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A systematic review on factors influencing teachers' intentions and implementations regarding formative assessment

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ABSTRACT

Teachers are playing crucial roles in the implementation of formative assessment, which has been widely recognised as a valuable strategy in enhancing students' learning outcomes. However, systematic analysis on factors that might facilitate or hinder teachers' intentions and implementations regarding formative assessment is scarce. This review covers 52 eligible studies and identifies factors, which have been categorised into personal and contextual factors, that influence teachers' intentions and implementations regarding formative assessment. The results of this review may benefit researchers, school leaders, and policy makers when they aspire to facilitate the implementation of formative assessment.

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assessment for learning;
teacher; intention;
implementation

Introduction

Teachers are playing crucial roles in the design and implementation of formative assessment which has been widely recognised as a positive facilitator of student learning (Black & Wiliam, 1998). The success of formative assessment depends on how teachers perceive and implement formative assessment activities in classrooms. However, systematic analysis on factors that might facilitate or hinder teachers' intentions and implementations regarding formative assessment is scarce. The current review aims to fill this gap and contributes to the understanding of the elements that need to be considered to support the implementation of formative assessment in classrooms. A clear understanding of the facilitators and impediments of formative assessment from teachers' perspective would help researchers, school administrators, and policy makers in formulating supporting measures for teachers' formative assessment practice. In this way, teachers are more likely to effectively play their vital role in implementing formative assessment.

Formative assessment

In contrast to summative assessment that mainly focuses on gathering and reporting students' learning achievement at the end of a learning period, formative assessment

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emphasises continuous monitoring and collecting evidence of student progressions during the learning process. There are diversified definitions of formative assessment in the literature (Bennett, 2011; Brookhart, 2007). Black and Wiliam (1998) defined formative assessment as a practice, undertaken by teachers and/or their students, which elicits evidence of student achievement and can be used to make decisions about future teaching or learning plans. The current study adopted this definition and emphasised that formative assessment involves collecting evidence about student learning through various activities and using that evidence to adapt future teaching and learning (Black & Wiliam, 2009; Popham, 2008).

Formative assessment enables teachers to monitor students' progress and activates students to self-regulate their learning (Black & Wiliam, 1998). It has been recognised as a beneficial strategy to promote students' learning and achievement in different circumstances. For example, Gikandi et al.'s (2011) review study suggested that formative assessment can enhance the active cognitive engagement of students and facilitate their understanding of learning contents. Li (2016) found that formative assessment had a positive relation with students' PISA reading achievement, mediated by teacher–student relationship and attitude towards reading. Furthermore, formative assessment can also help to reduce the achievement gaps among students. As Black and Wiliam (1998) mentioned, 'improved formative assessment helps low achievers more than other students and so reduces the range of achievement while raising achievement overall' (p. 141). The benefits of formative assessment manifested in research studies have made it an important agenda in educational reform all round the world (Birenbaum et al., 2015) although the effects vary widely among different implementations and student populations (Bennett, 2011).

Factors influencing teachers' intentions and implementations regarding formative assessment

Although the benefits of formative assessment on teaching and learning are well documented (Black & Wiliam, 1998; Wiliam, 2010), it is not an easy task for teachers to implement. Research found that the actual adoption of formative assessment in classrooms is far less than satisfactory (Berry, 2010; ; Yan & Brown, 2021). These challenging factors associated with formative assessment reported in literature could be generally classified into two groups: personal and contextual factors. The success of implementing formative assessment in classrooms depends on personal factors related to teachers' beliefs, attitudes, knowledge, and skills (Yan, 2014; Black & Wiliam, 1998; Heitink et al., 2016) because teaching is an activity where teachers enact their conceptions about teaching and learning (Harrison, 2013; Yan, 2018). For example, teachers' positive perceptions of the usefulness of formative assessment are positively related to teachers' intentions to implement formative assessment (*Karaman & Sahin, 2017; *So & Lee, 2011; *Yan & Cheng, 2015). Similarly, teachers with higher self-efficacy are more likely to carry out formative assessment (*Yan & Cheng, 2015), while a lack of confidence will result in less implementation of formative assessment (*Crichton & McDaid, 2016). In addition, teachers also need to have the required knowledge and skills before they can design and implement formative assessment in classrooms (*Rashid & Jaidin, 2014; Heitink et al., 2016). The knowledge and skills here refer to the understanding of formative assessment itself (Black & Wiliam, 1998) as well as the competence of blending formative assessment principles, subject

content knowledge, and pedagogical content knowledge (Black et al., 2001, April; Gipps & Brown, 1999). Professional training and development are, therefore, particularly important for both in-service and pre-service teachers (*DeLuca et al., 2019; *Hamodi et al., 2017). Professional training can facilitate the implementation of formative assessment by not only improving teachers' knowledge and skills related to formative assessment (*Dixon & Haigh, 2009; *Hondrich et al., 2016; *Koloji-Keaikitse, 2016), but also their pedagogical content knowledge (Jones & Moreland, 2005).

Besides personal factors, contextual factors also influence teachers' implementations of formative assessment (Birenbaum et al., 2015). Teachers' practices including formative assessment occur in a complex environment. The contextual factors at the micro-level, such as the complexity in the class climate, unpredictable responses of students (Cowie & Harrison, 2016), and the factors at the macro-level, such as social pressure, government educational policies, and internal school policies, may facilitate or hinder teacher autonomy in assessment practices (Yan & Brown, 2021), especially in an era of summative accountability testing (Yin & Buck, 2019). Thus, it is crucial to support teachers psychologically and practically so that they can effectively play their vital role in implementing formative assessment.

To provide a clear picture synthesising all these factors, it is desirable to have an appropriate conceptual model. The theory of planned behaviour (TPB) (Ajzen, 1985, 1991) provides a good starting point, especially when both intention and implementation regarding formative assessment are under investigation. In the framework of TPB, three predictors, i.e., attitude towards behaviour, subjective norm, and perceived behavioural control, determine the formulation of intention. Intention, together with perceived behavioural control, impact the actual behaviour. However, the original TPB framework has limitations. Firstly, this framework encompasses only personal (or internal) factors affecting intention and behaviour. As discussed earlier, contextual factors are important for teachers' assessment practices. Moreover, *Yan & Cheng, (2015) study found the three predictors – including attitude, opinions of important stakeholders, and self-efficacy – can adequately explain the formation of teachers' intentions to adopt formative assessment (51% of the variance was accounted for), but not teachers' actual formative assessment practices (only 6% of the variance was accounted for). Secondly, the original framework covers only three personal factors, i.e., attitude, subjective norm, and perceived behavioural control, but ignores other personal factors, such as knowledge and skills, which might also influence teachers' intentions and implementations regarding formative assessment. Thus, the current review used the TPB as the basis for categorising influencing factors but, at the same time, extended the framework to include other personal and contextual factors identified from reviewed studies.

Extant review studies on teachers' implementation of formative assessment

Despite the significant role teachers are playing in formative assessment, systematic analysis on factors that might facilitate or hinder their intentions and implementations regarding formative assessment is limited. This is a crucial research gap because only when the facilitators and impediments of formative assessment are identified, can its potential benefits be enacted and maximised.

There are few exceptions. Heitink et al. (2016) conducted a systematic review on prerequisites for the successful implementation of assessment for learning in classrooms. In their study, assessment for learning was regarded as one of the approaches to formative assessment integrated into classroom practices. They particularly emphasised that students play a vital role in assessment for learning. The authors identified prerequisites from four aspects: the teacher, student, assessment and context. As for the teacher, the two prerequisites were a) teacher knowledge and skills, and b) teacher beliefs and attitudes. Knowledge and skills are those necessary for teachers to effectively collect, analyse and interpret assessment data and adjust subsequent instruction. Beliefs and attitudes refer to the philosophy underlying their teaching practice, and a constructivist view regarding learning and pedagogy. However, Heitink et al.'s review covered a variety of aspects at a price that the number of prerequisites within each aspect was limited. For instance, only two prerequisites were related to the teacher aspect. The context aspect was confined to the factors internal to the school without considering factors external to the school. More importantly, their review focused on factors influencing the quality of implementation of assessment for learning, rather than factors determining whether or not teachers will intend to and/or actually implement assessment for learning. Answers to the latter question are likely to be a prerequisite for addressing the former question.

Fulmer et al. (2015) pointed out a lack of understanding of the complex relationships among teachers' views, knowledge and their assessment practices. Their review paper focused on the contextual factors that may affect teachers' understanding and adoption of assessment practices using Kozma's (2003) three-level (i.e., micro, meso, and macro) framework. Micro-level refers to the immediate classroom context, such as the characteristics of teachers and students; meso-level encompasses factors external to the classroom but with immediate influence upon it, such as the school and surrounding community; and macro-level involves distal factors that have indirect impact, via meso-level, on classrooms, such as national and cultural influences. Apparently, Fulmer et al.'s (2015) review focused on contextual factors that impact on assessment practices in general, but not on formative assessment in particular.

Iczi (2016) summarised factors influencing teachers' likelihood of adopting formative assessment and identified four categories including personal, contextual, resource-related and external factors. However, Iczi's (2016) article was a narrative summary, rather than a systematic review given that very limited information about the methodology (e.g., the key terms and searching strategy for searching articles, the inclusion criteria, and the number of studies included) was provided. Therefore, the audiences may have no clear ideas about the scope and coverage of the review.

More importantly, all the three review studies linked influencing factors directly to teachers' (formative) assessment practices without considering any mediating factors, such as intention to implement (formative) assessment. According to the TPB (Ajzen, 1985, 1991), individuals' personal beliefs do not directly predict actual behaviour, but via the behavioural intention as a mediator. Therefore, taking teachers' intentions to implement formative assessment into account would be meaningful to draw a comprehensive picture about teachers' implementation of formative assessment. Furthermore, differentiating factors that influence teachers' intentions and/or implementations regarding formative assessment would provide details that are crucial for designing supporting measures for teachers' formative assessment practices.

Thus, the gap in the literature is that there is a lack of a comprehensive and detailed understanding about factors that determine whether or not teachers intend to and actually implement formative assessment. The present review study aims to fill this gap by identifying factors underlying teachers' intentions and implementations regarding formative assessment from available studies. The specific research questions were:

RQ1 - What are the characteristics of the studies exploring teachers' intentions and implementations regarding formative assessment?

RQ2 - What factors can influence teachers' intentions to implement formative assessment?

RQ3 - What factors can influence teachers' implementation of formative assessment?

Methods

This review followed Petticrew and Roberts' (2006) guide of systematic review in the social sciences. The method has multiple steps including developing research questions, identifying search strategy, conducting the literature search, formulating inclusion criterion, evaluating study quality, and extracting data from the included articles.

Search strategy

We used synonym terms of *formative assessment* to reach a wider range of studies. After checking preliminary hits, five key terms including *Formative assessment*, *Assessment for learning*, *Formative evaluation*, *Formative review* and *Learning-oriented assessment* were chosen. These five key terms were combined with *Teacher intention* or *Teacher implementation/practice* during the search. It should be noted, although it is reasonable to categorise students' self-assessment and peer-assessment under formative assessment (Black & Wiliam, 2009), some studies that did not explore teachers' roles were excluded as they did not provide relevant information regarding the objectives of this review. Furthermore, studies that used self-assessment or peer assessment for non-formative purposes (e.g., Nieminen, 2020), are beyond the scope of the current review.

We consulted library professionals before the literature search to ensure our strategies were feasible and effective. The search was run in October 2019. Key terms were searched within ERIC and PsycINFO databases by title and abstract. When built-in filters were available, the search only included peer-reviewed journal articles written in English in the fields of education, psychology, and social sciences. At the same time, the reference lists of the available review papers on similar topics (e.g., Fulmer et al., 2015; Heitink et al., 2016; Iczl, 2016) were screened for potentially relevant articles using the snowball method (White, 1994). After removing duplicates, all articles were screened by reading titles and abstracts to check if the studies were related to the research questions. When unclear, full texts were read.

Two rounds of quality checking for the screening process were conducted. Two researchers screened 25 randomly selected articles and compared their inclusion decisions. The first round of screening resulted in 88% agreement on the selected articles. The researchers checked the disagreements and discussed any misunderstanding on the inclusion criteria. After that, the second round of screening on another set of randomly selected 25 articles reached 95% agreement on the screening results. Then, the real

screening of all initial search results began. Irrelevant studies were excluded, and a list of included articles was formed.

Inclusion criteria

During the literature screening process, studies were included if they met all of the following inclusion criteria. We evaluated study quality by using peer review as an inclusion criterion.

1. The study explored teachers' roles in formative assessment;
2. The major focus of the study was on factors that influence teachers' intentions or implementations regarding formative assessment;
3. The study presented empirical results (not theoretical or review papers);
4. The study was published as peer-reviewed journal articles; and
5. The study was written in English language.

Data extraction

The initial search resulted in 1,779 publications. In addition, 7 articles were identified through checking the reference list of available reviews and 5 more articles recommended by experts were included. After removing duplicates, the number of publications was reduced to 1,351. After applying the inclusion criteria to screen information from the title and abstract of the publications, 62 studies were left for data extraction. Key terms used in our searching were intentionally broad with an aim to find as many related articles as possible. However, many of the found articles were not related to our research aim or questions. For instance, 'Teacher intention' is extremely difficult to find accurately in the related articles. Some articles include both 'teacher' and 'intention' but they did not mention about teacher intention. After the data extraction process, 10 studies were found to be irrelevant or unsuitable for the current study's aim. Finally, 52 qualified studies were retained and analysed for our review. [Figure 1](#) shows the process of the literature search, screening, and inclusion.

After the selection, all the included studies were read thoroughly and recorded using a data extraction form. The data extraction form was constructed by the authors and included the following sections: study title, author name, year of publication, aim of study, research questions, hypothesis, sample information, country or region, key terminology, use of formative assessment aids or technology, task for formative assessment, subject, research design, type of research, data collection procedure, results, conclusions, factors identified, and remarks. This data extraction form helped to organise the key information of each study relevant to the current review and enabled the researchers to relate back to each selected study when writing a detailed review. The categories of influencing factors were constructed during the ongoing extraction process in an iterative fashion. On the one hand, the categorisation was informed by the research objectives, available references, and the TPB theory (Ajzen, 1985, 1991), as discussed earlier. The initial list included factors specified in the TPB framework and those identified in available review studies on similar topics. On the other hand, the category system evolved with a data-driven approach. It was open for new factors that emerged from the reviewed studies but not included in the original list.

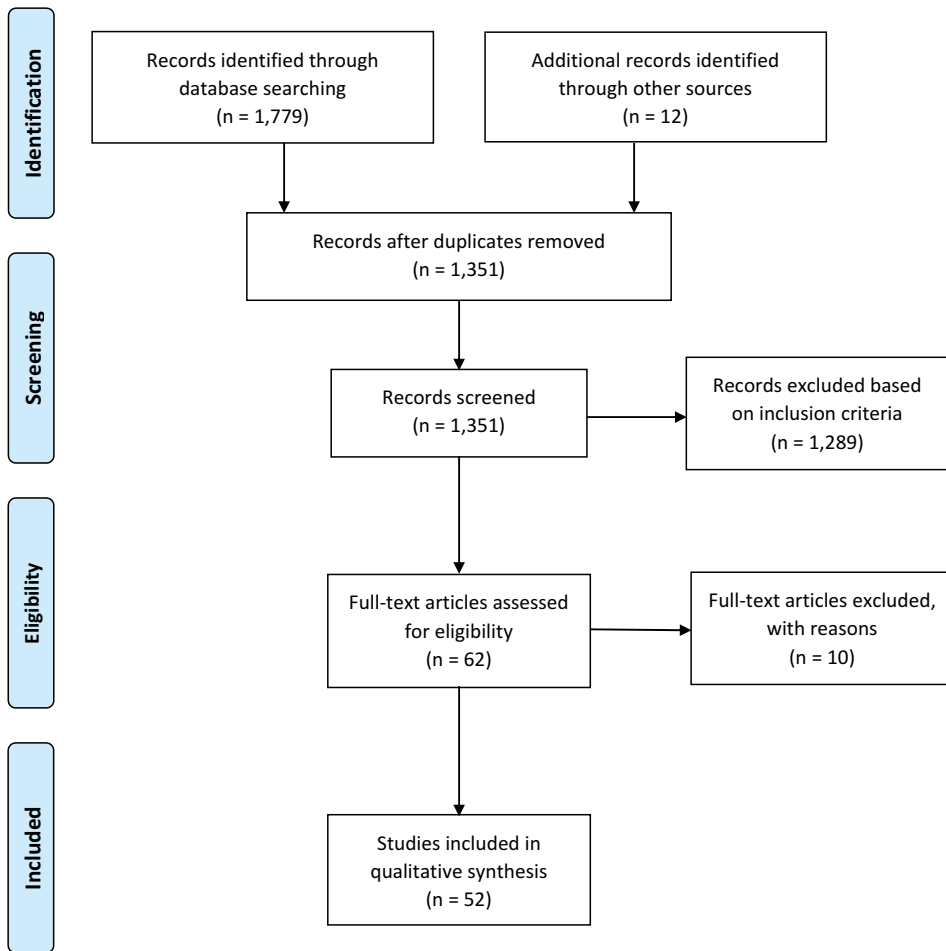


Figure 1. The process of literature search and selection.

Results

In this section, we firstly describe the characteristics of the included publications (RQ1), and then explore the factors influencing teachers' intentions to carry out formative assessment (RQ2) and the factors that determine teachers' implementations of formative assessment (RQ3) respectively.

RQ1 – What are the characteristics of the studies exploring teachers' intentions and implementations regarding formative assessment?

In terms of the total number, the studies are reasonably balanced in the exploration with 26 studies for factors related to teacher intention, 47 studies for factors related to teacher implementation, and 21 studies explored both. Regarding the research design, qualitative approach appears the most frequently. There are 27 qualitative studies, 10 quantitative studies, and 15 studies using mixed-method design. Most quantitative or mixed-method

studies applied a cross-sectional design with only two exceptions that used a quasi-experimental field trial approach (*Hondrich et al., 2016; *Schütze et al., 2017). The three most usual data collection methods are interview ($N = 37$), questionnaire ($N = 26$), and classroom observation ($N = 23$). Studies were conducted in varied countries and the top three areas were Europe, North America, and Asia. All studies were conducted in a single country with only one exception, i.e., *Nikou and Economides (2019) study that covered 32 European countries, indicating that the interpretation of research findings requires considerations of the contextual factors. Most of the study samples were from primary or secondary/high schools ($N = 47$) and the sample sizes reported in the studies ranged from 1 to 1,395 teachers. The sample sizes had huge differences among the studies largely because of the different research designs. Speaking of the teaching subjects of teachers, besides language, maths, and science, there were also physical education, music, liberal studies and physics teachers. The basic information of all the included studies can be found in Table 1.

The specifics of factors identified were analysed and then classified into two categories, i.e., personal and contextual factors (see Table 2). Personal factors refer to individual traits and characteristics, which vary from person to person, that can shape teachers' intentions or implementations regarding formative assessment. This category includes education and training, instrumental attitude, affective attitude, self-efficacy (i.e., perceived control; the term 'self-efficacy' was more frequently used), subjective norm, belief of teaching, and skill and ability. Contextual factors refer to those elements reflecting characteristics unique to a particular classroom, school, community, and society. The contextual factors surround teachers and have an impact on teachers' intentions or implementations regarding formative assessment. This category includes internal school support, external policy, school environment, cultural norm, student characteristics, and working condition. The findings regarding each category of factors are presented in the following sections.

RQ2 – Factors influencing teachers' intentions to implement formative assessment

Personal factors

Twenty-five studies identified personal factors that influenced teachers' intentions to conduct formative assessment. The most frequently reported factors were found to be *instrumental attitude*, *self-efficacy*, and *education and training*.

Eighteen studies reported the important influence of teachers' *instrumental attitude* towards formative assessment (see Tables 1 and Tables 2). Although not explicitly defined by all of the studies, the instrumental attitude towards formative assessment generally refers to teacher's perceptions about the effectiveness or consequences of performing formative assessment in influencing learning and/or teaching (*Karaman & Sahin, 2017; *Yan & Cheng, 2015). Under the framework of the TPB, instrumental attitude demonstrated significant effects on teachers' intentions to implement formative assessment. Similarly, a number of other studies echoed that the more positive attitude teachers held regarding the desirable consequences of practicing formative assessment, the more willingly they were to implement formative assessment (*Dixon & Haigh, 2009; *Sezen-Barrie & Kelly, 2017; *So & Lee, 2011; *Wong, 2014). In particular, teachers valued the merits of formative assessment as a useful tool to identify students' learning



Table 1. Basic information of included articles by author alphabetic order.

No.	Author and publication year	Country/region	Context			Research Design	Sample size	Data collection method	Intention ¹	Implementation ¹
			Education sector	Subject	Subject					
1	*Ahmedi, 2019	Kosovo	Primary	n/a		Quantitative	47 teachers	Questionnaire		P
2	*Ahmedi, 2019	Saudi Arabia	Primary	Science related		Mixed-method	210 teachers	Questionnaire, interview		PC
3	*Andersson & Palm, 2017	Sweden	Primary	Maths		Qualitative	22 teachers	Classroom observation, interview		P
4	*Aschbacher & Alonzo, 2006	US	Primary	Science		Mixed-method	25 teachers	Interview, exam, observation, document analysis		PC
5	Birenbaum et al., 2011	Israel	Primary, Secondary, High School	Maths, Humanities		Mixed-method	122 teachers	Questionnaire, semi-structured interview, artefacts and documents.		C
6	*Birenbaum et al., 2009	Israel	Secondary	Hebrew Literacy, English, Science		Qualitative	14 schools	Ethnographic interview, audio recordings of meetings		PC
7	*Black & Jones, 2006	England	Secondary	English, Maths, Science		Mixed-method	40 teachers	Questionnaire, interview	P	C
8	*Box et al., 2015	US	High school	Science		Qualitative	3 teachers	Classroom observation, interview		PC
9	*Brink & Bartz, 2017	US	High school	Maths, Physical Education, Foreign Language		Mixed-method	3 teachers	Questionnaire, interview, classroom observation	PC	PC
10	*Brown & Gao, 2015	China	Primary, Secondary	English, Science, and others		Mixed-method	17–1395 teachers	Questionnaire, interview	PC	PC
11	*Brown et al., 2009	Hong Kong	Primary, Secondary	Chinese, Maths, English		Quantitative	288 teachers	Questionnaire		PC

Table 1. (Continued).

No.	Author and publication year	Context				Research Design	Sample size	Data collection method	Intention ¹	Implementation ¹
		Country/region	Education sector	Subject	Education sector					
12	*Chroinin & Cosgrave, 2013	Ireland	Primary	Physical Education	Primary	5 teachers	Focus group interview		PC	
13	*Crichton & McDavid, 2016	Scotland	Secondary	English	Secondary	20 teachers	Interview	P	P	
14	*DeLuca et al., 2019	Canada	Secondary	Maths, Social Studies	Secondary	88 teachers	Interview, open-ended questionnaire, observation, artefacts.	PC	PC	
15	*Deneen et al., 2019	Singapore	Secondary	n/a	Secondary	913 teachers	Questionnaire	PC	C	
16	*Dixon & Haigh, 2009	New Zealand	Secondary	Maths	Secondary	4 teachers	Interview, questionnaire	P	P	
17	*Feldman & Capobianco, 2008	US	High School	Physics	High School	8 teachers	Observation, focus group interview, questionnaire		PC	
18	*Grob et al., 2017	Switzerland	High School	Science related	High School	11 teachers	Questionnaire, interview		PC	
19	*Haigh & Dixon, 2007	New Zealand	Secondary	Maths, English	Secondary	4 teachers	Meeting video, filed notes, interview	P	P	
20	*Hamodi et al., 2017	Spain	Higher Education	Primary Education, Music, Physical Education, Early Education	Higher Education	46 pre-service teachers	Questionnaire, discussion group	P	PC	
21	*Havnes et al., 2012	Norway	High School	English, Norwegian, Maths	High School	192 teachers	Questionnaire, focus group interview		C	
22	*Hondrich et al., 2016	Germany	Primary	Science	Primary	28 teachers	Classroom observation, student workbooks		PC	
23	*Hui et al., 2017	Hong Kong	Primary	Chinese, Maths, English	Primary	4 teachers	Interview	P	PC	



Table 1. (Continued).

No.	Author and publication year	Context			Research Design	Sample size	Data collection method	Intention ¹	Implementatio- n ¹
		Country/region	Education sector	Subject					
24	*Karaman & Sahin, 2017	Turkey	Primary	n/a	Quantitative	400 teachers	Questionnaire	P	P
25	*Karim, 2015	Iraq	Higher Education	ESL	Mixed-method	25 teachers	Open-ended questionnaire	P	
26	*Kim, 2019	US	Middle School	Maths	Qualitative	2 teachers	Classroom observation, interview		PC
27	*Koloji-Keaitse, 2016	Botswana	Primary, Junior and senior Secondary	n/a	Quantitative	691 teachers	Questionnaire		P
28	*Lee & Coniam, 2013	Hong Kong	Secondary	EFL	Mixed-method	2 teachers	Questionnaire, interview, classroom observation		PC
29	*Lee et al., 2012	US	Secondary	Science, Maths	Qualitative	38 teachers	Classroom observation (video-recordings), interview		PC
30	*Lock & Munby, 2000	Canada	Elementary School	Generalist	Qualitative	1 teacher	Classroom observation, interview, informal discussion		PC
31	*Lorente-Catalán & Kirk, 2016	England	Higher Education	Physical Education	Qualitative	22 pre-service teachers	Document analysis, observation, interview	PC	
32	*Lyon et al., 2019	US	High School	Maths, English	Qualitative	6 teachers	Classroom observation, interview		P
33	*MacDonald, 2007	Canada	Kindergarten	Literacy	Qualitative	3 teachers	Classroom observation, interview		P
34	*Marshall & Drummond, 2006	US	Secondary	English, History, Science	Mixed-method	6 teachers	Questionnaire, interview	P	P

Table 1. (Continued).

No.	Author and publication year	Context			Research Design	Sample size	Data collection method	Intention ¹	Implementation ¹
		Country/region	Education sector	Subject					
35	*Moss et al., 2013	US	Secondary	n/a	Qualitative	24 administrators	Classroom observation, questionnaire, meeting notes	PC	PC
36	*Nikou & Economides, 2019	32 European countries	Primary, Secondary	STEM	Quantitative	161 teachers	Questionnaire	PC	
37	*Rashid & Jaidin, 2014	Brunei	Primary	Core Subjects	Qualitative	15 teachers	Interview	PC	
38	*Ratnam-Lim & Tan, 2015	Singapore	Primary, Secondary	Maths and others	Quantitative	30 teachers and 13 parents	Questionnaire	C	C
39	*Sach, 2015	UK	Lower and Secondary School	n/a	Qualitative	3 teachers	Interview		C
40	*Saito & Inoi, 2017	Japan	Junior and Senior High School	EFL	Mixed-method	727 teachers	Questionnaire, interview	P	P
41	*Sathasivam & Daniel, 2016	Malaysia	Primary	Science	Qualitative	2 teachers	Classroom observation, interview		P
42	*Schütze et al., 2017	Germany	Secondary	Maths	Quantitative	67 teachers	Questionnaire		P
43	*Sezen-Barrie & Kelly, 2017	US	Secondary	Science	Qualitative	4 teachers	Classroom observation, interview	P	P
44	*Shirley & Irving, 2015	US	Middle and High School	Science	Qualitative	4 teachers	Interview		P
45	*So & Lee, 2011	Hong Kong	Secondary	Liberal Studies	Qualitative	36 teachers	Classroom observation, interview	P	P
46	*Tang et al., 2006	Hong Kong	Pre-primary, Primary, Secondary	Maths, Science	Qualitative	21 teachers	Interview, classroom observation, field notes	P	
47	*Tebeje & Abiyu, 2015	Ethiopia	Higher Education	Agriculture	Mixed-method	21 lecturers and 105 students	Questionnaire, observation, groups discussion notes		PC

Table 1. (Continued).

No.	Author and publication year	Country/region	Context				Research Design	Sample size	Data collection method	Intention ¹	Implementation ¹
			Education sector	Subject	Subject	Subject					
48	*Wallace & Priestley, 2011	Scotland	Secondary	Social Science, Maths, Language	Social Science, Maths, Language	Qualitative	5 teachers	Classroom observation, interview	PC	PC	
49	*Webb & Jones, 2009	UK	Primary	English, Maths	English, Maths	Qualitative	6 teachers and their classes	Classroom observation, interview		C	
50	*Wong, 2007	Hong Kong	Primary	Music	Music	Qualitative	3 teachers	Classroom observation, interview	P	PC	
51	*Wong, 2014	Hong Kong	Secondary	Music	Music	Quantitative	97 teachers	Questionnaire	P	P	
52	*Yan & Cheng, 2015	Hong Kong	Primary	n/a	n/a	Quantitative	450 teachers	Questionnaire	P	P	

Note. ¹Personal factor (P); Contextual factor (C)

Table 2. Number of included articles for each category.

Category	Studies	N	
<i>Teacher Intention</i>			
Personal	Instrumental attitude	7,9,10,13,15,16,23,24,25,31,36,37,40,43,45,50,51,52	18
	Self-efficacy	10,13,14,15,16,24,31,36,37,45,48,52	12
	Education and training	9,14,16,20,31,35,43,45,46,51	10
	Belief of teaching	10,25,48,51	4
	Subjective norm	48,52	2
	Skill and ability	46,51	2
Contextual	Internal school support	9,13,31,35,37	5
	External policy	10,31,38,48	4
	Cultural norm	2,15,38,48	4
	School environment	13,35,48	3
	Student characteristics	9	1
	Working condition	10	1
<i>Teacher Implementation</i>			
Personal	Education and Training	2,3,5,6,9,13,14,16,18,19,20,22,26,27,28,29,30,32,34,35,39,40,42,45,48,50,51	27
	Instrumental attitude	1,10,12,13,14,16,23,24,28,29,30,33,40,43,44,45,47	17
	Belief of teaching	4,8,10,11,29,30,34,35,43,44,45,48	12
	Skill and ability	4,8,12,17,18,19,28,29,32,41,42,45	12
	Self-efficacy	9,14,16,24,28,29,42,48	8
	Affective attitude	28,29,47	3
	Subjective norm	2,8	2
Contextual	School environment	2,6,7,8,9,13,14,16,17,18,20,28,35,39,48,49	16
	Internal school support	2,6,7,9,13,16,18,35,39,47,50	11
	Working condition	2,9,13,18,22,23,29,30,33,39,47	11
	Student characteristics	2,8,11,15,18,23,28,29,30,43,47	11
	External policy	2,8,10,13,18,38,39,48,50	9
	Cultural norm	2,8,10,20,21,28,38	7

strengths and weaknesses (*Dixon & Haigh, 2009; *So & Lee, 2011), to enhance students' learning performance (*Crichton & McDaid, 2016; *Sezen-Barrie & Kelly, 2017; *Wong, 2014), and to facilitate instruction adjustments (*Brink & Bartz, 2017; *Hui et al., 2017). These results explicitly showed that an acknowledgement of the positive impact of formative assessment helped to enhance teachers' intentions to implement formative assessment.

Twelve studies suggested that teachers' intentions to conduct formative assessment was strongly influenced by their self-efficacy (or perceived control) over performing it (see Tables 1 and Tables 2). Self-efficacy is usually defined as teacher's confidence in their ability to implement formative assessment and take control of it (*Karaman & Sahin, 2017; *Yan & Cheng, 2015). *Wong (2014) found that teachers who regarded formative assessment as an easy task were more likely to implement it than those who perceived it as being difficult. In *Dixon and Haigh (2009) study, teachers' involvement in projects enhanced their understanding of formative assessment and their confidence to practice it which, in turn, increased their willingness to implement formative assessment. *Nikou and Economides (2019) also found that, within a context of technology-enhanced teaching, teachers' perceived ease of using the technology influenced their intentions to adopt the mobile-based formative assessment. *DeLuca et al. (2019) advocated that purposeful training supported teachers to be comfortable in implementing formative assessment in classrooms. When teachers had sufficient training or supportive measures, they were more confident to take action. In contrast, as reported in *Crichton and

McDaid's (2016) study, teachers' lack of confidence and support in performing formative assessment had a negative impact on their actual inclination of implementation.

Ten studies indicated the crucial impact of *education and training* on teacher's intention to implement formative assessment (see Tables 1 and Tables 2). Teachers need to have enough knowledge and skill before they are ready to make attempts in classrooms (*Rashid & Jaidin, 2014). This factor might closely correlate to the self-efficacy factor, as discussed earlier, because having sufficient education or professional training makes teachers feel more capable of implementing formative assessment. *Dixon and Haigh (2009) study found that professional development programmes improved teachers' knowledge about formative assessment and influenced their perceptions regarding the difficulty and effectiveness of formative assessment. *So and Lee (2011) also reported the possibilities to optimise teacher's perceptions and understanding of formative assessment by expert-supported inquiry learning. Their findings suggested that a narrow understanding of the use of formative assessment limited teachers' creativity when applying this tool in their classrooms. In some other cases, education or professional training increased teachers' intentions by changing their attitude towards conducting formative assessment. For example, *DeLuca et al. (2019) revealed that teachers became more comfortable to implement formative assessment as they engaged in a continuous professional learning community and had guidance from knowledgeable experts. In addition, *Hamodi et al. (2017) reported that pre-service teachers' early exposure to formative assessment practices might have led to a positive attitude towards it and facilitated participants' implementation later as teachers. These results imply the need to provide teachers with appropriate education or professional training pertinent to formative assessment.

There are other important factors, but less frequently reported, that may influence teachers' intentions regarding formative assessment. For example, *Belief of teaching*, i.e., teachers' philosophy and perception about the relationship between teaching and assessment, has an impact on teachers' intentions to use formative assessment (e.g., *Brown & Gao, 2015; *Wallace & Priestley, 2011; *Wong, 2014). *Brown and Gao (2015) found that Chinese teachers were strongly influenced by their belief on the important role of summative assessments that limited their willingness to implement formative assessment. Similarly, teachers in *Wong's (2014) study favoured achievement-oriented assessment more than other forms of assessment and, therefore, were reluctant to conduct formative assessment. The important others' opinions, or the *subjective norm* in the TPB term, on formative assessment is another factor influencing teachers' intentions (*DeLuca et al., 2019; *Wallace & Priestley, 2011; *Yan & Cheng, 2015). Importantly, others' opinions on formative assessment can form a social pressure that shape teachers' intentions to conduct formative assessment.

The overall results of the above studies showed that the most frequently reported personal factors influencing teacher's intention to implement formative assessment are *instrumental attitude*, *self-efficacy*, and *education and training*. Positive acknowledgement of the usefulness of formative assessment, confidence in conducting formative assessment, and sufficient professional training can increase teachers' willingness to implement formative assessment. However, it is worth noting that the results do not imply that other

factors, such as *belief of teaching*, *subjective norm*, and *skill and ability*, are not important. A more objective conclusion is that there is less evidence available regarding the impact of those factors.

Contextual factors

It is not adequate to consider only personal factors without taking the larger context that influences teachers' formative assessment practice into account (*Yan & Cheng, 2015). The teaching context affects what teachers intend to do in their classrooms (*Brink & Bartz, 2017). Ten studies reported contextual factors influencing teachers' intentions to implement formative assessment. The most frequently reported factors were *internal school support*, *external policy*, *cultural norm*, and *school environment*.

Five studies reported the impact of *internal school support* on teachers' intentions regarding formative assessment (see Tables 1 and Tables 2). The internal support within schools include school policies and resources that facilitate teachers' implementation (*Brink & Bartz, 2017; *Crichton & McDaid, 2016; *Moss et al., 2013). Without school support, it is less likely for teachers to be keen on implementing formative assessment. For example, in *Crichton and McDaid (2016) study, the teachers reflected that they were required to implement formative assessment by their schools without any formal support measures. This led to the teachers' unwillingness to implement formative assessment as they felt not prepared to do it. In *Brink and Bartz (2017) study, the school administrators made formative assessment the first priority, provided effective technical support, continuous professional development, and other necessary resources for curriculum change. These supports resulted in the teachers' positive attitude changes and inclination to implement formative assessment.

Outside the school context, the *external policies*, i.e., government educational policies, also influence teachers' intentions to implement formative assessment. Policy-level initiatives such as assessment or curriculum reforms promoted by governments is a powerful factor (*Lorente-Catalán & Kirk, 2016; MacPhail et al., 2018). If governments officially promote formative assessment, teachers may find a sense of legitimacy to learn about it, and then become more willing to implement it. Furthermore, educational policies supporting formative assessment will encourage schools to provide relevant professional development which, in turn, enhances teachers' intentions to implement formative assessment. Teachers reported that they became motivated to implement formative assessment when they were supported by the government and school (*Tang et al., 2006; *Wallace & Priestley, 2011).

The *cultural norm* or societal perception of assessment could also promote or inhibit teachers' intentions to adopt formative assessment. As an example, the Chinese education system has been dominated by the examination culture since a long time ago which considered assessment as a tool of accountability and a standard of achievement (*Brown & Gao, 2015; *Yan & Brown, 2021). High-stakes examinations have been used to decide students' access to further education or employment opportunities. Therefore, stakeholders valued the summative assessment and teachers are used to the norm, ensuring the grades of students are more prioritised; and, they are reluctant to change their examination-oriented assessment practices (*Deneen et al., 2019; *Wallace & Priestley, 2011). Even in Western culture where the idea of formative assessment originated, it is

also challenging for teachers to balance between the pressure posed by externally-mandated assessments and formative assessment perceptions (Bonner, 2016).

A school with a positive *school environment* for formative assessment is also crucial and it is developed by encouraging leadership and collegiate support (*Moss et al., 2013; *Rashid & Jaidin, 2014; *Wallace & Priestley, 2011). School leadership plays a vital role in enhancing teachers' intentions to implement formative assessment. When school leaders are aware of the importance of formative assessment and know how to support teachers, a positive school environment can be built. *Moss et al. (2013) found that when administrators had a deep level of understanding and appropriate attitude towards formative assessment, their teachers were more inclined to take actions. It appears that, to enhance teachers' willingness to conduct formative assessment, administrators should establish a supportive school culture that is susceptible to formative assessment and observes the needs of the teachers. *Rashid and Jaidin (2014) reported a successful case of implementation of the school-based assessment for learning. They emphasised the importance of consistent support to teachers, and opportunities and a platform for teachers to discuss and share with each other. Under such a collegially supportive environment, teachers developed a deeper understanding and positive attitude regarding formative assessment and, therefore, were more willing to conduct formative assessment in classrooms. However, the impact seems varied as *Dixon and Haigh (2009) found that some teachers with low level of self-efficacy and outcome expectations did not experience increased intention despite the sharing among members in a community of teachers.

Student characteristics and *working condition* are also two influential contextual factors. Students characteristics not only play a crucial role in formative assessment processes (Guo & Yan, 2019), but also affect teachers' perceptions on formative assessment (van der Kleij, 2019) which, in turn, influence teachers' intentions to implement formative assessment. For example, teachers are encouraged by seeing students' active participation in formative assessment activities (*Brink & Bartz, 2017). Teachers working in larger classes are less intended to practice formative assessment because of the difficulties of class management and time (*Brown & Gao, 2015).

As a conclusion, contextual factors have a significant impact on teachers' intentions to implement formative assessment. Within school, having internal support (e.g., professional training, extra resources) that facilitate teachers to conduct formative assessment, and encouragement from school leaders and colleagues will be an incentive for teachers to take action. Outside of school, supportive educational policies can motivate teachers and, therefore, facilitate the promotion of formative assessment in schools. Cultural norm of assessment, student characteristics and working condition also influence how soon teachers accept the idea of formative assessment.

RQ3 – Factors influencing teachers' formative assessment implementation

Personal factors

Despite the mediating role of intention between personal predictors and actual behaviours specified in psychological theories (e.g., Ajzen, 1985, 1991), many studies included in this review ($N = 40$) investigated the direct relationship between personal factors and teachers' implementation of formative assessment. The most frequently reported factors

include *education and training*, *instrumental attitude*, *belief of teaching*, and *skill and ability*.

Twenty-seven articles explored the influence of *education and training* on teachers' implementation of formative assessment. In general, relevant education and training is an important facilitator for teachers' implementation of formative assessment. It should be noted that such an impact is usually exerted through altering teachers' knowledge, skills, attitudes, or self-efficacy. For example, teachers reported that engagement in learning projects developed their understandings about the role of formative assessment and initiated their actual implementation (*Dixon & Haigh, 2009; *Haigh & Dixon, 2007). Numerous studies found that having education and professional training can eventually result in increasing the frequency of formative assessment practice either by improving teachers' knowledge and understanding about formative assessment (*Crichton & McDaid, 2016; *Hondrich et al., 2016; *Koloi-Keaikitse, 2016; *Saito & Inoi, 2017), or, more specifically, by providing teachers with guidance on how to integrate formative assessment in to curriculum design and classroom instruction (*Wong, 2007). Although the effect of education and training is generally positive, the programme design matters. Studies mentioned that examples of good practice, expert support, collaborative learning with other teachers, and well-designed materials, were features of successful education and training that promoted teachers' implementation (*Birenbaum et al., 2009; *Brink & Bartz, 2017; *Dixon & Haigh, 2009; *Grob et al., 2017; *Haigh & Dixon, 2007; *Kim, 2019). In addition to in-service teachers, *Hamodi et al. (2017) argued that pre-service teachers' early experiences with formative assessment could result in actual implementations in their future teacher career. *Moss et al. (2013) also reported that, after participating in professional development programmes, school administrators became more supportive leaders of formative assessment because they gained a deeper understanding of formative assessment and knew how to facilitate teachers' implementation by better identifying their needs.

Seventeen studies explored the influence of teachers' *instrumental attitude* on their implementation of formative assessment. The instrumental attitude generally refers to one's opinion about the effectiveness or consequences of something (Ajzen, 1991), and hence, in the current study, it refers to teachers' view on formative assessment's value in teaching and learning. As teachers acknowledge the benefits of formative assessment in tracking student' learning progress, informing instruction adjustments, and promoting effective classroom activities, their implementation frequency increased (*Brink & Bartz, 2017; *Dixon & Haigh, 2009; *Lock & Munby, 2000; *MacDonald, 2007; *Sezen-Barrie & Kelly, 2017; *So & Lee, 2011). Negative attitude towards the usefulness of formative assessment may constrain teachers' formative assessment practice to a superficial level, such as only using the rubrics for a basic understanding check in classrooms but do not analyse the results further (*Brown & Gao, 2015; *Tebeje & Abiyu, 2015). However, the relationship seems not straightforward and other factors have a role in mediating the prediction of instrumental attitude on actual implementation. *Crichton and McDaid (2016) reported that, although many teachers conceptualised formative assessment as a useful tool, their implementation were still random because there was a lack of guidance on implementation. Some researchers argued that professional learning programmes can not only equip teachers with necessary skills, but also enhance their positive instrumental

attitude that, in turn, facilitate their implementation of formative assessment (*Crichton & McDaid, 2016; *DeLuca et al., 2019; *So & Lee, 2011; *Ahmedi, 2019).

Twelve studies reported the influence of teachers' *belief of teaching* on their implementation of formative assessment. The alignment between teacher's belief of teaching and the principles of formative assessment influenced how they apply formative assessment methods (*Lee et al., 2012; *Shirley & Irving, 2015). Teachers who found their goal of teaching was aligned with the principles of formative assessment would be more likely to perform it (*Lock & Munby, 2000). *Wallace and Priestley (2011) also argued that consistency between teachers' teaching beliefs and theory of formative assessment facilitated innovative implementations in their classrooms. Teachers' belief about how students learn and how to motivate students also had an impact on their actual implementation of learner-centred pedagogy and formative assessment (Barnes et al., 2015).

There are twelve studies reporting the influence of *skill and ability*. It is not a surprise that teachers' adequate knowledge of assessment methods, subject contents and teaching strategies determined if they actually implemented formative assessment (*Lyon et al., 2019; Barnes et al., 2015). Teachers' implementation of formative assessment may differ due to their different levels of teaching skill and ability to apply formative assessment techniques even with similar support and under the same environment (*Kim, 2019; *Sathasivam & Daniel, 2016). Again, education or professional training can improve teachers' skill and ability to implement formative assessment by providing step-by-step guidance and practical tutorials (*Grob et al., 2017; *Haigh & Dixon, 2007; *Schütze et al., 2017).

The impact of *self-efficacy* has been reported in eight studies. As teachers perceive that they have sufficient ability and skills to conduct formative assessment, they would implement more frequently over time (*Brink & Bartz, 2017; *Schütze et al., 2017). *Karaman and Sahin (2017) revealed that teacher's implementation of formative assessment was most strongly predicted by their level of self-efficacy from their survey data. In addition, *Dixon and Haigh (2009) study showed that self-efficacy has a mediating effect on teachers' implementation as teachers who had strong self-efficacy about implement formative assessment would persist to try it even when they encountered setbacks. *Schütze et al. (2017) also reported that teachers' ability to employ their formative assessment knowledge and generate actual classroom implementation was positively moderated by their belief of self-efficacy. The higher level of confidence they had, the more likely they would perform it.

The literature shows that *affective attitude*, and *subjective norm* also have an influence on teacher's implementation of formative assessment. Not surprisingly, when teachers had a positive affective attitude towards formative assessment, they became more likely to implement it (*Lee et al., 2012; *Moss et al., 2013; *Tebeje & Abiyu, 2015). In addition, teachers' formative assessment implementations were influenced by subjective norm, or the opinions of important others. These important other's (e.g., school leaders, policy makers, and parents) requests or decisions influenced whether teachers were going to implement formative assessment (*Ahmedi, 2019).

Based on the reviewed studies, it appears that *education and training*, *instrumental attitude*, *skill and ability*, and *self-efficacy* are most influential personal factors of teachers' implementation of formative assessment. Especially, well-designed education and

training that is pertinent to formative assessment can positively influence teachers' knowledge, attitude, skill, and self-efficacy regarding formative assessment and contribute to actual implementation. *Belief of teaching, affective attitude, and subjective norm* are also intrinsic factors that influence teachers' formative assessment practices.

Contextual factors

Besides personal factors, there are considerable contextual factors that influence teachers' implementation of formative assessment. Twenty-nine studies discussed influential contextual factors. Among them, *school environment, internal school support, working conditions, and student characteristics* were the most frequently reported.

Sixteen studies reported the influence of *school environment* on teachers' formative assessment implementation. A positive school environment in the current review study means that school leaders encourage formative assessment implementation and/or, within schools, teachers are open to collaborations with colleagues in implementing formative assessment (*Birenbaum et al., 2009; *DeLuca et al., 2019; *Sach, 2015). Periodic meetings with colleagues or experts become a source of practical guidance and environmental support that facilitate teachers' implementation of formative assessment in classrooms (*Birenbaum et al., 2009; *Black & Jones, 2006; *DeLuca et al., 2019). Teachers can have discussions about the implementation of formative assessment under the guidance of experts and knowledgeable colleagues. A shared understanding of formative assessment within schools can promote sharing and interactive learning among teachers which facilitate their formative assessment implementation (*Sach, 2015; *Wallace & Priestley, 2011). Support and encouragement from principals, school management team, and head teachers are also influential factors that propel teachers to implement formative assessment (*Ahmedi, 2019; *Brink & Bartz, 2017; *Moss et al., 2013; Barnes et al., 2015).

Internal school support, including all school-based policies and resources to promote formative assessment implementation, is another essential factor reported by eleven studies. Appropriate school policies can positively facilitate the implementation of formative assessment (*Ahmedi, 2019; *Crichton & McDaid, 2016; *Moss et al., 2013). Prioritising formative assessment in the school-based policies allows teachers to better implement formative assessment since they could focus more on students' learning progress and support students' truly mastering learning contents rather than the coverage of all the curriculum (*Brink & Bartz, 2017). However, the effect of school support is differentiated at the individual level. For example, *Crichton and McDaid (2016) found that when teachers took action in their classrooms to implement formative assessment because of the school policy, their implementation quality varied due to their inconsistent understanding of formative assessment. Beside school policy, professional training is an important form of internal school support that promoted teachers' actual implementation of formative assessment in classrooms (*Grob et al., 2017; *Moss et al., 2013; *Wong, 2007).

Eleven studies reported that teachers' *working conditions* such as time, curriculum pressure, and teaching facilities can also impact teachers' formative assessment implementation (*Ahmedi, 2019; *Lee et al., 2012; *Moss et al., 2013). In some conditions, it is difficult to fully enact the formative assessment process due to time constraints (*Moss et al., 2013). For example, teachers are limited by class time to collect students' responses,

and/or give timely feedbacks in their classrooms. Some other teachers may consider implementing formative assessment as consuming valuable class time that can be used for teaching curriculum contents (*Crichton & McDaid, 2016). In addition, deficient teaching and learning facilities (such as computers, projectors, internet access, books, office, printers, and others) and large student-teacher ratio are practical constraints for teachers to the implementation of formative assessment (*Tebeje & Abiyu, 2015).

Eleven studies mentioned that *student characteristics* such as their academic abilities, engagement in classroom activities, learning motivation, attitudes towards formative assessment, and student-teacher relationship affected teachers' implementation of formative assessment (*Ahmedi, 2019; *Grob et al., 2017; *Tebeje & Abiyu, 2015). Students characteristics can determine the difficulty of implementing formative assessment. Students with higher levels of academic abilities, engagement, motivation, and positive attitudes can make formative assessment an easier job for teachers.

External policies refer to the educational policies enacted by governments that influence teachers' implementation of formative assessment. The current international educational reforms prompting formative assessment can lead to more implementations in schools (*Dixon & Haigh, 2009; *Kim, 2019; *Wallace & Priestley, 2011). The government's policies can propel teachers to implement formative assessment due to its authority in resource allocation. For instance, the Hong Kong Education Bureau initiated an assessment reform that emphasised formative assessment in classrooms (*Wong, 2007, 2014). As a result, teachers' awareness and implementation of formative assessment have been increased. However, the quality of formative assessment in classrooms is still far from satisfactory (Yan & Brown, 2021; Berry, 2010). Similarly, in mainland China, although formative assessment is acknowledged in principle, teachers still put more priorities on the summative assessments as the teachers' accountability and schools' reputation are largely evaluated by students' performance in public examinations (*Brown & Gao, 2015). Hence, teachers have the incentive to cover the required curriculum firstly and ensure students' examination scores rather than the mastery of learning (*Ahmedi, 2019; Barnes et al., 2015). In this sense, educational policies might be an important external power that can push teachers to take action on formative assessment, but is not sufficient to ensure the high quality of formative assessment. Furthermore, *cultural norm* of assessment refers to the societal preference of assessment methods. The wide use of summative assessment impede teachers' implementation of formative assessment when various stakeholders (e.g., school leaders and parents) are more likely to agree with the goal of summative assessment (*Ahmedi, 2019; *Hamodi et al., 2017). It is challenging for teachers to insist on implementing formative assessment in classrooms if the society does not endorse its goal and value (*Deneen et al., 2019; *Yan & Brown, 2021).

As a summary, teacher's formative assessment implementation is positively correlated with *positive school environment*, *strong internal school support*, *supportive working conditions*, and *encouraging external policies*. The results showed that contextual factors within schools are vital on promoting teachers' implementation of formative assessment, but factors beyond schools, such as *educational policies* and *cultural norm*, are also important. It would be ideal for teachers' implementation of formative assessment if they are explicitly required to do so by the policies and, at the same time, are well supported in classrooms.

As past studies indicated that teachers' formative assessment practices might differ across education sectors and subject areas (Heitink et al., 2016; Kingston & Nash, 2011),

we conducted chi-square tests to examine whether the frequencies of reported personal/contextual factors vary across education sectors and subject areas. For the cross-sector comparison, studies on kindergarten or higher education teachers were excluded as the numbers of studies were small. Studies on a cross-sector sample were also excluded. Only studies focusing on primary school teachers ($N = 14$) and studies focusing on secondary/high school teachers ($N = 26$) were compared. The chi-square statistics revealed non-significant differences in the frequencies of reported personal/contextual factors between these two groups (Intention: $\chi^2 = 1.666$, $p = .197$; Implementation: $\chi^2 = 0.556$, $p = .456$). For the cross-subject comparison, studies on a cross-subject sample were excluded. Studies on humanity-related subjects (e.g., language, liberal studies, music, etc.) were combined into one group ($N = 9$); while those on science-related subjects (e.g., science, maths, physics, etc.) were grouped into the other group ($N = 16$). The chi-square statistics indicated that the differences in the frequencies of reported personal/contextual factors between these two groups were not significant (Intention: $\chi^2 = 0.030$, $p = .862$; Implementation: $\chi^2 = 0.060$, $p = .807$). These results showed that the distribution of personal/contextual factors reported in studies remained consistent across education sectors (primary vs. secondary) and subject areas (humanity-related subjects vs. science-related subjects). A close investigation on the cross-sector comparison revealed that, compared with secondary school teachers, primary school teachers' intentions were less likely influenced by contextual factors. For example, no study in primary sector reported the influence of *external policy*. However, no particular pattern was found from the cross-subject comparison.

Discussion

This review set out to identify factors that determine whether or not teachers intend to and actually implement formative assessment. In the following sections, we first discuss the characteristics of the included studies, and then discuss the major findings, i.e., factors influencing teachers' intentions and implementations regarding formative assessment.

The characteristics of the studies exploring teachers' intentions and implementations regarding formative assessment

The included studies ($N = 52$) were conducted across different educational settings, in varied countries and the biggest number of studies came from Europe. Qualitative ($N = 27$), quantitative ($N = 10$), and mixed methods ($N = 15$) were used but qualitative remained the most popular approach. Among quantitative studies, the research design were mainly cross-sectional. There are few studies with experimental or longitudinal designs in this field so the relationships between the predicting factors and teachers' intention/implementation are correlations rather than causal relationships. This finding is not surprising because educational settings are so complex that it is difficult to apply experimental designs, especially those with randomised designs (van der Kleij & Lipnevich, 2020). We acknowledge that both qualitative and quantitative methods are useful for inquiries in education. However, the imbalanced use of methods might imply that the existing empirical evidence is limited from a methodological point of view. In

future research, quantitative methods, especially experimental designs and longitudinal designs, should be considered whenever possible.

Factors influencing teachers' intentions and implementations regarding formative assessment

The factors influencing either teachers' intentions or implementations regarding formative assessment were categorised into two categories, i.e., personal and contextual factors, as summarised in Figure 2. The major personal factors influencing teachers' intentions to conduct formative assessment were *instrumental attitude*, *self-efficacy*, and *education and training*. The widely reported contextual factors included *internal school support*, *external policy*, *school environment*, and *cultural norm*. For implementation, *education and training*, *instrumental attitude*, and *belief of teaching* are the most common personal factors, with *school environment*, *internal school support*, and *working condition* as the most frequently reported contextual factors.

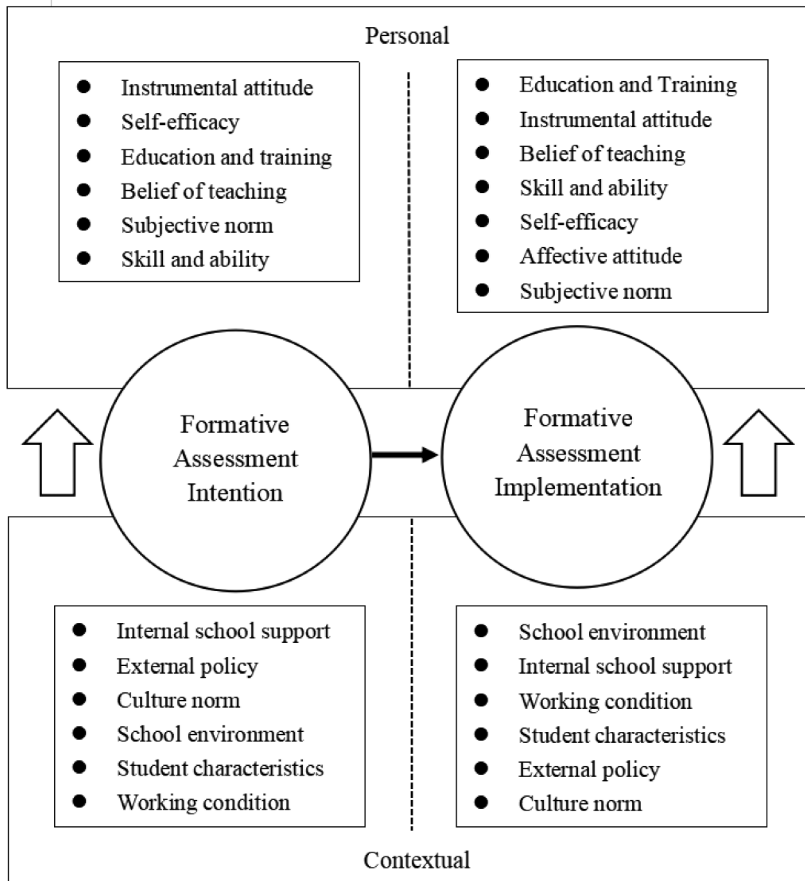


Figure 2. An integration of factors influencing formative assessment. *Note.* Factors are displayed according to their frequencies being reported in influencing intention and implementation respectively.

*Yan & Cheng (2015) reported that personal predictors covered in the TPB framework, such as attitude, subjective norms, and self-efficacy, could well explain teachers' intentions to adopt formative assessment, but not teachers' actual formative assessment practices. Echoing other researchers (*Sach, 2015; McKay, 2006), they advocated that contextual factors should be taken into account to understand teachers' implementation of formative assessment. This review verifies such an argument and further demonstrates that contextual factors influence not only teachers' implementation, but also their intention regarding formative assessment. Among the different levels of contextual factors influencing teachers' intentions and implementations regarding formative assessment, the school-level factors, i.e., meso-level factors in Fulmer et al.'s (2015) terminology, seem most important. *Internal school support* and *school environment* are two of the top three influential factors for both teachers' intentions and implementations.

The interactions within and across personal and contextual factors suggest that teachers' intentions and the implementations regarding formative assessment should be understood in an integrative approach that considers both personal and contextual factors, rather than treating them as two isolated segments. For instance, *education and training* appears as a fundamental factor, which is in line with Bennett's (2011) claim that teachers needed substantial time and professional support to become proficient in implementing formative assessment. While it is one of the personal factors that has been most frequently reported for both intention and implementation, it is believed to be able to change teachers' perceptions about formative assessment (Bonner, 2016). For example, education and training can enhance teachers' positive *instrumental attitude* (*So & Lee, 2011; *Ahmedi, 2019) and *self-efficacy* (*Crichton & McDaid, 2016; *DeLuca et al., 2019) that, in turn, promote the implementation of formative assessment. It can also improve teachers' *skill and ability* to implement formative assessment (*Grob et al., 2017; *Haigh & Dixon, 2007; *Schütze et al., 2017). Furthermore, *education and training* has a relation with the contextual factors as professional training is an important type of *internal school support* (*Grob et al., 2017; *Wong, 2007). Some personal and contextual factors are naturally overlapping. For example, cultural norm is closely related to subjective norm. The social pressure caused by cultural norm is often enacted through teachers' perceived important others' (e.g., school leaders and parents) opinions, i.e., subjective norm. It is also noted that contextual factors (e.g., school environment and internal school support) influence teachers' intentions through altering personal factors, such as attitude, skill, and self-efficacy with regard to formative assessment (*Dixon & Haigh, 2009; *Wallace & Priestley, 2011).

The relationship between intention and implementation regarding formative assessment warrants further attention. Although many studies included in this review investigated factors influencing both teachers' intentions and implementations regarding formative assessment, only two of them (i.e., *Karaman & Sahin, 2017; *Yan & Cheng, 2015) explicitly explored the relationship between intention and implementation. *Yan & Cheng (2015) reported a significant but weak predicting power of intention on implementation, while *Karaman and Sahin (2017) found non-significant correlation between intention and implementation. These findings echoed a long-lasting criticism of TPB, i.e., the weak predictive power from intention to behaviour, also known as the intention-behaviour gap (Fishbein & Yzer, 2003; Shirokova et al., 2016). This is similar to the misalignment between

assessment beliefs and practices reported in previous studies (Barnes et al., 2015). For example, Karp and Woods (2008) found that pre-service physical education teachers indicated a willingness to conduct alternative assessments, but it turned out that they implemented alternative assessments much less than what they planned. The researchers argued that the discrepancy between assessment beliefs and practices resulted from pre-service teachers' lack of experience with alternative assessment. Similarly, James and Pedder (2006) studied UK in-service teachers' assessment beliefs and practices and revealed that teachers did less than they valued regarding assessment for promoting student learning. They attributed the results to the testing context that required teachers to engage in performance-oriented assessment rather than learning-oriented assessment. As for the reasons underlying the intention-behaviour gap regarding formative assessment, *Yan & Cheng (2015) explanation is that, compared to personal behaviours which are largely determined by one's intention, working behaviours like formative assessment are more susceptible to contextual variables. Teachers do not act upon their intentions probably because there are contextual barriers that hinder their implementation of formative assessment. Does this finding mean teachers' intentions to conduct formative assessment is not important? The answer should be no. Without personal intention, teachers might still implement formative assessment due to external requirements or incentives. However, the tension between personal intention and external factors is likely to result in poor quality of formative assessment implementation (Yan & Brown, 2021). It will be ideal for the implementation of formative assessment when teachers have volitional willingness to do that under a supportive environment.

Also, this study found that, compared with secondary school teachers, primary school teachers' intentions to formative assessment were less likely influenced by contextual factors, especially external policies. A possible explanation is that primary students, as well as their teachers, usually face less pressure of high-stakes internal and external assessments than their counterparts in secondary schools do. As high-stakes summative assessment is a significant hurdle for formative assessment (Yan, 2018; Black & Wiliam, 1998), primary teachers appear relatively free of the constraints of external assessment policies.

Practical implications

The findings of this review have implications for educational practices and teacher training. First, the review shows that the most frequently reported factors influencing teachers' intentions and implementations are similar, for both personal and contextual factors. In particular, *education and training* might be a pivot point for promoting formative assessment among teachers because it is a factor that has strong impacts on both teachers' intentions and implementations; it also influences other personal factors, such as instrumental attitude, self-efficacy, and skill and ability. This finding also echoes the call to integrate formative assessment into the curriculum of pre-service teacher education and in-service professional development programmes (Andersson & Palm, 2017; Desimone et al., 2002).

Second, the findings indicate the importance of the school (e.g., *internal school support* and *school environment*) as the context that determinates the implementation

of formative assessment. Formative assessment is by no means an easy job for teachers (Black & Wiliam, 1998; Cowie & Harrison, 2016). Practical constraints may largely hinder teachers' implementation of formative assessment even though teachers have positive conceptions of formative assessment (*Yan & Cheng, 2015, Yan & Brown, 2021). Hence, an encouraging school environment, supportive school-based policies, and sufficient school support measures are necessary for teachers to be willing to and actually conduct formative assessment.

Limitations and future directions

A limitation of this study, similar to other review studies, is that while we tried to cover a wide breadth of studies pertaining to this topic, it is less likely to include every relevant study. Formative assessment covers a wide range of practices and has been studied in various terms (Wiliam & Thompson, 2007). It is not surprising that some studies have not been covered because of three reasons: 1) some studies used terms different from the selected five key terms to describe formative assessment; 2) some studies did not explicitly explore factors influencing formative assessment; and 3) some studies touched the topic of this review on some parts (e.g., in the discussion section) but did not treat it as the main focus. Cautious interpretation of the findings of the current review should keep this limitation in mind.

Furthermore, this review orders the factors according to their frequencies represented in studies. However, such an order does not necessarily imply the relative importance among these factors. Researchers and policy-makers might be interested in identifying those factors that are more important than the others. To achieve this goal, future studies need to conduct more nuanced analyses and consider the particulars among contexts, schools and even teachers. The studies included in this review have varied research contexts, diversified sample backgrounds, and different forms of formative assessment. Some factors may be regarded as the most important by teachers with a particular education/training background, in a particular school environment under a particular educational setting, but may be less important in another context. Thus, any initiatives or programmes to promote formative assessment should take the local particulars into account. As Wiliam (2019) argued, 'In educational research, "What works" is usually the wrong question because almost anything works somewhere, and nothing works everywhere. A better question is, "Under what circumstances does this work"' (p. 137). We, therefore, echo other scholars (e.g., van der Kleij & Lipnevich, 2020) and encourage researchers in this field to specify the particulars and context where the study is conducted so that readers could judge how the findings may inform their practices.

In conclusion, this study has identified two major groups of factors, i.e., personal and contextual factors, underpinning teachers' intentions and implementations regarding formative assessment. The findings highlight the complexity in predicting formative assessment practices. The interactions within and across personal and contextual factors as well as the intention-behaviour discrepancy further amplify the complexity. Nevertheless, this study contributes to a better understanding of the elements that need to be considered when designing school-based support measures or teacher professional development programmes with an aim to promote formative assessment.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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