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Classroom Based Assessment: Tension between Summative and Formative Assessment Practices among Primary Schools in Singapore

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ABSTRACT

This paper evaluates the classroom-based assessment within the primary schools in Singapore and the potential tension between summative and formative assessment practices. In addition, it provides recommendations to minimize the tension, including developing teacher assessment competencies and reinforcing bite-sized assessment as part of holistic learning. The paper concludes with some challenges teachers face in assessment practices during and after the Covid 19- pandemic.

Keywords: Classroom-Based Assessment; Formative Assessment; Self-Assessment; Bite-Sized Assessment; Summative Assessment

Abbreviations: TIMMS: Trends in International Mathematics and Science Study; PISA: Program for International Student Assessment; MOE: Ministry of Education; GCE: General Certificate in Education; ITE: Institute of Technical Education; PSLE: Primary School Leaving Examination; BSFA: Bite-Sized Formative Assessments; PERI: Primary Education Review and Implementation

Introduction

Singapore has earned global respect and local community praises for its sterling academic performance in international assessments such as the Trends in International Mathematics and Science Study (TIMMS) and the Program for International Student Assessment (PISA) (Barber [1,2]). For instance, in the last three TIMMS in 2011, 2015, and 2019, Singapore students were placed first in mathematics and science for both grade 4 and grade 8 (Martin, et al. [3-5]). Singapore also ranked among the top performers for mathematics, science, and reading in 2012, 2015, and 2018 PISA (Coughlan [6-8]). These impressive records come with the enormous effort put by the Singapore government, with the support of the Ministry of Education (MOE), committed teachers, and resilient students. A key emphasis on developing a world-class education system is having a high standard, innovative, balanced but rigorous assessment practices to enable students to acquire 21st century competencies and prepare them to thrive in the VUCA (volatile, uncertain, complex, ambiguous) environment (Aghazadeh [9,10]). This paper evaluates the classroom-based assessment within the primary schools in Singapore and the potential tension between summative and formative assessment practices. In addition, it also provides recommendations to minimise the tension and the paper concludes with some challenges teachers face in assessment practices during and after the Covid-19 pandemic.

Context

The education structure in Singapore consists of four stages:

1. Two years of kindergarten (pre- school),
2. Six years of compulsory primary school education,
3. Four or five years of secondary school education (divided between 'Express', 'Normal (academic), and 'Normal' (technical) streams) based on student's ability, and
4. Pre-university education for two to three years at mainstream junior colleges preparing students for the Singapore-Cam-

bridge General Certificate in Education (GCE) A-level examination, polytechnics for skills-based practice-oriented education, or the Institute of Technical Education (ITE) for vocational education (Issac [11]). The context of this paper focuses on compulsory primary school education, which has undergone several reforms such as bilingualism, Thinking Schools, Learning Nation, and Teach Less Learn More since Singapore declared independence in 1965 (Leong [12,13]). A detailed discussion of each major reform is beyond the scope of this paper. Excellent summative assessment performance becomes a de facto performance indicator for teachers and reflects the school reputation and its leaders (Leong [12,13]).

Primary School Education System

The majority of the primary schools are government-funded and are known as 'national schools' under the control of the MOE. As primary school education is compulsory for all Singaporeans, all children above the age of six will enrol in a national school to receive six years of schooling (Tan, et al. [13]). Children with intellectual disabilities or require special needs may be granted homeschooling or to enrol in one of the Special Education schools (MOE [14]). Primary school children typically study core subjects such as English language, Mother Tongue Language (MTL) or Second Language (Mandarin, Malay, or an approved Indian language), mathematics, social studies, music, and for Primary 3 and onwards, students would need to study science. Students are encouraged to participate in co-curricular activities such as sports, clubs and societies, and visual and performing arts (MOE [15]). The education system in Singapore has primarily been labelled as examination-oriented based on the principle of meritocracy (Cheah [16-19). Before 2008, Primary 3 students were placed in different categories (known as streaming) based on their year-end examination results for English, MTL, and mathematics. Students who obtained above average and average scores were put into the EM1 and EM2, respectively (EM stands for "English and mother tongue"). The weakest students were placed into the EM3 stream.

Such a streaming system has drawn a fair share of parents and media criticisms, including elitism and discrimination (Barr [20]). Consequently, MOE abolished this streaming system and implemented the subject-based banding system (Ng [21]). Essentially, the subject-based banding allows Primary 4 students to choose to read English, MTL, mathematics, and science at different levels of difficulty based on their assessment performance, interest and strengths, and teachers' advice (MOE [22]). Such flexibility promotes the 'every child is different' policy advocated by MOE, and it is far more superior to the 'one-size-fits-all' streaming system (Leong [23]). At the end of Primary 6, students will sit for a high-stake annual national examination, Primary School Leaving Examination (PSLE), covering oral, listening comprehension, and written examinations. The oral and listening comprehension focus on English language and MTL, while the written exam assesses students' ability in English language, MTL, mathematics, and science. The duration for each written examination varies from an hour to one hour and 50 minutes [24]. Based on their overall PSLE performance in all the subjects, students will be placed in either the four-year Express, five-year Normal (Academic), or five-year Normal (Technical) stream in secondary school. Based on the PSLE results over the past five years (2016 to 2020), 98.4% of the PSLE students (between 38,800 and 40,300) progressed to secondary schools.

Among these students, about 67% were admitted to the Express stream, 22% were in Normal (Academic), and the remaining 11% joined the Normal (Technical) stream (Yong, 2021). However, MOE has announced that this secondary school streaming will be replaced by subject-based banding in 2024 (Mokhtar [25,26]).

Classroom-Based Assessment

There has been extant literature documenting the definition and types of classroom-based assessment or classroom assessment (Airasian [27-30]). Essentially, classroom-based assessment is assessment, formative and summative, conducted by teachers based on the student learning that takes place within the context of a classroom and provides feedback to teachers and students on the quality of teaching, learning performance, reporting, management, or socialisation purposes (Hill [31]). Formative assessment and assessment for learning have been used interchangeably worldwide (Klenowski [32]). There are ongoing debates on the definition of formative assessment with overlapping characteristics (Bennett [33-37]). Discussion of the various definition and variations of formative assessment is beyond the scope of this paper. Instead, the definition of formative assessment used by Black and William [38] in their seminal work on assessment and classroom learning is used for this report as the formative assessment practices used by Singapore primary education were originally conceptualised from this definition. Essentially, Black and William define formative assessment as "encompassing all those activities undertaken by teachers, and/or by their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged" (pp. 7-8.).

They emphasise that formative assessment needs to provide evidence to improve students' learning and adapt to meet students' needs. To develop a formative assessment that enhances students' learning, teachers and students need to forge a close relationship in recognising the learning outcomes and, more critically, how they will achieve them (Wiliam [37]). Teachers need to identify any learning gaps from the evidence gathered in numerous formative assessments, and constructive feedback to students is vital to improve students' self-directed learning and confidence in handling further formative and summative assessments (Bennett [33,35]).

Bite-Sized Formative Assessment

Against the backdrop of refining the examination and assessment structure for primary school education, the Primary Education Review and Implementation (PERI) Committee was set up in 2008 to explore a more holistic and balanced assessment system to enhance the Teach Less Learn More principle (Leong [12]). The proposed assessment is termed as 'holistic assessment'. Essentially, the PERI Committee recommended that all primary schools place less emphasis on examinations for Primary 1 and 2 and employ a variety of bite-sized formative assessments (BSFA) to all students to instil their confidence and learning desire (MOE [39]). The implementation of bite-sized formative assessment was conceptualised from the seminal study of Black and Wiliam [38], and theoretical underpinnings of formative assessment foregrounded by Ramaprasad [40], where the activities of BSFA focuses on sharing success criteria with students, classroom questioning, comment-only marking with no grades or marks attached, and use of peer- and self-assessment to motivate learning [41]. The BSFA comprises of short quizzes, weekly non-graded topical test, short writing, reading and performance tasks, which serves to identify students' needs, abilities, and interest, ongoing monitoring of students' learning progress, and prompt feedback given to students to improve their learning (Shepard [42-44]).

Self- Assessment

An important subset of formative assessment used in primary school education in Singapore is self-assessment or "assessment as learning", which focuses on evaluating students' learning as a process of developing and supporting their metacognition that is not reflected in the traditional pen-and-paper tests (Dann [45-48]). Essentially, self- assessment "involves students thinking about the quality of their work, rather than relying on their teacher as the sole source of evaluative judgments" (Andrade [49]). The MOE has been actively promoting self-assessment such as learning logs, journal writings, portfolio creation, checklist and charts, and learning contracts to inculcate the habit of self-accountability in monitoring and managing one's learning progress (Andrade [49,50]). Feedback provided to students' self-assessment can improve their understanding and performance (Andrade [51,52]). The MOE recognises that self-assessment may not be suitable for summative assessment as it will compromise students' honesty and learning quality as they may focus on getting good grades (Wong [53]). Education scholars argue that self-assessment provides an opportunity for students to increase their self-awareness and assessment skills, and apply their learning in a psychologically safe learning environment (Andrade [52,54-57), enhance their thinking ability and confidence (Black [58,59]), promotes independent learning during and after schooling (Black [60-62]), improves communication and motivation to learn (McMillan [63,64]).

However, teachers need to be mindful that students need to be taught and equipped with the necessary skills to perform self-assessment, and not overly relying on scaffolding strategies, which is the temporary and initial stage of guidance, to ensure students truly experience the learning and not the assessment per se (Sadler [65-67]). Concerning reliability and validity of self-assessment, prior studies reported that self-assessment might be more appropriate for secondary education (Black [34,68]) and higher education (Cassidy [62,69-74]) as primary students are relatively less mature cognitively and may hinder them from doing self-assessment comfortably and accurately (Fontana [75,76]). In addition, several studies reported that students who lack confidence and practice of self-assessment might underestimate (Cassidy [69,73,77]) or overestimate (Ross [78,74]) their self-assessment scores. However, students will improve their judgment and gain confidence overtime to produce more reliable and accurate self-assessment results (Blatchford [78-80]). Further, several studies found that primary school students can perform the self-assessment confidently and accurately with proper intervention from teachers and support from parents. For instance, a recent study conducted by (Wong [81]) in Singapore involved 146 Primary 4 students, of which 75 students were taught the use of self-assessment, and no intervention was given to the remaining 71 students.

The results revealed a significant difference between the intervention and comparison groups concerning knowledge application, independent learning, communication, and motivation. These findings corroborate earlier results reported by Brown [76,80,82]. For fairness, issues may arise from group work where there could be unequal effort put in by each team member, plagiarism practices undetected by the teachers, and copying each other's work in class. Teachers need to handles such instances with care and emphasise the importance of honesty and fairness in formative assessments.

Summative Assessment

Summative assessment, or assessment of learning, emphasises that learning has taken place by focusing on the measurable outcomes rather than the learning process (Ahmad, et al. [83-86]). In Singapore, the primary school students will have to sit mid-year in May and final year examination in October from Primary 3 onwards. The grading weightage of the mid-year and final examination varies from 40% and 60%, respectively. Primary 6 pupils will sit for the high-stake PSLE between August and October. A good performance in PSLE will be a passport for entering into 'elite' secondary schools, albeit former education minister Mr. Heng Swee Keat stressed that "every school, a good school" (Ang [87]). The PSLE provides a rigorous and standardised measure of progression and accomplishment [88]. Prior studies reported that the summative assessments place a strong curricular emphasis on grades and content acquisition over holistic learning, resulting in students perceive achieving a high score in the examination is far more critical than collaborative peer learning and personality development (Koh [89,90]). Concerning the validity and fairness of assessments, there are issues on testing beyond what is required (over-testing) and testing beyond the expected level of the stu-

dents (above-level testing) (Leong [12]). Teachers from "top schools" tend to use such practices in the summative assessment to enable students to be "well prepared" for the PSLE. However, such practices may add pressure to weaker students, and the results achieved may not truly reflect the students' academic ability.

Tension between Formative and Summative Assessment

Singapore education system is highly regarded as examination-focused and grades-driven, where high-stake national examination such as PSLE is perceived as an objective and meritocratic mechanism to measure and differentiate students' academic ability and eligibility for acceptance into their secondary school of choice (Daneen, et al. [91-94]). Despite the holistic assessment system being implemented in primary schools, the curriculum still places emphasis and pressure on students and teachers on content acquisition and achieving excellent grades on summative assessments and international tests, rather than deep learning and holistic development (Hogan [95,96]). Thus, the tension between formative and summative assessment lies in the emphasis and backwash effects of high-stake national examination and purposes of assessment in promoting learning in schools (Tan [67,97]). The aggregate scores in PSLE indicate a student's performance relative to his or her peers in the subject, and not actual performance against any pre-defined standards or how well the student has learned and ability to apply the knowledge gained in class to non- examination areas (Tan [98]). Consequently, this tension creates undue pressure on students and parents, teachers' competencies in implementing BSFA and self-assessment for meaningful learning and operationalizing learning and teaching in tandem with assessment.

Undue Pressure on Students and Parents

As a developed country and multi-racial society where education is heavily emphasised as early as the pre-school days, children entering compulsory education at Primary 1 come from diverse backgrounds regarding culture, parents' education level, family income, and social status (Lim- Ratnam [13]). For instance, children from middle- to higher-income English-speaking families who are exposed to holistic development are more open to self-assessment and bite-sized assessment. Conversely, children from less-privileged and non-English speaking families who did not attend pre-school may not be ready to experience holistic assessment (Espinosa [99]). The existing literature on formative assessment focuses on the benefits of BSFA on students learning outcomes but pays little attention to the socio-cultural factors that may influence students' learning attitude and motivation (Song [67,97,100]). While the BSFA aims to lessen the students' anxiety so that the summative assessments will not overly pressure them, it turns out that students are having increased workloads and see these BSFA as small summative tests (Mohamed [92,101]). Parents see achieving excellent PSLE performance and being admitted to a prestigious secondary school as a benchmark for better future education and career advancement. Thus, they would invest in private tutoring, enrichment classes, and even personal coaching while working from home during the Covid-19 pandemic to improve their children's performance (Bary [102,103]).

Sales of assessment books and examination papers from top primary schools is a lucrative business in Singapore (Barr [20]). Consequently, students are pressured to deliver superior performance at every level of primary education, which hurts their well-being (Richardson [104]).

Teachers' Competencies

Educational scholars maintain that teachers' competencies in classroom management, curriculum, and assessment design, and lesson planning and delivery are of paramount importance in supporting students' learning in the classroom (Choy, et al. [105-110]). As the students may come from diverse backgrounds with different levels of intellectual ability, teachers, including those recruited from overseas who may have different socio-cultural beliefs, need to be competent to identify strengths and weaknesses of individual learners to employ different teaching pedagogies and constructing different types of BSFA to enrich students' classroom learning experiences (Berry [111-114]). Prior studies reported that teachers were incompetent to operationalise learning and teach in tandem with assessment (Koh [67,92,115]). For instance, inexperienced teachers may design BSFA that heavily assesses students' factual memorisation and rote learning (Koh [115]). In addition, new teachers may lack the experience in classroom management that enable teaching more meaningful and motivate students to learn in a psychologically safe learning environment (Barbetta, et al. [116-120]).

There is also a tendency for teachers to adhere to the 'letter' of formative assessment instead of understanding of the 'spirit' of it (Marshall [121]). Essentially, teachers adopt a mechanistic practice for the formative evaluation, starting with sharing learning objectives, posing questions, introducing "one-size-fits-all" BSFA assessment and self-assessment practices, and finally provide feedback in a systematic manner (Leong [12]). Further, teachers adopted an episodic approach to assessment where they develop a series of related BSFA practices one at a time based on the topic covered but without giving many insights to students on how these practices are connected to different topics and ideas (Tan [122]). Such compart mentalisation of various topics into different assessment practices leads to students experiencing the curriculum in a linear pattern, and a reductionist view of learning is constructed and perpetuated (Sadler [65]). Posit that assessment practices cannot be considered formative unless evidence of feedback is employed to adapt teaching and learning. Students are willing to respond positively to teachers' feedback to improve. There are also evidences that teachers are unable to provide constructive feedback to students' formative assessment, which have an impact on their learning and work quality (Rahmat [50,81,82,122]).

As every school is given the flexibility in designing a wide range of formative assessments as long as these assessment practices meet the student's learning outcome, there may be inappropriate labelling of assessment practices as formative or summative (Leong [23]). Assessment scholars noted that the dichotomy of labelling assessment as 'formative' and 'summative' are ambiguous and inconsistent in practice (Bennett [32,123]). For instance, some teachers perceived tests as summative, but rubrics imply that the task is formative. Others may interpret summative assessments that are broken down into continuous or modular assessments as formative (Leong [23]). On the practical front, the bite-sized assessment has created an additional workload for teachers. They need to spend more time constructing assessment items, marking, and providing more qualitative feedback to students (Tan [124]). These have taken a toll on their health, and many teachers were burnout. In addition, teachers feel that these bite-sized assessments serve as a precursor to examination preparation instead of supporting students' learning (Tan [10]). Beyond these, teachers face pressure from schools and parents to emphasise examinable topics as teachers are accountable to parents for their children performance, especially when the students' results in summative assessments do not align to their performances in the bite-sized assessments (Curdt- Christian [12,13,89,125]).

Minimising Tension

Developing Teacher Assessment Competencies

To support teachers to develop their competencies in developing formative assessment, which includes BSFA and self-assessment, MOE develops a capacity-building model with reference to the "Keep Learning on TrackTM" model introduced by Wiliam [126]. Essentially, the capacity- building model comprises three components. First, all primary school teachers will undergo a course to understand the theoretical framework of formative assessment. Second, teachers will embark on collaborative learning and peer feedback sessions during the monthly Teachers Learning Communities meetings. They share and apply the knowledge gained from the course by trying different types of formative assessment (Guskey [127,128]). Through this reiterative learning cycle, teachers can learn from their peers and senior teachers on the various formative assessment practices suited for students at different primary levels (Chappuis [129,130]). For instance, teachers need to consider other formative assessment practices consistent with specific teaching-learning progression (Black [58,131]). Subjects such as languages, humanities, and arts, teaching and learning progression can be a more "meandering, organic affair" (Marshall [132]) with minimal pre-planned feedback and responses. In contrast, mathematics and science subjects have a predetermined sequence of teaching-learning progression targeted outcomes, and assessment practices are designed to ensure students understand what needs to be done at each step before proceeding to the next.

To uphold MOE's "Teach Less Learn More" policy, teachers need to use BSFA that allows them to gradually move away from explicit teaching practices to more implicit processes of learning (Noyce [133]). The third component involves MOE ongoing support to provide resources and expertise to teachers, both existing and new, on the latest development in formative assessment used to engage students for holistic learning. Feedback from teachers on students' progress and assessment performance is gathered during inter-school networking sessions, peer observation, and dialogue with principals and heads of the department. A total of 125 primary schools adopted the capacity-building model, with 3,300 teachers involved in 2014 (Tan [124]). As feedback gathered from teachers was generally positive, it is recommended that MOE will continue to apply this model and work closely with schools to support teachers in honing their classroom formative assessment best practices to deepen student holistic learning and motivation.

Reinforcing Bite-Sized Assessment as Part of Holistic Learning

MOE needs to reinforce that a bite-sized assessment should culminate in holistic learning that enables students to demonstrate how well the knowledge is interconnected over time compared to how much knowledge is gained. The BSFA should be relevant to each other, and prompt feedback should be given to students for one assessment to enhance their learning and confidence in performing the subsequent assessment (Kennedy, et al. [134]). The accumulative effect of the series of BSFA should connect and align to an overall holistic learning outcome. MOE may consider the use of the patchwork assessment method, which was first introduced by Winter [135], where he claimed the patchwork is to "integrate the different assessment advantages of the essay and portfolio" (p. 119). Essentially, teachers may provide a series of BSFA for students to complete over a period of time, and culminates in a final task that requires them to synthesise what they had learned in the module or key topics (Akister [136-140]). It is believed that the patchwork assessment will enhance students' ability to learn relationally and holistically (Tan [67]).

Conclusion

The introduction of BSFA by the PERI Committee and self-assessment are the two primary formative assessment practices adopted by the school teachers to promote holistic learning among the primary school students in Singapore. While assessment remains crucial in measuring learning (summative assessment) and enhance learning (formative assessment) in a coherent and integrative manner, the tension faced by teachers, parents, and students between the formative assessment and summative assessment practices lies in the emphasis and backwash effects of high-stake national examination and purposes of assessment in promoting learning in schools. The capacity-building model to boost teachers' competency in assessment practices and the patchwork assessment method to reinforce BSFA practices as part of holistic learning are introduced to minimize the tension. However, the disruption in schooling caused by the Covid-19 pandemic since March 2020 has provided new challenges for MOE

and school teachers. National examinations and classroom learning have been cancelled or postponed (Awang [141]). Physical classes have been replaced by home-based learning via the Singapore Learning Space, a national primary school online learning portal implemented in 2018 that enables teachers to share resources for students to access and perform self-directed remote learning (Ng [142,143]). It may be time for MOE to reflect and examine educational changes that allow Singapore to adapt swiftly to build an education system in a balanced and steady manner (Ng [144]).

The employment of digital home-based learning and blended learning models where students are accountable for their self-directed learning with minimal guidance will be the 'new normal' (Ng [145,146]). New challenges faced by teachers include implementing BSFA, ssuch as take-home assignments and online assessment, monitoring students' progress, and providing timely feedback. Assessment scholars may conduct quantitative and qualitative research on the effectiveness of BSFA and self- assessment on student learning and motivation during and post-pandemic, be it in the classroom or at home, and how teachers may adapt to the new normal. Hargreaves [147] opines a balanced learning approach where more face-to-face support and less reliance on digital learning is essential after the pandemic. However, he did not take into consideration of different types of assessment practices, students' learning abilities, affordability of digital learning devices among different families, degree of conducive learning environment among students when offering a balanced approach, and what would be a suitable level of blended learning that would optimise students' learning [148,149]. These issues provide a fertile ground for education scholars to examine as the pandemic is still far from over at the time of writing. It is believed the findings from these studies will provide insights to MOE and teachers on the development of sustainable formative and summative assessment practices that enhance students' holistic learning and prepare them to thrive in the post- pandemic economy.

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