instruction. In addition, some mentioned that formative assessment checks for gaps before continuing lessons and to make sure objective or skill is met before the summative assessment. Furthermore, one teacher stated that formative assessment provides collective results; meaning one is able to provide more efficient feedback. The second category is student understanding. Teachers expressed

that formative assessment helps see if on right track, to track objectives, check for how well students achieved skills, and to check for gaps. The third category is timing. Teachers report that formative assessment happens after the learning process, it is an ongoing assessment, and is not cumulative. It also showed them how students developed from the beginning of the year. Now it is not true that formative assessment happens at the end of the learning process but rather during that process. In addition, formative assessment will not show how students have developed from the beginning of the year. Summative assessments and state tests might be more of this function. The formative assessment shows progress with regard to learning at that specific point in time. Therefore, we can conclude that some teachers are not entirely familiar with the purpose of formative assessment with regards to its timing.

Meaning of Formative Assessment during Online Learning

One teacher reported it being inessential while two teachers reported it is challenging due to student integrity. Of the nine teachers, five reported it is important for instruction while six reported it is important for learning. This is an important finding, as it shows how meaningful formative assessment is in guiding instruction and learning during online learning. Teachers found that it was effective in checking for engagement, providing ideas on gaps and students and guiding how to proceed with instruction. Actually, one teacher specifically described the formative assessment as "taking place all the time during instruction. It's taking place all the time, through oral questions, through projects, through quizzes, through games. Every time I am assessing my students." Others pointed out how important it is for the learning process in showing where students are, especially during online sessions. One teacher specifically explained

the importance of implementing formative assessment to keep up with problems in Lebanon.

Examples of Implementation of Formative Assessment

Teachers reported having implemented formative assessment through web-based tools, activities, instruction, or through different testing formats (quizzes, essays, multiple-choice, fill-in-blank).

One teacher explained the importance and helpfulness of using application or tools for formative assessment as they "increased their engagement" and checked "their understanding at the same time." Specifically, one teacher uses Near Pod, which allows "multiple ways of checking or assessing the student understanding throughout the lesson." Another example of web-based tools used is Ed-puzzle. Two teachers claimed to use this as it shows students a video and then will stop and check their understanding through the use of multiple-choice questions. Other web-based tools used are Quizziz, Quizzlet, Padlet, and GeoGebra.

Other teachers implemented formative assessment during the time of instruction. For example, one teacher reported that she uses asynchronous work before starting a lesson for students to have an idea about what they will be doing. Other teachers reported using oral and direct questioning. Specifically, one teacher explained "the student would directly annotate on my zoom white board" after students solve "I give direct feedback." The same teacher went on to explain that it was effective because it could test directly what the student is doing with minimal effect from parents or peers. Another teacher uses an application called whiteboard during instruction "where each student can separately write on his own white-board and does not see the answers of the

other students." This way she was able to test one specific objective for several students.

Formative assessment during online learning was also implemented by teachers through the use of activities such as group work, projects, homework, online activities, and written activities. In addition, one teacher uses entrance and exit tickets as an activity. She went on to explain that exit tickets will show whether the objective done is acquired or not and what are the common mistakes to get a better view of where students are with respect to the lesson; while she uses entrance tickets to aim to know their level of understanding, even after doing homework.

Most teachers used online quizzes, drop quizzes or written tests through forms. One teacher implements an online formative assessment after every lesson. Most teachers use multiple-choice questions, while another teacher implemented no multiple-choice questions, only steps to follow.

Training Regarding Application of Formative Assessment

Six teachers reported receiving training from the school. Five of those teachers received training for the application of formative assessment during online learning. Specifically, one teacher described the type of training: "we got all the tutorials how to use forms, how to open the test, how to end the test, how to do the duration, … put a start time, end time, how to send it as an assignment, how to send it as a pop quiz, how do they see it, how do they get a notification." Two of those six teachers felt the school training was not enough nor successful. One of the teachers reported that the training she received was related to Microsoft 365 and Microsoft TEAMS and not specific to formative assessment. One teacher expressed that she received no training and relied on her experience, as did another teacher. Four teachers took it upon themselves to research

strategies, take online classes, learn about tools and interactive assessment. One specific teacher informed me that she is working on her thesis in Educational Technology; therefore, she is extremely familiar with the tools to be used.

Use of Results from Formative Assessment during Online Learning

Four teachers mentioned how they specifically analyzed the results. Many took results on an excel sheet which reported on the skills while also providing the average. In addition, teachers looked for students who failed the assessments and tried to collect data about their mistakes. If students have experienced a connection issue, one teacher deletes or cancel the formative assessment grade. Another teacher expressed that she can look at the summary of questions to find out the most chosen and how each student responded through the use of the application Quizziz. Two teachers reported they would stop the lesson if the results were not as expected. Moreover, they indicated that this means something is wrong or that "maybe the concept was hard to be delivered online." On the other hand, two teachers expressed that they would not stop lessons because of the Lebanese curriculum. The reason for this is because they work in parallel with other teachers, therefore they need to keep the same pace when delivering lessons. On another hand, they do not have the luxury of time to stop because of all the objectives that should be covered before the end of the year. Instead, they would continue and give extra practice. Four teachers reported that they would provide extra sheets for practice, give additional work or readings, and provide videos to watch. Three teachers conduct meetings with necessary personnel. For example, one teacher refers the failing grade to the Head of Department to "talk to students to see where the problem is." Two other teachers follow closely with the student and conduct private sessions or meetings.

Follow Up on Practicality in Online Learning

Four of the teachers reported that formative assessment online was practical, likewise, four other teachers reported it to be practically based on specific conditions mentioned below. Only one teacher described it as being not that practical.

Teachers explained that it is practical and helpful, especially the online apps, as there is no face-to-face interaction. Other teachers described that it is a prerequisite for the lesson and an indicator for teachers that the skill is grasped. For example, it allows teachers to know of any misconceptions. One teacher felt it is the only way as there is no other way to assess students. In addition, the same teacher believes that asking questions isn't enough and that "assessments give space for everyone to use talent or be creative".

Other teachers described formative assessment during online learning to be practical however, there were some conditions. First, you should tell students that it is not an assessment, as it "will reduce receiving help" from outside sources. With that being said, students should be responsible for their learning process. Another teacher expressed the need to find a more practical way of delivering formative assessment online, should online learning continue. Similarly, variable effects should be dealt with, specifically electricity and the internet. Finally, one teacher expressed how she relies more on written exams scores because it showed her who took high grades. Furthermore, it showed her which students performed well online as they would have performed in person.

One teacher described it as being something she doesn't believe in due to her surprise as to how many students were performing well now though previously were not doing well. Moreover, she felt it is "not efficient for student performance" and does

not see it as useful since you are uncertain of events happening behind the screen. With all these issues, she still thinks that it is something that needs to be done during online learning. Likewise, another teacher felt that “they need to be practical” especially while teaching online. In addition, it was expressed that it could be practical to some extent for students who are taking it seriously and are not receiving any help. Many teachers had concerns because they don’t know what was happening behind the screen. Likewise, it might not be effective and practical as there may be problems with options, students might not know how to use tools, face problems on platforms and while submitting tasks.

Suggestions to Improve Use of Formative Assessment in Online Learning

One teacher expressed that in her opinion they wouldn’t be teaching online anymore while another teacher had no suggestions to provide. For the rest of the teachers, the suggestions can be divided into the categories below:

- Technology Tools
- Assessment Methods
- Classroom Methods
- Grading

One teacher believes that advanced technology is needed, while two teachers expressed that there needs to be a platform with a way to control cheating. Another suggested finding a platform with a wide item bank, where questions are timed, and the camera is on. In her opinion, this would help to also reduce cheating.

With regards to assessment methods, two teachers believe that it should be one-on-one. Others suggested that it will be fun and interactive through activities and games. Moreover, the following suggestions were also provided

- having a rubric for formative assessment projects
- conducting oral assessments
- open-book assessment
- allowing multiple attempts
- focus analysis on problem-solving tasks

Classroom methods suggestions are focused on creating more engagement, fixing time issues, modifying the curriculum, and providing professional development for teachers. Grading methods should include removing the name assessment, not telling students that it is an assessment, and providing many attempts for the quiz. Another suggestion was related to not considering the grade of formative assessment. However, as previously stated grading is not a characteristic of formative assessment, as a formative assessment should not be assigned a grade like a summative one.

CHAPTER 5

DISCUSSION

The study described and attempted to investigate Lebanese middle school teachers' (a) knowledge and beliefs regarding formative assessment during online learning, (b) the practices and specific tools used during online learning, and (c) views regarding the efficacy of formative assessment during online teaching during the pandemic. A sample of 31 middle school teachers participated in the survey divided equally among grade 6, 7, and 8 levels. With regards to subject area, the sample included more science teachers than English and math teachers. The survey was followed by interviews and nine teachers took part in them. The teachers were selected from private schools that implemented formative assessment during online teaching and use English as the language of instruction.

Middle school teachers teaching English, Mathematics, and Science completed a questionnaire via Lime Survey. This survey was designed to explore teachers' knowledge of formative assessment, their beliefs regarding formative assessment during online learning, and their practices, and thoughts regarding the efficacy of use during online teaching. The items in the survey were adapted from Brown (2006), Yan and Cheng (2015), and Guadu and Boersma (2018). All items in the survey were subjected to review by two educational psychologists and were then piloted on two teachers to check for clarity of the items and any ambiguities. The survey consisted of both close-ended and open-ended questions which were analyzed accordingly. Following that, a sample of nine teachers chose to participate in the interviews via Zoom. The interviews were used to further validate and clarify responses received from the survey. All

teachers expressed familiarity with formative assessment and the majority have been using it for some time.

Teachers' Knowledge of Formative Assessment

The results indicated that Lebanese middle school teachers are familiar with formative assessment and have been using it for some time. Moreover, results showed teachers were in high agreement regarding formative assessment being essential in instructional improvements, improving the quality of teaching and learning and monitoring students. Furthermore, findings showed that teachers consider feedback as an essential component of formative assessment and that it helps determine how much students learned from instruction. These results strongly imply that the knowledge of middle school teachers' regarding the purposes of formative assessment seems to be in line with the purpose and characteristics of formative assessment as proposed by Black and William (2009). Instructors' knowledge of formative assessment practices has an important influence on student learning (Kim et al., 2021). Likewise, Young and Jackman (2014) reported that grade 7 – 9 teachers held positive perceptions regarding formative assessment use in the classroom. These results highlight the importance of embedding formative assessment during online learning, as teachers will be able to evaluate their instruction and change it to improve the quality of teaching and monitor learning.

Lebanese middle school teachers are also knowledgeable about the optimal timing of formative assessment and that it should not be given at the end the of unit. We can infer that teachers, therefore, are familiar with the use of formative assessment throughout the lessons. The idea is further supported by the finding that formative assessment is designed to continuously support teaching and learning (Clark, 2012).

One interesting finding is that 24 of the 31 teachers believed that formative assessment involves assigning a grade or an evaluation to a student's work. As the researcher previously noted regarding observations in Lebanese private schools, this is a possible misconception of the proper use of formative assessment and was found in the results. According to Izci (2016), a possibility of focusing on grades might have to do with external pressures. School administration and parents might only care about a grade in order to determine where their child stands in ranking as opposed to where they are in the learning process. Likewise, Abi Faraj (2011) reported that teachers would rather use formative assessment tools that consisted of a grade instead of using strategies resulting in time taken out of the session. This misunderstanding entails that teachers use results in terms of grades and rankings to determine student achievement and success (Black & William, 2009). This is more related to summative assessment, as formative assessment deals with evaluating students informally in an ongoing fashion (Perera-Diltz & Moe, 2014) and acts as a tool to facilitate and modify learning in order to help students better understand the material (Weurlander et al., 2012).

During the interview, teachers' were asked about the purpose of formative assessment and responses were grouped to providing feedback, better student understanding, and timing. The first two categories are more related to the purpose of formative assessment. However, timing is more of a characteristic of formative assessment practices and not a specific purpose. In addition, responses showed how some teachers are implementing formative assessment at the end of a unit as opposed to the end of a lesson. Thus, again blurring the lines between summative and formative assessment. The results from this section answer part of the first research question, determining what teachers' knowledge of formative assessment is during online

learning. The need to know how knowledgeable teachers are regarding formative assessment provides us with a general picture of how well they know the purposes and characteristics.

Teachers' Beliefs of Formative Assessment during Online Learning

Teachers' answers were analyzed with respect to beliefs of formative assessment during online learning. Initially, the results from the study showed that teachers highly agreed that formative assessment is essential to online learning and makes online teaching more effective. These findings reiterate the importance of formative assessment during online learning and the need to learn more about practices in order to improve learning. In addition, teachers believe that instructional adaptation based on formative assessment is effective in improving student learning during online learning. These results are consistent and supported by Guadu and Boersma's (2018) findings that teachers have positive beliefs regarding formative assessment in relation to improving and enhancing student learning and instruction, as well as identifying students' level of performance. Additionally, Büyükkarcı, (2014) reported that sharing learning goals taught in the classroom is one principle of formative assessment.

With regards to feedback during formative assessment, 28 teachers believed that it helps to motivate students. These responses are congruent with Panero and Aldon (2016) describing feedback as a process informing both students and teachers about student understanding. Therefore, highlights how feedback can be critical for successful teaching and learning (Nyland, 2018) during online learning and that it depicts students' success factors (Bozkurt et al., 2020). More specifically, according to previous research, the motivation of students depends on the type of feedback. Weurlander et. al, (2012) and Spector et al. (2016) reported that students are influenced by the assessment

methods and timing of feedback and that if there is a delay in feedback this could impact its effectiveness. Likewise, Özdemir-Yılmazer and Özkan, (2017), found that when teachers focus feedback on emotion that is both student-centered and instructional, feedback results in more student motivation. Therefore, the results from previous studies and this study shed light on the importance of improving student learning through planned feedback, especially during online learning in Lebanon. Theoretically, it is also important for formative feedback to involve meta-cognitive strategies (Clark, 2012). The findings from this section coincide with Büyükkarcı, (2014) who found that teachers believed that one of the principles of formative assessment related to feedback. Abi Faraj (2011) also reported that teachers believed providing feedback regarding students' performance was an important part of formative assessment.

However, 17 teachers believed that providing feedback during online learning is difficult and time-consuming. Guadu and Boersma (2018) found that due to a range of challenges teachers may not have good practice of formative assessment, and this could be why some teachers do not apply it or find it difficult. First, teachers might find it time-consuming to prepare and choose the appropriate type of formative assessment to use during online learning. Moreover, it might be difficult to get students to take the formative assessment seriously, which might affect the results. Furthermore, external issues related to Lebanon's current situation could make providing feedback difficult. However, teachers may not realize that it could also be easy to provide feedback, even individualized feedback. During online learning, it was reported that schools use different platforms to conduct sessions. Therefore, providing feedback using these platforms chat rooms can be easy to implement. Teachers can provide text or a voice

note with details of the feedback. Dalby and Swan (2019) highlighted that the more sophisticated the software the better feedback.

Finally, teachers agreed that formative assessment during online learning maintains students' interest. With online learning, students are unable to interact and communicate with teachers and others as they would in person. The use of formative assessment can allow students to stay involved and interested in their learning process. There is a variety of interactive tools Lebanese Middle School teachers shared such as Nearpod, Kahoot, and Socrates that can help with the implementation of formative assessment during online learning. Enhancing student motivation and achievement are part of the meta-cognitive demands that support students' context (Clark, 2012).

Findings from the interview confirmed that the majority of teachers view formative assessment during online learning to be important for both instruction and learning. Moreover, teachers believed that formative assessment is effective in engaging students, identifying gaps and guiding how to continue instruction during online learning. In addition, responses are related to the framework provided by Black and Williams (2009) who specified three steps involved in formative assessment: identifying where students are, where they are going, and what needs to be done to get there (Black & William, 2009). One interesting finding is that a teacher reported that formative assessment to be applied during online learning to better cope with "problems in Lebanon." This is especially true due to the constant electricity and internet cuts; some students might be unable to attend sessions or miss parts of sessions. Therefore, using formative assessment will assist in identifying those students who were unable to take part in the learning process due to contextual factors. The identification of these students can allow teachers to determine how to proceed with instruction and cater to

these students who were unable to learn or attend due to outside factors. Reporting the beliefs of teachers in regards to formative assessment during online learning answers the second part to the first research question. Understanding their beliefs helps to have a deeper view of attitudes regarding the use of formative assessment during online learning. This deeper understanding allows us to further determine how teachers use the practices and tools related to formative assessment during online learning.

Teachers' Practices of Formative Assessment and Tools used during Online Learning

Teachers reported that they frequently used formative assessment during online learning. Although important and necessary, results showed that students were not given the opportunity to self-assess themselves, their peers, and provide feedback to one another. Self-assessment is important as it allows students to critically reflect and modify their work. These findings show that teachers are not adapting the self-efficacy components of formative assessment described by Clark (2012). These components, related to socio-cognitive and sociocultural theories, are crucial in helping students become active learners in their education. Moreover, peer assessment allows students to reflect on learning with their peers and share goals and how to proceed. Büyükkarcı, (2014) reported that teachers believed that one principle of formative assessment was related to the use of self and peer-assessment.

The results indicated that there is frequent use of immediate feedback to students based on the result of formative assessment during online learning. Some responses indicated that there was a difference in the frequency of reported use of individualized feedback. More detailed observation of practices is needed to determine whether teachers do provide individualized feedback to the learner or only to the group as a

whole. Furthermore, another finding that does not align with short-answer responses was that teachers provide remarks to the whole class due to time constraints. Most of the responses were leaning towards less frequency of use although teachers reported having commonly provided feedback to the group. Due to extreme demands, teachers struggle to engage in formative assessment (Kim et al., 2021) and provide detailed individualized feedback to each learner. These results can be explained by the fact that teachers do not have enough time. In Lebanon, most online classes had anywhere around 20-30 students in one online class. Therefore, it would be difficult to individualize feedback for each of the students, as it is difficult to work with a large number of students with diverse abilities (Kim et al., 2021). Instead, teachers tended to provide general remarks to the whole class which might be less time-consuming and more convenient for teachers. However, as mentioned previously teachers could use platforms to give individual and group feedback through written or voice notes. Peyghambarian et al. (2014) found reading comprehension exam scores to improve using online formative assessment with automatic feedback. With automatic feedback, students can be given feedback immediately allowing concepts to be reinforced. Therefore, with specific software and platforms teachers can embed automatic feedback into questions whether the answer is right or wrong, more detail regarding the answer will show on the screen.

Formative assessment results were used by teachers to make instructional changes during online learning and this was also confirmed by interviews. The majority of the teachers' described how the use of tools and applications allowed them to collect, analyze, and interpret results. With technology these days, it is much easier and efficient to view and analyze results from formative assessment and determine reasons why

students performed as they did. Formative assessment according to Guadu and Boersma (2018) determines what students have acquired and where possible gaps lie, which is why teachers need to identify how results are used for instructional purposes not only for reporting purposes. Therefore, the reported results from formative assessment can allow teachers to further plan with respect to instruction and extra practice.

Contrary to previous researcher beliefs, the majority of teachers reported that they have received training in implementing formative assessment and are able to design proper tasks. However, ten teachers did not have efficient supporting material. Previous thoughts regarding teachers not having proper training with regards to formative assessment did not align with results from the survey however, the results of the interview do. During the interview, many teachers described the training they received to be mostly related to platforms used during online learning not specifically for formative assessment. Therefore, further information is required to understand whether teachers have received training specific to formative assessment during online learning, what the training entailed, etc. Furthermore, there is a demand for how to create appropriate online learning environments, including the use of formative assessment, to account for the diversity of students (Kim et al., 2021). Likewise, when there is a positive change with administrative support, as Brink and Bartz (2017) found, teachers were learning how to acquire instruction, provide specific feedback, adjust their instruction, etc. Similarly, Martin et al. (2016), found professional development influenced elementary school teachers' perception of the use of internet-based formative assessment entailing the need for theoretical and practical training with regards to classroom assessment (Özdemir-Yılmazer & Özkan, 2017). Accordingly, it can be

concluded that it is important for schools to support teachers for the effective implementation of formative assessment during online learning.

Lebanese middle school teachers reported commonly and frequently using oral feedback, classroom exercises, and homework. Moreover, teachers also reported frequently using different questioning techniques, end-of-unit exams, and observation. The less frequently used tools were peer-assessment, e-portfolios, and journal writing. The commonly used practices of formative assessment found in Young and Jackman (2014) were also oral feedback and different questioning techniques. The least used tool, journal writing was consistent with results. According to Young & Jackman (2014) self-assessment, peer assessment, and portfolios were sometimes used. These results coincide with Lebanese Middle school teachers' least commonly and frequently used tools. These results show that both during online learning and face-to-face learning the use of tools was similar. Moreover, it makes sense as answers to previous questions have shown that oral feedback in the form of group format was easier to apply when implementing formative assessment during online learning. Assigning classroom exercises and homework might also be easier to implement and therefore is the one commonly used.

On the other hand, peer assessment might be the least commonly used because of the barriers during online learning. Though, there were discrepancies between teachers' reported practices and their observed practice of formative assessment in relation to peer and self-assessment that could be possibly attributed to contextual factors (Guadu & Boersma, 2018). It may be difficult to place students into break-out rooms and monitor all groups to ensure they are working. Moreover, reading journal entries could be time-consuming for teachers. Other commonly used tools were

different questioning techniques and end-of-unit exams. Teachers commonly used end-of-unit exams, which does not properly coincide with the uses of formative assessment. As stated before, such use better aligns with summative assessment purposes. Therefore, we can see a common misconception of formative assessment involving the use of end-of-unit exams.

Familiar platforms like emails, google classroom, YouTube and WhatsApp have all been commonly used to conduct a formative assessment during online learning according to findings from Robiasih and Lestari (2020). Similarly, the most commonly used platforms reported by Lebanese middle school teachers were Google Classroom, Microsoft Teams, and Web-Based Tools Websites. When asked specifically what type of tools were used; the majority of teachers implemented quizzes through different applications, followed by the use of web-based tools, and finally, others used different exercises and activities during the session. During the interview, teachers provided specific examples of how they have used formative assessment during online learning. Results showed that there was a variety of tools used by teachers during online learning while implementing formative assessment. However, what needs further research is how effective these examples or techniques were during online learning. In addition, there seems to be inconsistency with the reporting of the use of web-based tools between close-ended and the open-ended questions of the study. Initially, teachers reported to having used web-based tools sometimes, however, during open-ended questioning it was reported to be commonly used. Additionally, teachers provided examples of using web-based tools. Su (2020) provided recommendations that online assessment during the pandemic would require the use of innovative techniques. However, in order to apply these tools teachers need to have deep knowledge of the

tools and their use (Perera-Diltz & Moe, 2014). The practices of teachers and tools used were important to report in light of online learning, and it answers the second research question. Understanding the practices and tools implemented during this time will allow us to further determine its efficacy and ways to improve.

Teachers' Perception of Efficacy of Formative Assessment during Online Learning

During online learning, twenty-six of thirty-one Lebanese middle school teachers reported that formative assessment during online learning improved teaching effectiveness in several ways. OMeta-cognitive and motivational factors are essential for both school context and serve as a basis for functioning productively beyond school (Clark, 2012). Learners are more active when being part of the learning processthus making them self-learners (Mukhtar et al., 2020). This is key in the socio-cognitive and sociocultural constructivist view of learning. On another hand, five teachers expressed that it does not improve teaching effectiveness because they questioned the reliability of the obtained scores.

Due to limited face-to-face interaction, formative assessment was deemed practical as it assisted teachers in monitoring student progress and understanding, thus maximizing the effectiveness of the learning process and instruction. Also, with the use of different platforms, formative assessment is more accessible, especially since there could be previously made templates and questions that teachers can use for formative assessment, reducing time spent prepping. Though important to note that it may depend on the sophistication of the system provided by the school it also depends on teachers' training. Another important finding mentioned was that it was practical especially for students, as it motivates them to become independent responsible learners. The

practicality of formative assessment however, is also seen to depend on several contextual factors.

Some teachers claimed that formative assessment was impractical and could lead to an inaccurate evaluation of students' progress. This claim can be due to the teacher's focus on the grade as opposed to the plan of what should be done with the results. Teachers' have expressed that formative assessment is not practical during online learning due to having less control over students, impractical to prepare, and due to external limitations. These results coincide with Pastore et al. (2019) who reported that around 21% of teachers rarely considered assessment as a drive for student learning and that teachers conducted summative assessments more as there could be more control. It is possible that some teachers did not believe in the effectiveness of formative assessment as Büyükkarcı (2014) states that they may not use them as effectively as a summative assessment.

With the closure of schools, it is apparent that there will be negative effects or challenges (Esposito & Principi, 2020) that could account for a loss of learning. Teachers expressed specific challenges with the use of formative assessment during online learning related to technological issues, integrity challenges, student challenges, and school/instruction challenges. Lebanon has been facing ongoing issues with electricity for years. This has escalated now due to the economic crisis, which has put a tamper on being able to teach and learn online. Furthermore, internet connections and electricity cuts were mostly reported as issues that affected the administration of formative assessment during online learning. With the economic crisis, some families may be unable to provide devices to their children. If all students are not on the call or leave the call, how are teachers supposed to know whether the students have grasped

concepts? These issues indicate that there is a need to understand the technological barriers restricting to use of formative assessment during online learning.

Another issue raised by teachers revolves around integrity. With the barrier of online classes, teachers are unable to monitor students, especially during formative assessment online. Due to this loss of interaction, good formative assessment relies on observations during the learning process which may be difficult to conduct online (Nyland, 2018). On many counts during the interviews, teachers stated that they could hear parents, siblings, and at-home teachers whisper answers to the students. Cheating was the main challenge reported by the majority of teachers which was also a disadvantage and Mukhtar et al. (2020) reported that students might not create their own work.

Another challenge raised was motivating students and teaching them to be responsible for their work. Results indicated that students were not interacting, submitting late, and did not take responsibility for their learning. This result does not align with self-regulated learning. With students unmotivated, it would indicate that they do not hold the metacognitive and self-efficacy components highlighted in the theory of formative assessment. A final challenge reported related to school and instructional challenges. In addition, it was reported that school platforms lacked proper implementation for purposes of formative assessment. Therefore, we can infer the importance of proper training and platforms to conduct formative assessment during online learning.

This section answers the third research question of the study. In order to improve formative assessment during online learning, we must understand teachers' constructive views with regard to its efficacy.

Conclusion

The education sector is and continues to be highly effected by the COVID-19 pandemic. Online learning along with hybrid learning are being implemented depending on active cases. Assessment supports learning (Black & William, 2006; Yan & Cheng, 2015) and provides a measure of what students have learned making it an essential part of teaching and learning (Khan & Jawaid, 2020) during online learning. With the shift of focus from summative to formative assessment during online learning (Bozkurt et al., 2020), teachers can evaluate more thoroughly what students have acquired and where their gaps are (Guadu & Boersma, 2018) throughout the learning process. One important question to ask is how teachers are using and implementing formative assessment?

Due to the situation in Lebanon and as Esposito and Principi, (2020) reported in several countries, implementing online learning with digital technology was tough therefore excluding many from learning. Likewise, as Robiasih and Lestari (2020) noted, students have different access to the internet, devices, and support during learning; this is especially true in Lebanon where there is a lack of electricity and internet; along with the economic situation. Therefore, the use of formative assessment both during and after the pandemic will be important with the reopening of schools. Teachers will be able to identify the student's weaknesses and strengths and what needs to be further worked on. This research sought to answer three research questions. Lebanese Middle School teachers' knowledge and beliefs of formative assessment allows us to shed light on their familiarity with formative assessments, its uses, and their perspective of using it during online learning. It is also important to understand

teachers' current practices to improve the use and efficacy of formative assessment during online learning.

Limitations of the Study

The following are possible limitations of the proposed study:

- The sample of the proposed study only focuses on private schools in the Greater Beirut area and therefore, the results cannot be generalized to all schools in Lebanon.
- The data collected is based on self-report as opposed to observations of teachers' actual practices.
- Due to the current situation in Lebanon, many schools declined to participate in the study therefore, delaying the collection of data.

Recommendations for Future Research

- In terms of future research, it would be useful to extend current findings by observing teachers' formative assessment practices during online learning sessions.
- Future research is needed to develop applications to be used for formative assessment during online learning, along with training of teachers.
- As the current study found that one challenge of formative assessment during online learning is controlling cheating. Therefore, there is a need for research that explores programs that can control cheating during online learning with respect to formative assessment, specifically with connectivity issues in Lebanon.

APPENDIX A

Formative Assessment Knowledge, Beliefs, and Practices During Online Teaching and Their Efficacy as Perceived by Lebanese Middle School Teachers

Name of school: _____

Subject taught: _____

Grade level: _____

Years of experience: _____

I- Knowledge of Formative Assessment

Rate your familiarity with Formative Assessment

1-not at all familiar	2-slightly familiar	3-somewhat familiar	4- moderately familiar	5- extremely familiar

Have you been using Formative Assessment? Yes No

If yes, for how long have you been using it? _____

If yes, have you used it in 1. Online teaching 2. Face to face 3. both

Please provide the extent of your agreement of each of the following statements based on your knowledge of formative assessment.

1) Formative assessment improves the quality of teaching and learning.

1- strongly disagree	2- disagree	3- agree	4- strongly agree

2) Formative assessment is used to monitor student learning.

1- strongly disagree	2- disagree	3- agree	4- strongly agree

3) Formative assessment involves assigning a grade or an evaluation to student's work.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

4) Formative assessment helps determine how much students have learned from teaching.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

5) Feedback to students is an essential component of formative assessment.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

6) Formative assessment is given at the end of a chapter or unit.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

7) It is essential to use results of formative assessment in instructional improvements.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

II- Beliefs of Formative Assessment during Online Learning

Please provide the extent of your agreement of each of the following statements based on your beliefs of formative assessment.

1) Formative assessment is essential to online learning.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

2) Formative assessment makes my online teaching more effective.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

3) During online learning, feedback given in formative assessment helps motivate students.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

4) Formative assessment helps maintain students' interest in learning online.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

5) In online classes, formative assessment is easier to implement than summative assessment.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

6) I find formative assessment easy to implement during online learning.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

7) Instructional adaptation based on formative assessment are effective in improving student learning during online instruction.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

8) I think that providing feedback during online learning is difficult and time consuming.

1- strongly disagree 2- disagree 3- agree 4- strongly agree

III- Practices during Online Learning

Please provide the extent of frequency of each of the following statements based on your practices of formative assessment.

1) During online learning, I use formative assessments in my lessons.

   Never Sometimes Frequently Always

2) I give students immediate feedback based on results from formative assessment.

   Never Sometimes Frequently Always

3) I individualize the feedback for each student.

   Never Sometimes Frequently Always

4) Due to time constraints, I provide general remarks to the whole class.

   Never Sometimes Frequently Always

5) During online classes, I provide students the chance to assess themselves, and their peers, and provide feedback to one another.

6) I make use of FA results to introduce instructional changes in my online teaching

   Never Sometimes Frequently Always

Please answer yes or no to the following questions.

7) I received sufficient training to implement formative assessment during online learning.

   Yes No

8) I can design appropriate assessment tasks for formative assessments conducted during online learning.

Yes No

9) I have sufficient supporting material to implement these assessments.

Yes No

10) Please check the tools you use during online learning and rate how frequently you use them based on table below.

1- Never 2- Sometimes 3- Frequently 4- Always

Type of Formative Assessment	✓	**Frequency**
Unplanned Quizzes		1 2 3 4
E-portfolios		1 2 3 4
End of unit tests		1 2 3 4
Web Based tools: Kahoot, Nearpod, Polls, etc.		1 2 3 4
Oral feedback		1 2 3 4
Different questioning techniques		1 2 3 4
Journal writing		1 2 3 4
Self-assessment		1 2 3 4
Peer-assessment		1 2 3 4
Observation		1 2 3 4
Classroom exercises		1 2 3 4
Homework		1 2 3 4

Please read each question and answer based on your experience of using formative assessment during online learning.

11) During online learning, how often have you implemented formative assessment per week? (Form of drop box with choices)

Everyday
Almost everyday
About 2 to 3 times
Rarely

12) List the tools you use when implementing formative assessment during online learning.

IV-Efficacy of Using Formative Assessment during Online Learning

1) In your opinion, can formative assessment improve teaching efficiency during online learning? Explain why and how.
2) How indicative are the results of formative assessment during online learning of student learning? How useful do you find these results?
3) How do you usually provide feedback to your learners during online learning? Please provide an example.
4) How practical do you find the use of formative assessment during online learning?
5) Are there any specific challenges you have faced while providing formative assessment during online learning? Please elaborate.

Kindly provide an email for interview purposes: _____

APPENDIX B

Interview Questions:

- In your opinion, what is the purpose of formative assessment?
- What does formative assessment mean to you during online instruction?
- Give an example of how have you implemented formative assessment during online learning.
- Did you receive any training regarding the application of formative assessment during online learning?
- How do you use results from formative assessments during online learning?
- Do you believe the use of formative assessment tools is practical in online learning? Why or why not?
- Give 1 or 2 suggestions to improve the use of formative assessment in online learning.

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