

# Examining What Influences Mathematics Teachers' Implementation of Formative Assessment

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## Abstract

Teachers play an important role in ensuring the effectiveness of management, especially in formative management, which has been widely recognized as a valuable strategy for improving student learning outcomes. Systematic analysis is carried out of factors that may facilitate or hinder the intention of teachers in ensuring the effectiveness of the implementation of formative assessment in teaching. The results of this study are expected to help facilitate teachers in carrying out teaching tasks, especially in performing effective formative evaluations in the classroom. The study covers 23 qualified studies and identifies factors that have been categorized into several key factors: personal or cognitive-behavioral, affective, and contextual, which influence the intentions and performance of teachers regarding formative assessment. Each factor can be a major obstacle to the effective implementation of formative evaluation in the classroom. The effectiveness of the implementation of the formative assessment is important in ensuring that students' experiences in learning are positive, and the results of this study are expected to benefit researchers, school leaders, and policymakers in understanding whether the constraints among teachers in the assessment are mainly related to the educational assessment.

**Keywords:** Influences, Mathematics Teachers', Formative Assessment

## Introduction

Evaluation is an important part of teaching and learning, and it should be done all the time. This approach should also include gathering data on how each student performed, determining what it means, recording it, and reporting it. The word "penassessment" refers to a process that incorporates several methods for determining how well a student is learning and for making value judgments based on the student's learning progress (Miller et al., 2009). Hence, teachers should be involved in the development of a recognized formative assessment, and they should be able to assist students in learning more effectively (Black and William, 1998). To ensure that the school's assessment is accurate, helpful, and meaningful and that it sets the benchmark for every teaching process that is implemented, it is crucial that all future and current instructors have a thorough understanding of the evaluation

process' fundamental principles. The success of a formative assessment depends on how the teacher approaches and executes formative assessment-related classroom activities.

It is suggested that research be done on the topic of doing systematic analyses of factors that may affect or stop the use of formative assessments in the classroom. With the help of this reenactment, addressing the next thing or gap is meant to help people understand the things that need to be considered for formative assessment to work in the classroom. From the teacher's point of view, understanding should start with the teacher's role as a guide and the problems that come up when formative assessments are used. This will help researchers, school administrators, and policymakers produce ways to help teachers use formative assessments better and figure out how to solve problems. In terms of formative evaluation in the classroom, math teachers will be able to do their duties more effectively. Therefore, the assessment will go well if the teacher understands what is required, such as a tool (an educational resource), techniques, procedures, and everything related to records (PRH, recording, data), to obtain information from the student's formal or informal learning activities.

### **Formative Assessment**

In contrast to summative assessment, where the teacher uses both quantitative and qualitative data to judge the students' level of learning understanding and then publishes the results at the end of the semester or year, McMillan (2004) says that more attention should be paid to ongoing observation and collecting proof of students' growth throughout the learning process. The goal is to get information about how well students are learning so that quick steps can be taken to help them learn better. Black and William (1998) say that every teacher should use formative assessment to plan the next lesson or learning plan and gather evidence of the students' progress.

During formative assessment, the teacher will keep track of each student's progress and encourage them to take charge of their own learning (Black and William, 1998). This is because teachers can check on the progress of their students in a formative way by observing, asking students questions orally, giving quizzes, giving training, giving homework, and getting feedback from the students. But this evaluation is flexible, one-of-a-kind, does not cover everything, and is limited to a title or subtitle (McMillan, 2004). In addition, formative assessment can help close the achievement gap between students (Black and William, 1998), raise the academic performance of kids who struggle in class, and narrow the accomplishment gap while raising standards for all students. Studies have shown that doing formative assessments can be helpful, and it has become a major issue in education reform around the world (Birenbaum et al., 2015). As part of the Malaysian Education Development Plan (2013–2025), the school-based assessment technique (PBS), which was adopted in 2016, is also being used.

### **Factors Influence the Intentions and Implementation of the Teacher in a Formative Assessment**

It is undeniable that many changes have taken place in the country's education system, whether in terms of direction, vision, or mission to shape the student's well-being. This includes the methods used to measure the progress of pupils in a particular subject in a school. Therefore, the implementation of formative assessment is often a challenge, and it happens not only to teachers in Malaysia but also to teachers all over the world. What is often questioned is how well the test reflects the real skills of the student. Among the issues is that

the assessments conducted in the classroom are so concerned with cognitive aspects that the psychomotor and affective aspects are ignored (Boon et al., 2017). Some of the studies done in Malaysia on the problem of formative assessment that Malaysian teachers face are about teachers' knowledge, their attitudes, and how they manage their time.

One thing that makes it hard for teachers to use effective formative assessments when teaching math is that they do not know enough about it. This is because the teacher did not get enough information and did not have a good understanding of how to use effective formative assessments in the classroom (Mahmud et al., 2020). This also makes it hard for teachers to produce good ways to test students' understanding of math (Dyana, 2017). This will make it possible to use verification information when putting formative assessments in place in the math classroom. Fara and Siti (2021) show that teachers are confused and have no knowledge of implementing formative assessments, where teachers inform their pupils that they will be assessed before teaching and teachers choose whether to perform assessments while in class or after class through pupils' work. This will result in the implementation of the assessment not being focused and effective in teaching math. This is also found in the Haidzir and Norasmah (2019) study, where most teachers do not have exposure and only conduct formative assessments based on reading from guidebooks and information from colleagues. Thus, it is the role of teachers to obtain knowledge and information from various sources to know effective procedures, concepts, and assessment criteria.

Acceptance of grade-based scoring is still a backup for most math teachers, who are constrained by assessment. This refers to the study by Haidzir and Norasmah (2019), which states that teachers are still unable to accept changes in assessment and that grade-based assessments are more suitable to measure the progress of pupils. This is also supported in the Mahmud et al (2020) study, which states teachers are still comfortable with exam-oriented assessments. This proves that there are still a handful of teachers who consider scoring grades easier to determine the performance of pupils' understanding in math subjects. In addition, school management (PGB) still emphasizes KPIs as a benchmark against school achievement targets, as described in a Dyana blog post 2017. With this, excellent students will be given attention while students who are weak in learning will be marginalized. Therefore, the teacher should change and emphasize the implementation of a real assessment in the teaching of mathematics so that each pupil is not neglected. However, this is refuted in the Fara and Siti (2021) study, which shows that most teachers could implement PBS assessment in teaching mathematics. This ability shows that teachers can implement effective formative assessments in teaching mathematics.

The most critical issue that almost every teacher addresses is lack of time. Studies should be prepared to assess various planning and management. Mahmud et al (2020) state that the assessment recording should be consulted based on the standard content of correct and up-to-date mathematics teaching and the assessment records should be recorded in the system provided. Therefore, the teacher should plan the formative assessment plan properly so as not to be burdened with the indebtedness of recording the assessments of the students. If teachers are not wise to manage proper planning, they will have problems managing other tasks (Dyana, 2017; Haidzir and Norasmah, 2019). In addition, teachers also need to catch up on topics to be completed, which is followed by the problem of student attendance, which will put pressure on teachers (Fara and Siti, 2021), as well as the dense and large distribution of classes (Haidzir and Norasmah, 2019), which will increase the burden of teachers' duties. Due to the weight of administrative duties and the requirement to acquire ongoing support

from the school administration, the math teacher finds it challenging to do the real assessment. The welfare of teachers is something that needs to be taken seriously because a teacher will undoubtedly become depressed if they have a lot of students, diverse subjects, and many class periods per week (more than twenty-five pupils).

Wyer and Albarracin (2014) found that there are three parts to assessment implementation restrictions: impact, behavior, and thought. A study on how people feel about statistics (Estrada et al., 2011; Ramirez et al., 2012) also talks about these three things.

1. Affective component toward probability (AP): This describes how a person feels about probability, such as how much they like or dislike a topic or how much they worry, fear, or get excited about studying probability.
2. Cognitive competency against probability (CCP) is a way to measure a person's ability, knowledge, and intellectual skills when it comes to researching or using probabilities. If teachers think they are good at figuring out probabilities, they will be more likely to teach about it.
3. Components of behavior towards probability (BP): The propensity to act in a particular manner, such as the propensity to make decisions in random situations or to assist others in learning and utilizing probabilities.

So, the goal of this study is to find as many other things as possible that make it hard to use evaluation in math education.

### **Extremist Studies in the Implementation of the Formative Assessment of Past Teachers**

Although the role and usefulness of performing formative assessment are well known, not all teachers grasp its significance; consequently, it is crucial to conduct a thorough examination of potential elements that facilitate or impede the assessment's effectiveness and efficiency. Hence, this research is crucial for identifying any potential obstacles to the implementation of a formative assessment to provide information that can be used to bridge the gap, overcome the problem, and optimize the execution of the assessment.

According to Heitink et al (2016), who undertook a comprehensive investigation of the conditions for the successful application of evaluations for learning in the classroom, there are notable exceptions. Assessment for learning was identified as one of the formative assessment strategies incorporated into classroom practices in his study. Students should play a crucial role in assessment for learning, they urge. In addition, they define prerequisites from four perspectives: teacher, student, assessment, and context. Nevertheless, based on the function of the instructor, the teacher's knowledge, abilities, and trustworthiness, as well as his or her disposition, are crucial prerequisites for conducting classroom assessments.

Teachers must possess the knowledge and skills necessary to effectively collect, analyze, and interpret assessment data based on students' capacities for continuous instruction and adjustment. As opposed to beliefs and attitudes, which refer to the philosophy underlying their teaching practices and a constructive view of learning and pedagogy. However, Heitink et al (2016) study covers multiple facets at the cost of a limited number of preconditions for each. For instance, in two prerequisites pertaining to the teacher's aspect, an understanding of the context is limited to the internal factors of the school without regard to the external factors of the school. More than anything else, their study focused on factors that influence the quality of assessment implementation for learning as opposed to factors that determine whether teachers truly intend and perform or simply perform based on assignments or the requirement to do so for the assessment of students' learning.

The Iczi Study (2016) found that teachers' practices for formative assessment are affected by personal, contextual, internal (school), and external (PPD, Ministry, Community) factors. According to Iczi (2016), also from the narrative summary, rather than the results of a systematic review, there is still relatively limited information on the study methodology, for example, the main terms and search strategies for finding articles, inclusion criteria, and the number of included studies are stated to support this factor. However, it can also be used as a reference or example for the researcher to conduct a review based on the likelihood of this occurrence in the study.

Importantly, these two research-linked characteristics directly influence the assessment practices of teachers in the classroom without considering any meditation-related variables, such as the desire to conduct the formative assessment. According to TPB (Ajzen, 1985, 1991), the individual's personal beliefs indirectly predict his or her actual action, but only through the mediation of the behavior's aim. Hence, the teacher's motivation to execute a formative assessment will provide a more comprehensive picture of the teacher's implementation of a formative assessment. In addition, the various elements that influence the teacher's intent and implementation, or lack thereof, of formative assessment will provide crucial information for building support measures for more effective teacher formative assessment practices.

Based on previous research, it is important to close the knowledge gap to find out why teachers use formative assessments the way they do. The effects of a complete and detailed lack of knowledge about the factors that affect a teacher's decision to plan and use formative assessment will be better understood and, as much as possible, minimized. The following are research questions:

- Question 1 - What are the characteristics of research examining the intentions and implementation of formative assessments by mathematics teachers?
- Question 2 - What are the teacher's personal factors to consider when doing formative assessment in the classroom for mathematics teaching?
- Question 3 - What contextual factors impact the mathematics teacher's implementation of formative assessment in the classroom?

### **Study Methodology**

The methods utilized are based on the methodology adapted by Petticrew and Roberts (2006) for the review of systematic literature to analyze sources related to factors influencing the intent and implementation of formative assessments by mathematics teachers. Developing research questions, identifying search strategies, conducting literature searches, formulating inclusion criteria, assessing the quality of studies, and extracting data from the accompanying articles are all components of this methodology.

### **Search Strategy**

The first screening was conducted to gather as many publications as possible that were relevant to the study, and the following actions were taken: Finding a piece of literature to emphasize to use as a model, inspiration, and writing sample is the first stage in any research project. To get an idea of the keyword search for the article you want to search, for example, "Issues and Challenges in the Implementation of Formative Assessment," the second step used is to use some articles that may not be related to the main field of study, namely mathematics, using Google Scholar. This step is crucial since it is the third of a three-part process that involves modifying the article's title to reflect the topic of study you are interested in, in this case, mathematics. The fourth and last stage entails converting the

search criteria to English to access a wider range of research that has been conducted internationally. The fifth stage is to utilize English keywords to locate articles or literature summaries that correspond to the research reference used to locate pertinent publications about the subject or area of study. ERIC, SCOPUS, WOS (Web of Science), Mendeley, ETHOS, and Google Scholar are among the systems that have been utilized.

Since November 1, 2021, the keyword "teacher restrictions in the implementation of assessments" has been used to look for research articles. However, this is not an effective way to find articles about studies. But the right article could not be found until a different search method was used with the keyword "formative assessment issue math instructor." 52 linked articles over the past 5 years have so far been located. The outcomes of the second screening search should thus be used, and the subsequent procedures have been put in place to filter the articles that are appropriate for the study. Only 35 papers were judged to be eligible after the researchers individually examined every item. Asking friends to read the article that has been chosen in accordance with the study is the second stage. Therefore, 39 pertinent publications have been found, and researchers have compiled a list of articles that are cited.

### ***Peer Selection Criteria***

During the literature screening process, the study is selected if it meets all the following criteria. Assessment in the quality aspect of studies was determined using peer reviews as a selection criterion.

1. The study explored the role of teachers in formative assessments.
2. The focus of the study is on factors that influence the teacher's intention or implementation of the formative assessment.
3. The study presents empirical results (not theoretical papers, not proceedings, conferences, or revisions).
4. The study was published as a peer-reviewed journal article.

### ***Data Extraction***

The initial search using the ERRIC platform obtained 6,297 using the keyword "formative assessment issue math teacher" and the keywords (teacher\*) AND ("attitude") AND ("formative assessment") for searches in ERIC, Scopus, Google Scholar, and UKM Library. This search was obtained from 6,240 articles from ERIC, 17 articles from Scopus, 32 articles from Google Scholar, and 8 articles from UKM e-Library. The selection was then set by selecting the criteria based on the period from the last 5 years, from 2017 to 2021, and the number of articles has changed, with only 209 articles, 169 from ERRIC, 10 from Scopus, 25 from Google Scholar, and 5 from UKM e-Library, respectively.

However, after researching and finding the criteria for involving math teachers and issues related to formative assessment involving behavior, the teacher's knowledge of the number of articles has changed to 69. However, researchers only selected accessible, appropriate, and relevant articles, and only 55 articles were recorded to be read. Thus, the researchers selected 25 articles from ERRIC, 7 articles from Google Scholar, and 3 articles from UKM e-Library, while 20 articles were dropped because they were found to involve no math teacher studies, no studies on students, and were not related to the implementation of formative assessments in math classes.

Finally, out of 35 articles, only 25 wants to be read, and researchers have tried to find the article that really fits. So, the researchers decided to use only 20 articles in total, with



19 articles from ERIC and 1 article from Google Scholar. The conclusion of the article-finding process is shown in Figure 1 of the search diagram using the PRISMA process as a reference search process.

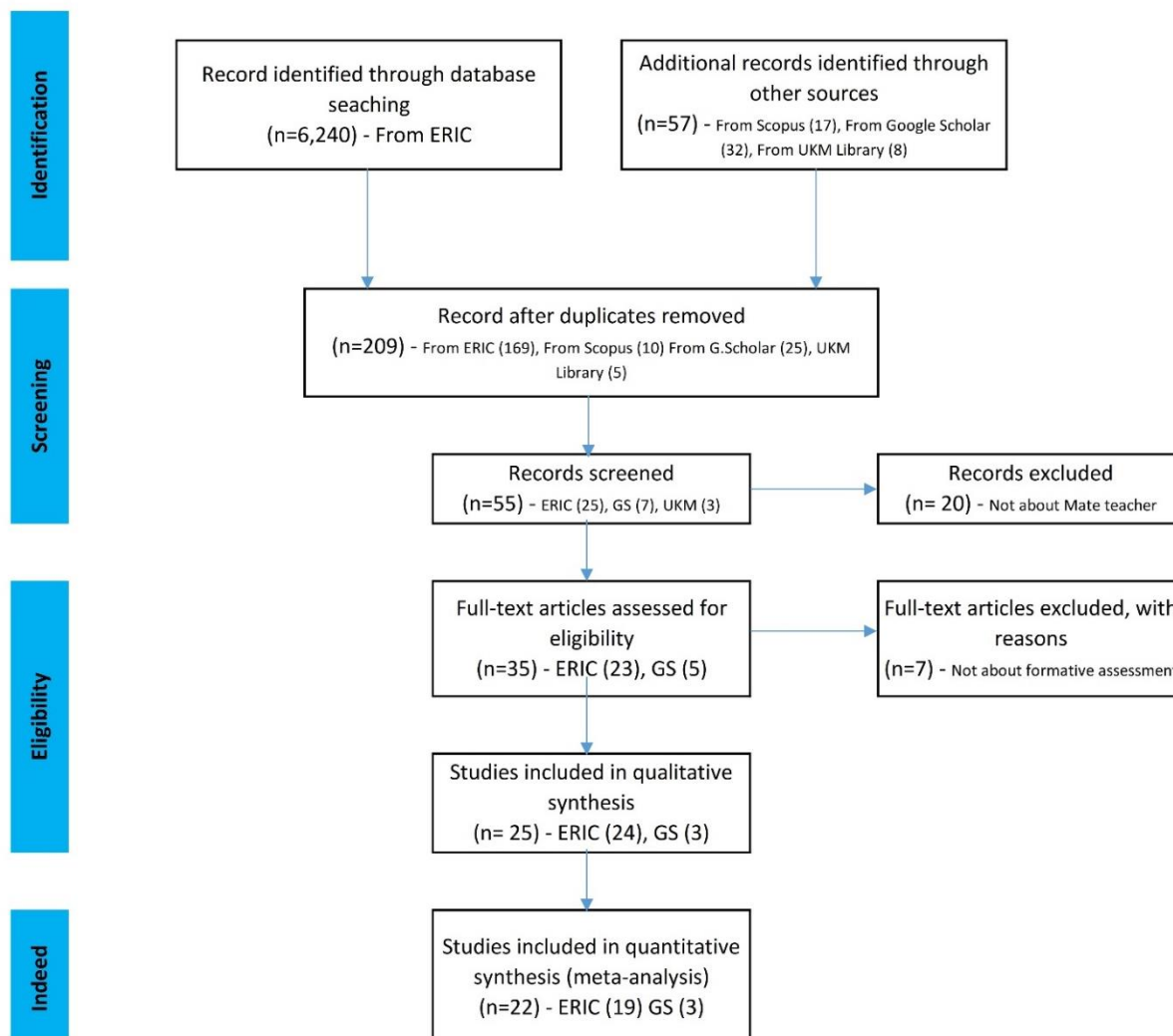


Figure 1: The process of search and selection of literature

After the studies were chosen, they were read carefully, and their information was written down on data extraction forms. The researcher made the data extraction form, which has the following sections: study title, author, publication year, purpose of study, research question, hypothesis, sample data, country or region, key terms, use of formative or technological assessment aids, tasks for formative assessment, subject, research design, type of research, data collection procedure, results, conclusions, identified factors, and words. When writing a comprehensive review, this data extraction form lets us get back in touch with each study that was chosen by collecting the relevant data from each study that is related to the current investigation. During the process of finding systematic ways to refer easier, the category of how important things are that affect how assessment is done is also made.

The categorization scheme is based on the goals of the study, prior literature, and behavioral development theory (Ajzen, 1985, 1991). The original list contains elements mentioned in the Theory of Behavioral Development's theoretical framework and discovered in related investigations. On the other side, the category system is open to additional

elements that may subsequently be discovered from the reviewed study because it is data-driven in its evolution.

### **Study Findings**

In this section, it will explain the characteristics of the accompanying publication (Study Question 1), which will then explore the factors that influence the teacher's intention to implement the formative assessment pen (Study Question 2) as well as the teacher's personal factors that determine the implementation of the formative assessment pen (Study Question 3), as well as contextual factors in their respective places of duty.

#### ***Study Question 1 - What are the characteristics of research examining the intentions and implementation of formative assessments by mathematics teachers?***

In terms of the number of studies screened, only 23 articles were selected for this reading and study. However, after being re-evaluated, only 17 articles were selected to contribute to the constraint factors, while 3 articles elaborated on the study on strengths in the implementation of a good assessment in the classroom. The article was rejected because it did not clearly decipher the relevance of the problem of implementing formative assessments, especially in the classroom.

In study design, 10 studies used quantitative design, 9 studies used qualitative design, and 4 studies used a mixed design. In terms of data collection methods, the frequency of using interviews ( $n = 14$ ), questionnaires ( $n = 11$ ), and classroom observation ( $n = 7$ ) was similar. Most of the chosen meals came from Asia ( $n = 11$ ), Europe ( $n = 7$ ), Africa ( $n = 3$ ), and continental America ( $n = 2$ ).

In the selection criteria for the article, the most important criteria are that the sample of the study must be a math teacher. A second requirement, on the other hand, must be about problems with how math is taught. The third aspect must be related to the teacher. However, there is also a selection of selected articles not related to mathematics subjects but involved because the study criteria have valuable information and are useful to lead to the main study of the researchers. In the school criteria, primary school teachers are ( $n = 11$ ), secondary school teachers are ( $n = 7$ ), and educational institutes are ( $n = 1$ ), while the rest are mixed, i.e., secondary, and primary schools or secondary schools and educational institutes. A total of 3,382 teachers involved in one study were from Turkey ( $n = 956$ ), while the least involved two teachers in one study in South Africa. Basic information on the included studies can be found in Table 1 below.



Table 1  
Study Basic Information (Articles)

Num.	Writer's Name	Study Title	Country of study	Education Sector	Research Design	Sample size	Data collection methods
1	Abdul Halim Abdullah, Bomi Shin, Muhammad Sani Abdurrahman, 2020	A Comparative Study of Mathematics Assessment Practices between Malaysian and South Korean Secondary Schools Mathematics Teachers	Malaysia and South Korea	Lower Secondary	Quantitative	71 Malaysian teachers & 51 South Korean teachers	questionnaire, observation and (6 people involved - interview)
2	Adri Van der Nest, Caroline Long, Johann Engelbrecht, 2018	The impact of formative assessment activities on the development of teacher agency in mathematics teachers	South Africa	Grade 9	Qualitative	9 teachers	Open questionnaires, semi-structured interviews, observations, and triangulation
3	Andrea (Drey) Martone, Dianna Reagan, Gayle Reed, 2018	Understanding the Use of Mathematics Interim Assessments: A Case Study	United states	Primary and Secondary Schools	Qualitative	3 teachers	Interviews, observations, and triangulation
4	Aunt Mahdieh Mirian, Hutkemri Zulnaldi, 2020	Mathematics Teachers' Conceptions of Assessment: Gender and Academic Qualification Comparisons	Iran	High School	Quantitative	567 teachers	Questionnaire
5	Citra Putriarum Tanudjaya, Michiel Doorman, 2020	Examining Higher Order Thinking in Indonesia Lower Secondary Mathematics Classrooms	Indonesian	Primary High School	Mixed method	372 students and 6 teachers	Semi-structured interview
6	Diane Cunningham, 2021	A Case Study of Teachers' Experiences of Blended Teaching and Learning	New South Wales	Institute of Higher Education	Qualitative	4 teachers	Interview, observation, analysis
7	Effrat Akiri, Hrisilda Matathia Tor, Yehudit Judy Dori, 2021	Teaching and Assessment Methods: STEM Teachers' Perceptions and Implementation	Israel	Institute of Education and Schools	Mixed method	125 teachers and lecturers	Interviews and questionnaires
8	Fara Izzati Marnizam, Siti Rahaimah Ali, 2021	Assessment of the Implementation of Classroom Assessment (PBD) among Primary School Mathematics Teachers	Malaysia	Primary School	Quantitative	114 teachers	Context, input, process, and product evaluation
9	Hem Chand Dayal, 2021	How Teachers Use Formative Assessment Strategies during Teaching: Evidence from the Classroom	Australia	High School	Qualitative	Two math teachers	Observation of documents, monitoring of teaching and interviewing
10	Hem Chand Dayal, Bronwen Cowie, 2021	Professional Learning Intervention in Mathematics: A Case of Developing Portfolio Assessment	Fiji	High School	Qualitative	12 teachers	Interviews and observations
11	Jani Hannula, 2019	Characteristics of teacher knowledge produced by preservice mathematics teachers: the case of open-ended problem-based learning	Finland	Higher education, High school	Mixed method	5 groups (5-6 teachers)	Discussions in groups, Focus group interviews, artefacts,
12	Marja Van den Heuvel-Panhuizen, Ali Akbar Sangari, Michiel Veldhuis, 2021	Teachers' Use of Descriptive Assessment in Primary School Mathematics Education in Iran	Iran	Primary School	Qualitative	17 teachers	Questionnaires, observations, interviews
13	Melanie Brink, David E. Bartz, 2017	Effective Use of Formative Assessment by High School Teachers	French	Upper High School	Mixed method	1000 students, 1 math teacher, 1 psychologist and 1 language	Questionnaires, observations, interviews
14	Muhammad Sofwan Mahmud*, Muhamad Farhan Abdul Halim, Nadia Fasha Mohd Drus, 2020	SCHOOL-BASED ASSESSMENT PRACTICES AMONG PRIMARY SCHOOL MATHEMATICS TEACHERS BASED ON TEACHINGEXPERIENCE	Malaysia	Primary School	Quantitative	37 teachers	Survey and questionnaire methods
15	Özge Keskin, M. Sencer Çorlu, Alipaşa Ayas, 2018	Voicing Mathematics Teachers: A Holistic Overview of Their Early Career Challenges	Turkey	High School	Qualitative	10 teachers	Semi-structured interview
16	Poomoney Govender, 2019	Formative assessment as 'formative pedagogy' in Grade 3 mathematics	South Africa	Early Grade	Qualitative	12 teachers	Interviews and observations
17	Poomoney Govender, 2020	Insights into Grade 2 teachers' enactment of formative assessment in mathematics in selected priority schools in Gauteng	South Africa	Grade 2	Qualitative	2 teachers	Semi-structured interviews and observations
18	Vesile Alkan, Tolga Cosguner, Yucel Fidan, 2019	Mathematics Teaching Anxiety Scale: Construction, Reliability and Validity	Turkey	Primary School	Cauntitative	956 teachers	Questionnaire
19	Vjolica Ahmedj, 2019	Teachers' Attitudes and Practices Towards Formative Assessment in Primary Schools	Kosovo	10 Primary Schools	Quantitative	47 teachers	Questionnaire, self-assessment

The specifics of the factors identified in the articles have been analyzed and classified into two categories, namely personal and contextual factors (see Appendix 1). Personal factors refer to individual characteristics, which vary from person to person and can influence the intention or implementation of the teacher on a formative assessment. This category includes aspects of knowledge that elaborate and demonstrate the conformity or non-conformity of the teacher in implementing the planning, implementation, assessment, evaluation, and transparency in mastering the understanding of the content of the lesson.

As for the teacher's behavior, it will be clear that he or she is willing to do the job, is aware of the latest educational policies (curriculum), wants to change based on the current situation, is willing to change the school or classroom environment, is able or interested in learning more, and is always ready to do the job in charge. On the affective side, it will show what teachers face when putting assessments into practice in the classroom, based on current topics: recording assessments, managing time, skills, and the ability to do tasks, continuous self-efficacy, and the ability to deal with working or classroom conditions or students with different problems by using the right activities or programs.

The contextual factor, on the other hand, is related to the situation the teacher is in and affects what the teacher plans to do or how they do it in the formative assessment. For the part about how teachers' duties and values are shared, it includes the teacher's willingness to follow the management's rules about class schedules, management tasks, working conditions, management support, school or ministry policies, school culture norms (for teachers, parents, and the local community), and students or pupils. Findings on each category of factors are presented in the following sections.

Num.	Writer's Name	Factors																	Contextual Factors						
		Knowledge/Cognitive					Personal Factors					Affective							Distribution of Tasks/Values						
		Planning	Implementation	Assessment	Valuation	Content	Always receive commands	Be sensitive to education policy	Change with the situation	School/classroom environment	Improving knowledge	Responsible	Teaching by topic	Record assessment	Time management	Skills and capabilities	Self-efficacy	Working conditions/classes/pupils	Timetable	Management Tasks	Working conditions	Management support	School/Ministry Policy	Cultural norms	Student/Student
1	Abdul Halim Abdullah, Bomi Shin, Muhammad Sani Abdurrahman, 2020	x	x	x	x	x		x	x		x			x	x	x		x					x	x	x
2	Adri Van der Nest, Caroline Long, Johann Engelbrecht, 2018	x	x	x	x			x		x	x			x	x		x	x		x	x		x	x	x
3	Andrea (Drey) Martone, Dianna Reagan, Gayle Reed, 2018	x	x	x	x		x	x		x		x	x	x	x	x							x	x	
4	Aunt Mahdieh Mirian, Hutkemri Zulnadi, 2020				x		x	x	x		x												x	x	x
5	Citra Putriarum Tanudjaya, Michiel Doorman, 2020	x				x		x	x			x					x	x	x				x	x	x
6	DIANE CUNNINGHAM, 2021	x		x		x			x		x					x	x	x			x	x	x	x	x
7	Effrat Akiri, Hrisilda Matathia Tor, Yehudit Judy Dori, 2021	x		x	x	x		x	x	x	x			x		x	x	x			x	x	x	x	
8	Fara Izzati Marnizam, Siti Rahaimah Ali, 2021			x	x	x		x	x		x	x	x	x	x	x	x	x				x			
9	Hem Chand Dayal, 2021						x	x				x								x	x		x	x	
10	Hem Chand Dayal, Bronwen Cowie, 2021	x		x	x			x	x						x	x	x	x		x	x		x		
11	Jani Hannula, 2019	x			x	x	x	x	x		x	x								x			x		
12	Marja Van den Heuvel-Panhuizen, Ali Akbar Sangari, Michiel Veldhuis, 2021	x	x	x	x	x	x	x	x	x		x		x	x	x		x	x	x	x	x	x	x	x
13	Melanie Brink, David E. Bartz, 2017	x			x		x						x	x	x	x	x	x	x	x	x	x	x	x	x
14	Muhammad Sofwan Mahmud*, Muhamad Farhan Abdul Halim, Nadia Fasha Mohd Drus, 2020		x	x	x	x	x	x	x	x	x	x								x	x	x			
15	Özge Keskin, M. Sencer Çorlu, Alipaşa Ayas, 2018	x	x			x		x	x	x				x	x		x	x	x	x	x	x	x	x	x
16	Poomoney Govender, 2019		x	x	x	x		x	x	x			x	x	x	x	x	x		x	x	x	x	x	
17	Poomoney Govender, 2020	x	x		x	x	x	x	x	x			x	x	x	x	x			x	x	x		x	
18	Vesile Alkan, Tolga Cosguner, Yucel Fidan, 2019	x	x		x		x	x			x	x											x		
19	Vjolica Ahmedi, 2019	x	x			x		x	x			x											x		x

## Appendix 1: Checklist of study variables

### Study Question 2 - What are the teacher's personal factors to consider when doing formative assessment in the classroom for mathematics teaching?

#### Personal Factors

The lack of knowledge aspects in conducting the planning, implementation, assessment, evaluation, and content of the lessons related to the appropriate activities carried out is one of the teacher's personal factors in the desire to implement formative assessment in the classroom for the teaching of mathematics.

#### Aspects of Teacher Knowledge

A total of seventeen studies were done with the purpose of discovering personal or cognitive characteristics influencing teacher assessment implementation in the classroom. The purpose of the studies is to list the teaching probabilities of the teacher's perception of his capacity to teach probabilities, to assist students, to provide effective tasks for identifying relevant sources, and so on. The most common feature is the teacher's knowledge aspect, which includes the teacher's ability to plan, implement, assess, and evaluate as well as expertise in comprehending the topic of the student's learning.

*i) Planning*

In teacher planning skills, there were thirteen studies discussing matters related to content or constraints related to the implementation of formative assessments in the classroom. The following is a list of study excerpts, with a reference to the list of authors in

**Appendix 1**

1. The level of knowledge of teachers about non-routine mathematical problems is not in line with their skills for solving and developing non-routine mathematical problems. [1]
2. In the results of this study, a deeper focus on students as active students is important. [3]
3. Knowledge of existing ways to teach HOT, experience with HOT problems, and the support of colleagues. [6]
4. Taken together, the metaphorical teacher reveals several ways to be student-centered. [7]
5. The primary justifications given by the teacher for selecting a particular method of instruction and assessment relate to the skills of the teacher or student. (Not building something challenging or new) [8]
6. Discussions, activities, and tasks in the classroom that show proof of student achievement, give feedback that motivates students, get students to take charge of their own learning, and get students to teach each other are all good. [11]
7. Different knowledge of teachers is more clearly involved in the task. [12]
8. Identification of four dilemmas that teachers face: conceptual, pedagogical, cultural, and political dilemmas. [13]
9. Throughout the program, a student-centered and constructivist way of teaching math is talked about. For example, making connections between math and students' everyday lives and having students work in groups to solve problems based on real-world situations are just two examples. [14]
10. This necessitates that the educator provides ample explanations of each mathematical concept so that no student is left behind. This necessitates that the educator provides ample explanations of each mathematical concept so that no student is left behind. [21]
11. By figuring out what the students need and keeping an eye on how they are doing, the teaching and learning sequence can be set up in a way that makes sense. This can include instructions on how to run the teaching and learning courses and improved programs that put more attention on the students' learning goals. [22]

As a teacher, I have valuable experience in planning for the implementation of effective formative assessments in the classroom (Akiri et al., 2021). This is due to teachers' lack of awareness of the aim of formative assessment approaches (Poomoney, 2020), as well as philosophical, pedagogical, cultural, and political quandaries (Heuvel-Panhuizen et al., 2021), as well as varied degrees of teacher expertise (Hannula, 2019). Furthermore, Abdul Halim et al (2020) mentioned in the study that teachers' degree of knowledge on non-routine math problems is not in line with their ability to solve and improve non-routine math, and that instructors also lack comprehension when implementing their plans. Teachers, according to Bartz (2017), should consider students' willingness to accept responsibility for their involvement in the use of formative assessments to increase learning. As a result, it is critical that teachers understand systematic assessment planning as well as continuous and effective

monitoring practices (Ahmedi, 2019). As a result, the instructor must be skilled at activity planning (Keskin et al. 2018). Pupil-centered teaching, such as classroom discussions, activities, and assignments that demonstrate student performance, is focused on providing feedback that mobilizes students by activating them as owners of their own learning and as teaching resources to one another (Dayal and Cowie, 2021; Cunningham, 2021). As a result, it is critical that teachers develop a strategy that can truly assist in not only assuring subject achievement but also ensuring total understanding of the students in all aspects, including conducting analyses that can assist kids with learning challenges. 2019 (Ahmedi).

### *ii) Teacher Implementation*

The second component is in the aspect of implementation. The following 10 studies have to do with the constraints on the implementation of this assessment, and **Appendix 1** is referred to as:

1. Due to varying perspectives, definitions, and methods for implementing formative assessments in classrooms, teachers are unclear about what formative assessments are meant to do. [22]
2. To prevent students from missing out, the teacher must explain each mathematical concept. Teachers should also assist students in clearly understanding each mathematical concept and operation. [21]
3. The technique does not encourage students to think creatively in the classroom because teachers ask questions that require facts, procedures, and yes/no responses, which are ineffective for formative evaluation. [19]
4. The difficulty of integrating what they know 'about' formative assessments with their daily practices [18]
5. Teachers mention the challenges they face when giving their students the customary formal assessment. Most of the time, it seems like formal assessment tasks are beyond what students can do. [18]
6. The lack of knowledge of the subject area causes several other challenges, as shown by the participants. Some participants attribute the source of challenges in classroom disciplines to a lack of knowledge of their subject areas. [17]
7. A student's SBA can be completed more than once, with each time focusing on evaluating and using data from the student's responses to help the student perform better. [15]
8. In an interview following the teacher's observation, the teacher explains that the assessment gives useful information for adjusting the instructions but adds that they find it challenging to do so given the plan to have the students finish their textbooks in full at the end of the academic year. [13]
9. New assessment techniques may present cultural challenges to long-established classroom, school, or societal cultures. [13]
10. Creating a "learning culture" is what helps teachers share openly about their processes and learning. (Cultivation of learning to aid the continued understanding of pupils) [3]
11. The formative assessment in math classes emphasizes both cognitive and effective aspects, in keeping with the objectives of the current South Korean math curriculum. [2]
12. Lack of basic knowledge among teachers, insufficient guidelines for teachers regarding the implementation of the SBA, and a lack of monitoring the classroom. [1]

The teacher's implementation in the classroom is also important for ensuring that the assessment done without any information liquidity is effective and accurate in the second part. But one problem teachers have is that they do not know how to do assessments in the classroom (Ahmedi, 2019; Keskin et al., 2018). The same is true for teachers who understand their implementation but face challenges in implementing assessments due to time constraints where teachers must help students with learning difficulties (Alkan et al. 2019), on top of being burdened with other tasks other than teaching (Govender, 2019). Furthermore, a lack of educational resources contributes to the impossibility of implementing teacher evaluation (Abdul Halim et al. 2020). However, the most significant contributor to this implementation constraint is due to practices that have existed around the school (Heuvel-Panhuizen et al., 2021), which is that a frequent practice makes teachers unfamiliar with the changes that have been made (Drey et al., 2018). Even teachers believe that the process of implementing formative assessments is complicated, making it difficult for them to implement a real assessment (Ahmedi, 2019). However, the greatest constraint that teachers face is that the enormous number of students, cramped classroom conditions, and diversity of pupil understanding levels make it difficult for teachers to do their job (Govender, 2020 & Ahmedi, 2019).

### ***iii) Assessment and Evaluation***

The third and fourth components are concerned with teacher constraints when it comes to implementing continuous assessment and evaluation in the classroom. Here are 11 article review statements about the problems teachers face when evaluating and using student assessments, with references to **Appendix 1**: -

1. Concerns regarding the assessment and challenging external factors led students to note that "there is a great deal of anxiety regarding the test." [2]
2. As was to be expected due to concerns about the outcomes of systematic assessments, this demonstrates that scores and accomplishments are prioritized over mathematical understanding. [2]
3. The purpose of the evaluation process is for students to comprehend where they are, where they are going, and what they must do to get there. [3]
4. This research helps clarify the significance of educators in fostering a learner-centered classroom. Different methods of student-focus are displayed by the educator in metaphor. [7]
5. When asked what they take away from the assessment, teachers typically state that they learn that the test is for the student's benefit. [13]
6. Teachers, and especially math teachers, need a firm grasp of the SBA's assessment protocol to ensure their students are not unfairly penalized. [15]
7. Belief in teaching and learning mathematics, the nature of student response, teaching experience, and grade-level-specific experience. [16]
8. Teachers may not reflect deeply on this or develop a constructive classroom management strategy for their actual careers. [17]
9. ATP is used by teachers as a lesson plan rather than a tracking document. The teacher's misunderstanding of the purpose of ATP encourages them to adhere strictly to ATP content. [18]
10. The teacher "teaches to the test" to meet performance goals at the expense of conceptual learning, and the reason for this is the teacher's lack of understanding of formative assessment. [19]

11. Through assessment of students' needs and monitoring of their progress, the teaching and learning sequence can be designed appropriately with instructions to regulate teaching and learning courses and refined programs, resulting in a more effective concentration on students' learning goals. [22]

According to Keskin et al. (2018), the main difficulty teachers encounter in this component begins with the teacher's seriousness about conducting assessment activities. This is a big problem if the teacher does not have a good plan for how the assessment will be able to show what the student has learned. Even teachers are not proficient in the use of assessment forms, and implementation guidance and the effectiveness of information obtained in assisting students will not apply to Govender's assessments (2019 and 2020). Teachers also need assessment implementation skills (Cunningham, 2021) to convince students that the planned activities are meant to improve their learning process over time. However, according to Jani (2019), confusion persists because of the loss of information due to class sizes that are too large. However, the culture of grade-consciousness among teachers persists because the summative test makes it easier to assess students' level of understanding and the process is quicker, simpler, and more measurable (Heuvel-Panhuizen et al. 2021). This is also supported by Cunningham (2021), who asserts that as a result, teachers will disregard formative assessment in favor of focusing on students' test performance and completing the curriculum as quickly as possible.

#### ***iv) Mastery of Teaching Content***

The last part goes against what the teacher can do to make the lesson's content more in-depth. In this article, there are 7 articles related to the problem of the teacher in understanding the content, and Appendix 1 is referred to as: -

1. There is evidence that educators are less likely to use rigorous, iterative, assessment-based pedagogical approaches with their students. [8]
2. Some elementary school educators are not well-versed enough in their subjects to implement rigorous formative assessment practices. [8]
3. Teachers of Mathematics face difficulties in implementing PBD in classrooms because of the limitations they place on the method. [9]
4. Primary school Mathematics Teachers have good knowledge to conduct PBD. [9]
5. There is evidence to suggest that elementary education majors' lack of background knowledge hinders their ability to teach SCK (teaching aids). [12]
6. Pedagogical dilemmas may appear when they are not sure how to use new assessment methods to collect and document student data. [13]
7. Teachers in the sample reported that they had difficulty applying what they learned about formative assessment in the classroom, but that they quickly gained proficiency after receiving training and coaching. [14]
8. Teachers in the sample are becoming increasingly aware of the benefits of using formative assessments in the classroom as they collaborate with colleagues. [14]
9. Math teachers in particular need a deep familiarity with SBA assessment procedures to ensure that their students are being fairly evaluated. [15]
10. To ensure the success of these aspiring educators in the classroom, it is crucial to enhance the efficacy of mathematics education. [21]

Management in administration also contributes to teachers' inability to implement effective assessments in the classroom. Among them are ensuring that teachers receive adequate training (Heuvel-Panhuizen et al., 2021); providing an adequate handbook as a reference



(Brink & Bartz, 2017); and ensuring that assessment implementation is effective through continuous monitoring (Mahmud et al., 2020). Teachers will face challenges if the following are ignored: not understanding in depth how the assessment should be carried out (implementation) Akiri et al, (2021), how to use or implement the correct recording in Cunningham's assessment, (2021), implementing the correct method or approach or should be used to assess the students (planning) Fara & Siti (2021), and deepening and understanding the importance of assessments. It is therefore preferable that teachers master the syllabus so that all aspects of teaching, including planning, implementation, monitoring, and evaluation, are well done and effective, particularly in formative assessments.

### ***Aspects of Teacher Behavior***

Personal factors of the second aspect studied are related to the teacher's behavior toward the probability of teaching toward the acceptance of instructions given by management, sensitivity to curriculum policies, changing with changes, in line with the conditions of the school or classroom environment, motivated to increase knowledge, and always responsible with all responsibilities given in full. Studies are to examine whether the teacher has or does not have a knowledge of (or is willing or not to have a knowledge of) probabilities, whether he gives preference to probabilities over other topics, and whether he thinks the topic should be postponed or emphasized by the teacher. Of the 16 articles, three are related and formulated as follows:

#### ***i) Always Receive Instructions***

It is common knowledge that the instructors comply with the instructions in a manner that is commensurate with the standards set by the school from which they receive instruction. The teachers are carrying on with the completion of the tasks that have been given to them.

#### ***ii) Be sensitive to Changes in Education Policy***

However, there are three studies that show that most teachers do not take curriculum policy seriously (Ahmedi, 2019). As (Heuvel-Panhuizen et al., 2021) teachers lack confidence in formative assessment to improve student learning performance, this is due to the practice factors they have become accustomed to.

#### ***iii) Ready to Accept Changes***

Being ready to change with the changes that occur during the four studies is the most demanding thing to do because the teachers' deep, normal practice has lulled them into a sense of ease (Akiri et al., 2021). According to Govender (2019), low teacher awareness is linked to the significance of assessment because teachers do not want to consider the best alternatives for implementing change (Akiri et al., 2021) or trying to improve their ICT skills (Cunningham, 2021) to help facilitate the teachers' day-to-day responsibilities. Govender states that this is because teachers do not want to consider the importance of assessment.

#### ***iv) Be aware of the school or classroom environment***

Three different studies investigated what it means when students do not do as well as they should on tests. According to the research conducted by Van der Nest et al (2018), a few educators are unable to conduct assessments because of the significant amount of travel time required between classes as well as the large and varied number of times required. Tanudjaya

and Doorman (2020) say that some teachers still do not understand or have not mastered the skills of planning how to use questions or activities to make assessments work well. Tanudjaya and Doorman say this is a problem because it makes it hard for teachers to do their jobs well. As a result, educators must use their knowledge and experience when planning instructional activities (Govender, 2020) that are truly effective and impactful in ensuring students' understanding of learning is fully realized.

***v) To increase knowledge and awareness (responsible)***

There are seven studies that talk about how teachers should take responsibility for their jobs, such as making sure that student tests are done right, are useful, and help students (Dayal and Cowie, 2021). Hannula (2019) says that, based on what they teach, some teachers still do not understand the teaching construct. Fara and Siti (2021) also said that some teachers still have negative feelings about how well formative assessment works, even though they do not say why. This is because, in the end, summative assessment will be viewed as the true achievement of the students, as Alkan et al (2019) agree. The Keskin study (2018) and the Mahmud et al (2020) study, which claim that most teachers still care about exams to gauge how much their students have learned or what they know, also support this. Abdul Halim et al (2020) say that assessment is also used to group students by level, while formative assessment is general or all-encompassing and does not group students by their level of understanding.

***Affective Aspects***

In this way, the study refers to the study of the teacher's non-conformity in teaching by topic, recording assessment, time management, skills, and the ability to evaluate, assess, and improve, as well as self-efficacy and familiarization with working conditions, classes, and students. As a result, there are three articles, and most of the studies focus on teachers' skills and abilities when it comes to assessing students in classrooms, considering working conditions, classes, and students. Where it is found that there are several factors, such as working conditions in remote areas that make it hard to get educational resources (Van der Nest et al., 2018), teachers "burning out" because they have a lot of work with a lot of classes and students (Akiri et al., 2021), and supported by Fara and Siti (2021), where teachers need to repeat what has been assessed if some students do not go to school.

In the constraints on time found in two studies, it is stated that teachers are running out of time because it takes a long time to check the assessments that have been done and find solutions to the problems faced by pupils (Govender, 2019; Martone et al., 2018).

According to Keskin et al (2018), two studies looked at teachers' skills and abilities in correctly assessing and recording assessments. Teachers are not ready to prepare for all topics with different skills, subjects, and student levels because they do not have the skills and abilities to do formative assessments in the classroom well (Govender, 2020). In fact, two studies on the creation of formative assessment records (Van den Heuvel et al., 2021) found that teachers only made assessment reports when asked to do so by the school administration. They reported on how to evaluate what they teach, but not on whether the students understood it (Govender, 2019).

So, teachers should always make sure they have self-efficacy (there are three studies on this) and are sensitive to changes in the education system by taking courses (Dayal and Cowie, 2021). Also, keep learning new things in any field to improve the skills that will help with data management (assessment and recording), planning, and implementation in

assessment (Cunningham, 2021), as well as making it easier for teachers to do their daily jobs (Putriarum et al., 2020).

***Study Question 3 - What contextual factors impact the mathematics teacher's implementation of formative assessment in the classroom?***

**Contextual Factors**

Contextual variables are the constraints that arise in small components of school management, such as the timetable, management tasks, working conditions, management support (courses, ABM provision, educational resources, financing), school policy, cultural norms, and students. There were 19 studies that investigated all of these topics.

In this regard, the school should begin by conducting assessment activities related to all the above components while ensuring that the teacher is not burdened with a compact and varied timetable (Akiri et al., 2021), that management tasks are assigned in a balanced manner, and that the school infrastructure is comfortable for both teachers and students. A topic description should be based on the instructor's expertise or given to a teacher who is capable of teaching mathematics (Mahmud et al., 2020).

The school administration should ensure adequate educational resources and widespread dissemination of information regarding the most recent education policy (Fara and Siti, 2021) among school personnel. According to T3 studies, teachers are unable to conduct effective formative assessments due to a lack of educational resources (Govender, 2019). Van den Heuvel et al (2021) reported in their study that teachers lack confidence in implementing formative assessments and do not have the skills to record formative assessments in the classroom (Keskin et al., 2018). This is because teachers still lack exposure to how to implement formative assessments in the classroom (Govender, 2020).

In addition, according to Dayal (2021), the school administration lacks clear guidelines for the implementation of classroom assessments. This is demonstrated by the fact that, according to Van den Heuvel et al (2021), teachers who were inconsistent in recording assessments noted that they had the option of recording assessments after class or only when requested. This indicates that the school lacks or does not implement consistent monitoring and the standard practice of having teachers who are comfortable teaching in accordance with traditional culture (Akiri et al., 2021) and school cultural norms (Cunningham, 2021). Even though some teachers are willing and knowledgeable about the implementation of formative assessments, they do not practice it (Ahmedi, 2019).

As there are teachers who do not comply with the curriculum policy, continuous monitoring from the school administration is necessary to ensure that formative assessments are implemented correctly and effectively to improve the performance of students in math learning (Ahmedi, 2019; Money and Cai, 2018).

There are four studies related to focusing on summative assessment as a true measurement of student performance and used as a guide to school excellence programme planning in stating the school policy. As a measure of a school's performance, test scores increase the school's emphasis on the test performance of its students (Govender, 2019). This actor focuses on contextual factors that have a significant effect on a teacher's desire to implement formative assessment. In schools, there is a need for internal school support to provide teachers with guidance or motivation to improve their skills, self-knowledge as an example to encourage or recommend professional training, and additional resources that can be shared. Encouragement from school leaders and peers will motivate teachers to change and develop themselves not only during school hours but also outside of school and during

school breaks. Dasar education also plays a role in ensuring that all implemented programs or reforms are not only disseminated or shared but also fully understood, experienced, and practiced in schools. The objective is to ensure a positive return on investment in the students' development, particularly in education; consequently, all teachers will adopt a new culture. As there are teachers who do not comply with the curriculum policy, management is necessary to ensure that formative assessments are implemented correctly and effectively to improve the performance of students in math learning (Ahmedi, 2019; Money and Cai, 2018).

### **Discussions**

The goal of this study is to find out what makes a teacher decide to use formative assessment and how they do it. So, in the next section, we will talk about the features of the included study. Then, we will talk about the key findings, which are the things that affect how the teacher plans to use formative assessment and how they do it.

### **Features of studies that explore factors that influence the intention and implementation of the teacher on formative assessment**

The included studies ( $n = 23$ ) were conducted in a variety of educational settings and countries, with the majority originating from Asia. Qualitative ( $n = 9$ ), quantitative ( $n = 10$ ), and mixed ( $n = 4$ ) methods are used, but qualitative approaches remain the most prevalent. Cross-sectional research designs predominate among quantitative studies. Among them is the experimental design or longitude in this field to disentangle the relationship between the factors of the initial prediction of the teacher's intent or action, which is a correlation rather than a causal one. These results are not surprising given the complexity of educational settings, which makes it difficult for researchers to employ experimental designs, particularly random designs (van der Kleij and Lipnevich, 2020). Any research question in the field of education can be answered using both qualitative and quantitative techniques. Nonetheless, it is conceivable that the existing empirical evidence would become extremely limited from a methodological standpoint in the event of an excessive use of methods. It is suggested that future research, if quantitative methods are used in studies, employ experimental design and null longitude design to diversify the study, obtain additional findings, and increase the distribution of studies.

### **Factors influencing the teacher's intentions and implementation of the formative assessment**

Figure 2 is a summary of the personal and contextual factors that affect formative evaluation. The principal personal factors that influence a teacher's decision to conduct formative assessment are knowledge (cognitive), behavior, and task performance proficiency. Common contextual factors include the distribution of timetables, the distribution of management tasks, working conditions and atmosphere, school administration support, school, or external policies (ministries), cultural norms (local environment), and students. For implementation, the most common personal factors are education and training, instrumental attitudes, and teaching beliefs, while the most common contextual factors are the school environment, internal school support, and working conditions.

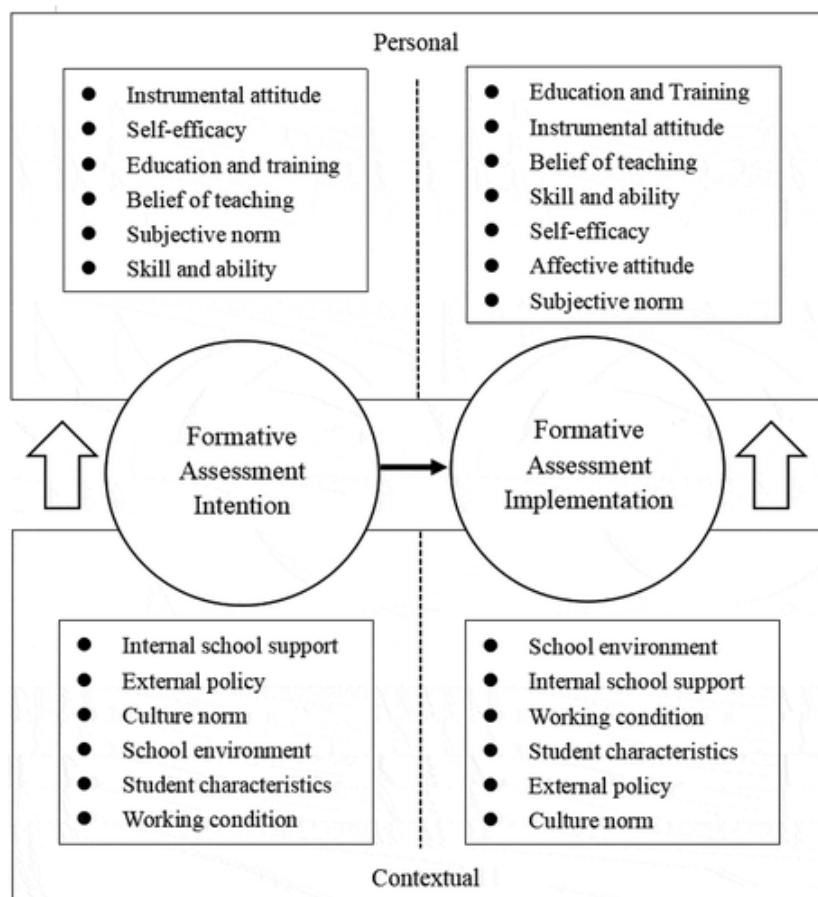


Figure 2. Integration of factors affecting the formative assessment

Notes: Factors are shown based on how often they are mentioned in the goals and actions of each group.

Yan and Cheng (2015) reported that personal practices that are part of daily work, such as attitudes, subjective norms, and self-efficacy, also influence the teacher's intent to implement and practice real formative assessments. McKay (2006) argues that contextual factors must be considered to comprehend the implementation of formative assessment by teachers. Contextual factors influence not only a teacher's implementation but also their intentions regarding formative assessment, as demonstrated by this study. In Fulmer et al (2015)'s description of the internal support of the school and the school environment as two of the three most influential factors for the intent and implementation of formative assessments by teachers in the classroom, the factor influenced by the school itself is one of the different contextual factors influencing the desire and implementation of the teacher in formative assessment.

Interactions within and between personal and contextual factors suggest that the teacher's intentions and implementation of formative assessments should be understood through an integrated approach that considers both personal and contextual factors, rather than as two distinct segments. In line with Brink and Bartz's (2017) assertion that teachers need time and professional support to become proficient in conducting formative assessments, education and training appear to be fundamental factors. It is believed to have altered the teacher's perception of formative assessment, despite being one of the most frequently reported personal factors for both intent and implementation (Govender, 2019).

For example, education and training can help teachers have a more helpful attitude and feel like they can do their jobs well, which will encourage them to use formative assessments. It can also help teachers get better at doing formative assessments (Brink and Bartz, 2017). Education and training also have something to do with the environment, since professional development is an important part of school-based support (Money and Cai, 2018). Several personal factors and contexts overlap naturally. For instance, cultural norms and subjective norms are closely related. Cultural norms frequently manifest themselves as social pressure through the subjective norms of powerful teachers (such as the views of parents and school administrators). It is also noted that contextual factors (e.g., school environment and internal school support) influence the teacher's intentions in relation to formative assessments through changes in personal factors such as attitudes, skills, and self-efficacy (Cunningham, 2021).

In formative assessment, the relationship between intent and implementation has received additional attention. According to Dayal (2020), the trust and practice of teacher evaluation in the service have revealed that teachers do not value the assessments found to promote further student learning, despite the numerous studies that have examined the intentions and implementation of teachers in formative assessments. Dayal (2020) also described the test results as requiring teachers to conduct performance-oriented assessments as opposed to learning-oriented assessments. Concerning the reasons for the gaps in behavior associated with formative assessment, Ahmedi (2019) explains that precompression with personal behavior is partially determined by one's intentions and work behavior and is more susceptible to contextual variables. It is possible that contextual barriers impede the implementation of formative assessments by teachers, despite their intentions.

The question is whether these results indicate that a teacher's intention to conduct formative assessment is unimportant. The correct response is not "yes." Even without personal motivation, a teacher may be able to conduct formative evaluations due to external needs or incentives. However, the tension between personal intentions and external factors may result in inadequate quality formative assessment implementation (Keskin et al., 2018), and a formative assessment will only be implemented if the teacher is willing to do so alone.

Studies that looked at how often secondary school teachers and primary school teachers did formative assessments found that primary school teachers did them less often. Foreign policy is likely to have an impact on this (Yan, 2018; Black and William, 1998). This trend might not be happening because students and teachers have less pressure from internal or external assessments than secondary school teachers. In high school, tests may be given more often and be more important than formative tests, which should be done openly and thoroughly (Yan, 2018; Black and William, 1998), which are done in the preliminary stages of learning. Since students do not have to do a general assessment (UPSR), it seems like external assessment policy does not put too many restrictions on elementary school teachers.

### **Practical Implications**

The findings of this study have implications for teacher education and training practices. First, studies show that the factors most frequently reported as influencing the teacher's intentions and execution are the same for personal and contextual factors. Education and training may be an important point to promote formative assessment among teachers because it is a factor that has a strong impact on the intentions and implementation of the teacher; it also affects other personal factors, such as instrumental attitudes, self-efficacy, and skills and capabilities. The findings also urge the integration of formative assessments into the education curriculum



of pre-service teachers and in-service professional development programs (Desimone et al., 2002).

Second, these results show how important the school is as a setting that affects how the formative assessment is used. For example, internal school support and the school environment are two examples. Formative assessment is not an easy job for teachers (Black and Williams, 1998). Practical barriers may hinder the implementation of a teacher's formative assessment even if the teacher has a positive concept of formative assessment (Ahmedi, 2019). Therefore, a favorable school environment, supportive school-based policies, and adequate school support measures are necessary for teachers to be prepared and truly conduct formative assessments.

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