

TEACHERS' PERSPECTIVES OF THE INTRODUCTION OF MATHEMATICS SCHOOL-BASED ASSESSMENT IN TRINIDAD AND TOBAGO

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Abstract: *In 2016 the Caribbean Examinations Council (CXC) introduced a school-based assessment component into the Caribbean Secondary Education Certificate (CSEC) Mathematics examination. The assessment required teachers to guide students' exploration of real-world scenarios through mathematics projects. Despite teachers' protestations about poor communication and support throughout its implementation, there have been no published investigations into teachers' perspectives on the assessment, including their understanding of the assessment, their preparedness to implement it, and their perspective on its contribution to teaching and learning mathematics. Thematic analysis of focus-group interviews with nine secondary school teacher-implementers in Trinidad and Tobago revealed teachers' appreciation of the assessment as a teaching and learning tool, despite the challenges they anticipated in managing teaching time, and administration of numerous projects among diverse student populations. This study provides insights into teachers' perspectives in the early stages of the adoption of an educational innovation, as a backdrop for further exploration and comparison of their perspectives after the initial implementation phase.*

Keywords: *mathematics, school-based assessment, teachers', perspectives, CXC*

INTRODUCTION

Darling-Hammond (2017) opined that the rate of adoption of educational innovations is directly proportional to the level of positive attitude towards it. Thus, if teachers are resistant to adopting an innovation, student preparation will suffer and anticipated gains will not be attained. Many educational contexts have implemented alternative approaches to traditional assessment involving high-stakes public examinations, including a school-based component that brings a balanced approach to assessing what students know and can do at the end of their schooling (Burke, 2011). The same is true

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for Caribbean countries which, like other countries, are struggling to reform the teaching and learning of mathematics to arrest the decline in student performance.

In 2016, the Caribbean Examinations Council (CXC, 2016a) formally articulated its intention to implement a mathematics school-based assessment (M-SBA) into its Caribbean Secondary Education Certificate (CSEC) Mathematics examination. The M-SBA score was to be provided by students' mathematics teachers and was to be included in the CSEC Mathematics grade for the first time in 2018. Based on Rogers' (2003) definition of an innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 12), in the Caribbean context, the M-SBA could be considered an innovation because it was, at the time, new to the teachers and students who would be engaging it. Although SBA has been part of the CSEC examinations in other subjects, its newness to CSEC Mathematics aligned well with Rogers' (2003) definition of an innovation. For the purposes of the present study, the innovation examined is the M-SBA that mathematics teachers were expected to implement in their instruction.

Even before 2016, amid rumours of the M-SBA, and even up to 2019, mathematics teachers across the Caribbean have challenged the CXC and their primary employers (Achong, 2019) on having to grade the CSEC M-SBA. However, various news agencies around the Caribbean have reported primarily on teachers' desire to be paid for assessing the M-SBA, which has overshadowed teachers' other concerns about the CSEC Mathematics assessment. There have been no reported empirical studies that capture teacher-implementers' understanding of the M-SBA, their perspectives on their readiness to implement and manage it, and its contribution to the teaching and learning of mathematics in secondary school classrooms.

We report on a pilot study conducted in Trinidad and Tobago in 2017 to elicit from a small sample of teachers their experiences during the implementation process in order to capture and understand their perspectives on the M-SBA. One of the authors was a curriculum supervisor for mathematics teachers who provided instructional support for teachers implementing the M-SBA, and the other two authors were university lecturers responsible for mathematics teachers' professional development. Our perceptions that mathematics teachers held negative attitudes towards the M-SBA gained strength from media reports in the *Jamaica Observer* in 2018 and *Barbados Today* in 2017, as well as from our informal interactions with teachers. CSEC Mathematics is considered a compulsory subject in Trinidad and Tobago because it is typically a requirement for employment in various fields and for matriculating to higher education. However, we believed it imperative to understand the nature of mathematics teachers' perspectives on the M-SBA in order to gain insight into their understanding and experiences to be able to support them through the implementation process.

LITERATURE REVIEW

Exploring student assessment

Student assessment entails the process of collecting, collating and interpreting learning and achievement of students (Aduloju et al., 2016). Student assessment outcomes provide insight into students' understanding of curricula and the extent to which educational goals have been attained. Though the nature of student assessment may differ across contexts, De Lisle (2015) identified three approaches to assessment that are commonly used for educational change: high-stakes public examinations used for student selection, promotion and certification; national assessments to monitor student learning and progress; classroom assessments for teachers to monitor and support student learning and progress, and make instructional decisions.

High-stakes public examinations and national assessments are summative, occurring at the end of a significant period of instruction. They are usually single-time assessments of learning that provide a snapshot of what students can recall and do at the time, usually conducted in sterile and stressful environments (Stiggins & Chappuis, 2006). Such assessments often negatively influence teachers and students by unintentionally promoting teach-to-the-test classroom instruction, drill-and-practice activities and rote learning. This raises questions about the meaningfulness of sole reliance on these assessments as data sources upon which curricular, policy and instructional decisions are made. Traditional mathematics examinations with multiple calculation exercises for students to perform cannot assess students' investigative and problem-solving skills involving real-world problems; these insights can only be achieved over time in the classroom.

Teaching and learning drive improvements in student outcomes, so these processes deserve deliberate and focused attention. The inclusion of formative assessment or assessment *for* learning in classrooms facilitates continuous and on-going exchanges between teachers and students for improving teaching and supporting learning (Black & Wiliam, 1998a; Perrenoud, 1998; Brown, 2011), and moves assessment beyond the purpose of assigning a pass/fail status to students. Formative assessment integrates the social constructivist approach to learning (active co-construction of knowledge) into instruction and highlights the *process* of learning alongside the product of learning that is typically evidenced by a single test score outcome. Boud and Falchikov (2006) argued that assessment plays a critical role in developing students' knowledge, skills and dispositions for learning beyond their formal schooling years. Formative assessment, also referred to as continuous assessment and school-based assessment (SBA), reduces teachers' over-reliance on public examinations for making meaningful instructional decisions and improving student learning and achievement (OECD, 2005).

Defining school-based assessment

SBA refers to a particular type of formative assessment of students that is embedded in teaching and learning, and which positions the teacher in a critical role in assessing student learning. Formative assessment used in this way allows the teacher to collaborate with students to design and plan an assessment task, and to guide and monitor students' progress through the steps involved in executing and completing the task. SBA is typically integrated into the curriculum and instruction provides opportunities for students to learn content within the context of the assessment task. The teacher collects samples of student work and modifies instruction and learning activities to align with students' learning needs to complete the task. The teacher provides timely and constructive feedback to students on their progress to allow them to improve their learning over time.

In countries such as Hong Kong (Tong & Adamson, 2015), Zambia (Kapambwe, 2010), Tanzania (Byabato & Kisamo, 2014), Malaysia (Hashim et al., 2013), and Ghana (Awoniyi, 2016), SBA has been integrated into public examinations that result in exit certification from secondary school. The use of SBA in this way has been the general approach to assessment by the CXC in the English-speaking Caribbean, and this interpretation of formative assessment is the focus of this paper. In most of the subject examinations, the classroom teacher guides, monitors and grades students' SBAs that contribute a percentage to the overall student grades on high-stakes public examinations. SBA used in this way is a planned and systematic assessment strategy that aggregates a student's scores on a teacher-assessed task related to school-based activities during the school year and the student's score on a public examination. Both forms of assessment are directed by a curriculum that has been provided by an agency external to the school (De Lisle, 2015). Burke (2011) described this approach as a balanced assessment that provides better insight into student accomplishment.

Benefits of school-based assessment

Theoretically, SBA removes the sole dependence on students' scores on public examinations for information about student learning (Veloo et al., 2015). For teachers, the formative nature of SBA provides insight into students' understanding of what is being taught and highlights areas of strength and difficulty for students that can guide teachers' feedback on their progress and learning (Chappuis & Chappuis, 2008). Teachers also gain insights into the effectiveness of their instruction and can use them to create a variety of assessment tasks to capture students' strengths and abilities, which is especially good for low achievers (Black & Wiliam, 1998b). In some educational contexts, including Hong Kong (Tong & Adamson, 2015), Zambia (Kapambwe, 2010), Tanzania (Byabato & Kisamo, 2014), Malaysia (Hashim et al., 2013), and Ghana (Awoniyi, 2016),

the SBA has been integrated with summative assessment, which allows teachers to contribute to students' achievement outcomes. Together, these insights can increase teachers' motivation for teaching. Black and Wiliam (1998b) have pointed out that SBA allows students to actively participate in their learning by allowing them to reflect on their performance and devise strategies to improve.

The OECD (2005) asserted that formative assessment should guide students toward developing their metacognitive skills for learning, which would further equip them with tools for learning and strategies for problem solving. SBA, as a means of formative assessment, can aid students in summarizing their knowledge and skills in various formats that highlight their abilities and strengths through assessments that are designed to do so, which are atypical of traditional summative assessment. SBA can also reduce the anxiety associated with high-stakes public examinations, and offers teachers the opportunity to use assessment to promote student development and growth (De Lisle, 2013). Together, these outcomes contribute to students' developing self-regulated and independent learning habits.

With reference to mathematics, the National Research Council (2005) highlighted the need to harness the informal innate mathematical reasoning ability which we all possess and which schooling can stifle, and to build on existing knowledge and conceptions when introducing new ideas and concepts. A project-based SBA would allow students to use their innate mathematical reasoning to identify a problem and, through the process of refinement, arrive at the most efficient solution. The project also would allow students to clarify, compare and devise alternative solutions through discussion with peers. As far back as 1996, Parke and Lane reported that across six schools which they studied, teachers reported that they gained insight into students' conceptual understanding by comparing their explanations. This led these researchers to modify their instruction in order to clarify, for students, the nature of the tasks and the ensuing explanations. This project-based approach to the SBA is the basis of the CSEC M-SBA.

Teachers' experiences with SBA

SBA has been widely debated in the education community, and in the Caribbean its contribution to students' exit grades makes it a research imperative. Stanford et al. (2015) differentiated between dissemination of information about an educational innovation and propagation of it to the extent that its adoption is successful. They opined that propagation is successful when the innovation aligns with the needs and interests of its users and if those users are supported during its implementation. Success also depends on the effective dissemination of information about the innovation. Stanford et al. also highlighted the importance of change theory in moving users of an innovation from trial to adoption. They reminded readers that change occurs over time, beginning

with consultations with adopters, developing their awareness about an innovation through appropriate dissemination channels, and utilizing different strategies during the implementation that target users of the innovation in the particular educational context. Inadequate support for adopters from dissemination to propagation has implications for the success of the innovation because, as Black and Wiliam (1998a) reminded, regardless of how compelling the evidence of its benefits, teachers will resist adoption of an educational innovation if they are not assisted in translating innovations into practice.

Although SBA is not new, in some educational contexts it might be a novel approach to some users. In the case of the Caribbean, for example, SBA has been an integral component of CSEC examinations in many curriculum subjects, but its integration into the CSEC Mathematics made it an innovation to mathematics teachers who have not had exposure to this form of assessment, even when they were students themselves. One might assume that mathematics teachers would be willing to adopt the M-SBA because their colleagues in other curriculum subjects had already been managing SBAs in their areas for many years. However, Stanford et al. (2015) pointed out that there is no evidence to support Seymour's theory that the success of an innovation in one context is evidence of success for others adopting the same innovation. They highlighted the importance of identifying the needs of the users, engaging them in using the innovation and they stressed also that following up with feedback from them about the innovation can strengthen the chances of a successful adoption.

Stanford et al. (2015) cited authors such as Litzinger et al. who advocated the use of multiple dissemination strategies to inform the users about the innovation, including workshops and electronic sources to support propagation of the innovation. Henderson et al., according to Stanford et al., advised innovation developers to support new adopters to minimize barriers to successful adoption, including providing documentation and other materials. These suggestions find validity in a number of studies that preceded them. For example, Yip and Cheung (2005) reported that Hong Kong teachers who were implementing a version of SBA articulated concerns about adequate support for them in areas such as information and resources necessary for their management of SBAs. Nair et al. (2014) reported similar findings of their study in Terengganu. Additionally, Malakolunthu and Hoon (2010) reported that teachers in Kuala Lumpur desired support in understanding the objectives and purpose of the SBA, and needed specific guidelines to monitor and guide students, and for grading SBAs. Therefore, there is support in the literature for the notion that it was incumbent on the CXC to attend to the diffusion and propagation processes in order to ensure the successful adoption of the M-SBA.

Teachers' personal beliefs about teaching and learning are critical determinants of their assessment practices. If teachers do not believe that SBAs contribute to students' growth

and development, and will not produce gains for their own practice, it is unlikely they will consider the SBA as an opportunity to reflect on and adjust their classroom practices to actively engage students in learning. However, as Alaba (2012) reported, even when Nigerian teachers understood the benefits of SBAs, they resisted implementing it, citing reasons such as poor understanding of it, and the practicality and reasonableness of integrating the SBA into instruction. A significant concern reported in the literature on SBAs includes teachers' assessment competencies (Yip & Cheung, 2005; Byabato & Kisamo, 2014; Singh et al., 2017; Williamson, 2017). In fact, McMillan (2000) reported that teachers' knowledge and understanding of assessment affect how well they integrate assessment into instruction. Heritage (2007) extended the need to address teachers' knowledge of assessment to include their knowledge about their students and their pre-knowledge, their curriculum content knowledge and their pedagogical content knowledge. These are important considerations.

The literature is rife with reports about teachers who struggle to integrate SBAs into their teaching. For example, Veloo et al. (2015) noted in their Malaysian study that secondary school teachers reportedly struggled to integrate content and activities related to SBAs into instruction. Similar findings were reported by Lukman and Uwadiogwu (2012) and Amoako et al. (2019) about Nigerian teachers. The more knowledgeable and competent teachers are about assessment practices, the better they can assess their students, to the extent of selecting effective assessment approaches to improve their students' competencies. Malakolunthu and Hoon (2010) reported that teachers in Kuala Lumpur lacked adequate knowledge and understanding about SBA and struggled to manage SBAs in their schools. Lukman and Uwadiogwu also noted this about teachers in Nigerian schools. John (2002) highlighted the importance of teachers' knowledge of the SBA and its components in their successful adoption and management of it for the benefit of students.

Another concern arising in the literature on SBAs is teachers' readiness or preparedness to manage the SBAs. Stiggins (2005) affirmed that when teachers are not knowledgeable about good assessment practices, they are unwilling to attempt them. Cheah (2010) reported that teachers' knowledge, skills and attitudes affect their success with SBAs, noting that professional development contributed to improving teachers' understanding, competence and confidence in integrating the new primary mathematics assessment requirements. As Awoniyi (2016) noted in her study of Ghanaian teachers, and Singh et al., (2017) noted in their study of Malaysian primary school teachers, when teachers are not knowledgeable about assessment of SBAs in particular, they struggle to integrate them into their practice, to grade them, and generally struggle with their self-confidence in managing the SBA. In fact, for success with SBAs, teachers must become assessment literate (Stiggins, 1995), meaning that they must acquire the knowledge, understand the theoretical and philosophical foundations, and develop the skills associated with

integrating various forms of assessment strategies into their practice. It is apparent that using SBA for formative purposes rather than as simply another form of assessment of learning requires teachers to develop their knowledge of assessment and skills associated with using assessment in this way (Bennett, 2011). Authors including Black et al. (2004), and Darling-Hammond et al. (2009) expressed the view that teachers need substantial professional development related to formative assessment in order to effectively and efficaciously integrate SBA into their practice. In fact, Darling-Hammond et al. were of the view that teachers require a minimum of 50 hours of professional development to bring about significant changes in their practice.

Other researchers also noted that teachers perceived that the SBAs negatively impacted their workload (Byabato & Kisamo, 2014; Kapambwe, 2010; Raman & Yamat, 2014; Williamson, 2017; Yip & Cheung, 2005), particularly where class sizes are large and students are noisy (Kapambwe, 2010; Lukman & Uwadiogwu, 2012; Raman & Yamat, 2014), and when some students require more feedback than others (Tong & Adamson, 2015). Majid (2011) noted that these concerns centred around time for administration, paperwork and moderation of SBAs.

Yet another concern of teachers revealed in the literature is whether SBAs impartially reflect students' learning, given nuances in school contexts and ethical practices (Williamson, 2017). Researchers such as Cheung (2001), Nair et al. (2014), Veloo et al. (2015), Singh et al. (2017), and Awoniyi (2016) also noted the latter concern in their respective studies in Hong Kong, Malaysia and Ghana. They reported that teachers voiced concerns about colleagues who produced false grades for their students in order to improve their achievement outcomes. This is no minor issue, as Cheung and Veloo et al. pointed out, but it can be overcome by training for teachers in the assessment process, including lesson planning, and assessment and rubric development.

Tong and Adamson (2015) highlighted a student-related teacher concern regarding the SBA: students' commitment to the SBA. They pointed out that the additional demands on students' time to complete the SBAs and meet deadlines might compete with their other responsibilities and commitments. If this is the case, then the benefits that should accrue to students might not be realized. In conclusion, it appears that although SBAs can contribute to the outcome of high-stakes public examinations, they have not solved the problems they were intended to mitigate (Williamson, 2017).

CONTEXT OF THE STUDY

Students in Trinidad and Tobago sit high-stakes public terminal examinations at the end of Year 5 of secondary school (Grade 10). These examinations are overseen by the CXC and use multimodal assessment to capture the abilities of diverse student populations

across the Caribbean (De Lisle, 2015). The curriculum subjects that the CXC examines include an SBA component, which in most subjects is a coursework project or assignment that is “administered in schools and [graded] by the students' own teachers” (CXC, 2013, p.1), during Grades 9 and 10. The CXC (2015a) describes the SBA as:

an integral part of the course covered by the students. The syllabi for the respective subjects provide the teachers with guidelines for selecting appropriate assessment tasks that are valid measures of the students' ability and that will give reliable estimates of their achievement in the SBA component of the course. The SBA is intended to assess the knowledge, skills and attitudes germane to the subjects which are not easily assessed in external examinations. For the SBA, teachers construct activities which enable students to demonstrate their achievement of the objectives outlined in the syllabus (p.1).

The stated purpose of the SBA is to develop in Caribbean citizens life-long capabilities in “critical and creative thinking, problem solving, logical reasoning, modelling ability, teamwork, decision making, research techniques, information communication and technological competencies” (CXC, 2015b, p. 1). The SBA contributes to students' overall grades in the CSEC examinations that are externally moderated by the CXC, the external agency responsible for developing curricula and directing public examinations for the English-speaking Caribbean. There is no requirement for students to earn a “good” grade in the SBA in order to earn a passing grade in any CSEC examination. Students' overall grade is the aggregate of the SBA grade submitted by their teachers and the grade they earn in the written external examinations.

Since its inception in 1979, the CXC has expanded its subject offerings as well as the subjects that have an SBA; mathematics was included in 2016 for the first time. The addition of M-SBA resulted in protestations among mathematics teachers and the teachers' unions in Trinidad and Tobago and across the Caribbean in 2017, following the still unresolved 2015 protestations emanating from Barbados. Both governments responded with warnings of disciplinary action against non-compliant teachers (“T&T gov't warns of implications for teachers”, 2018). Although teachers' resistance appears focused on compensation, through informal conversations with teachers in Trinidad and Tobago, we have gleaned that Trinidad and Tobago teachers are aggrieved by other issues that could jeopardize the success of the M-SBA. CSEC Mathematics was formerly assessed through a summative assessment comprising a multiple-choice examination and a problem-solving, essay-type examination. The change in 2016 that integrated the M-SBA into the assessment resulted in a balanced assessment (Burke, 2011); the M-SBA contributes 20% to the overall grade. The CXC clearly articulated its rationale for integrating the M-SBA into the assessment process:

to individualise a part of the curriculum to meet the needs of students ...[through] feedback to the student at various stages of the experience ... to build the self-confidence of students as they proceed with their studies. ... [to] facilitate the development of the critical skills and abilities that are emphasised by [mathematics] ... and [to] enhanc[e] the validity of the examination on which candidate performance is reported (CXC, 2016, p.1).

The M-SBA was intended to be a mathematics project that investigated real-world everyday phenomena as students used the mathematics they were learning in the CSEC Mathematics syllabus, under the guidance of the mathematics teacher (CXC, 2016a). Teachers and students would co-design the projects, and teachers guide and monitor students' work, providing feedback as necessary for improvement. Teachers would grade the projects using the guidelines and rubrics provided in the Mathematics Syllabus and submit a grade to CXC just prior to the CSEC Mathematics examination. Teachers were expected to integrate teaching and learning activities into their instruction, including teacher-student and student-student discussions about the M-SBA. This approach appears to model a backward design (Mueller, 2016), in which assessment drives the curriculum. Thus, the teacher first determines the tasks to be performed and the skills that students will need, then the curriculum is developed (or in this case, re-organized) so that teachers can adjust their instruction to support students' skills development and acquisition. The assessment tasks would allow students to demonstrate their conceptual understanding by producing a final product, with a focus on helping students develop and use high-level cognitive reasoning, as well as on their growth and performance (Dikli, 2003).

The CSEC Mathematics syllabus and the M-SBA were intended to facilitate intangible aspects of learning such as "critical and creative thinking, problem solving, logical reasoning, modelling ability, teamwork, decision making, research techniques, information communication and technological competencies for life-long learning" (CXC, 2016a, p. 1). Other skills include collaboration and communication, given that students are allowed to engage in group projects for the M-SBA. However, such assessments can be subjective and bring into question their own validity and reliability, as well as the effort required to develop, monitor and score same (Dikli, 2003). Fortunately, as Kitiashvili (2014) argued, the gap between actual and desired levels of performance can be narrowed through constructive feedback for improvement. This, then, requires the teacher's input in students' work throughout the project's duration. This latter point supports the CXC's attention to the relatively low pass rate in CSEC Mathematics that marginally increased from 41% in 2016 to 44% in 2018 (CXC, 2018). Retired Deputy Principal of The University of the West Indies, Cave Hill Campus, Professor Pedro Welch

defended CXC's introduction of the M-SBA by highlighting the opportunity for teachers to play a role in assessing the content they taught and contributing to their students' grade ('Massa Day' not done – teacher, 2017).

STUDY DESIGN

This qualitative study with a phenomenological design was selected to explore and document the subjective perspectives of the teacher-implementers of the M-SBA in thick, rich descriptive detail, based on their experiences during the implementation. Subscribing to the epistemological perspective that regards the people involved in implementing the M-SBA as critical data sources for the research questions, it was natural to engage them in the data collection process (Groenewald, 2004). Additionally, understanding that researchers hold their own beliefs about a phenomenon and struggle to extricate themselves from their own presuppositions, it was determined that, as a methodology, a phenomenological design provided that explorative research design that can restrict researchers biases. Therefore, to understand participants' perspectives on the M-SBA, during data collection they were encouraged to describe their experiences and to provide insights into how these experiences have shaped their perspectives of the M-SBA. The phenomenological approach allowed themes to emerge from the data rather than be imposed on the data.

The overarching research question that focused this study was: What are first-time mathematics teacher-implementers' perspectives on the CSEC M-SBA?

This was decomposed into the following sub-questions:

1. What were the teachers' understandings of the M-SBA?
2. How prepared were the teachers to implement the M-SBA in their classrooms?
3. How did the teachers perceive that the M-SBA affected teaching and learning?

Sample

Data were collected from nine mathematics teachers from public secondary schools in one education district in Trinidad and Tobago. They were teaching Grade 9 and Grade 10 students (ages 15 – 18 years) who were preparing for the CSEC Mathematics examination in 2018, and who would be the first cohort to complete the M-SBA. The sample comprised two male and seven female teachers whose ages ranged from 28 years to 45 years, and teaching experience from 5 years to 12 years. Of the nine, four taught at co-educational schools, three taught at single-sex girls' schools, and two taught at single-sex boys' schools. These participants were purposefully selected as, according to Hycner (as cited

in Gorenwald, 2004), the phenomenon under study drives the research method and the choice of participants. In this case, the experience of the participants in implementing the M-SBA aligned with the purpose of the present study. They had also attended workshops hosted by the Curriculum Division of the Ministry of Education and the CXC to disseminate information to teachers about the M-SBA, and to provide initial training for implementation.

Data collection

Data were collected through a 90-minute semi-structured focus group discussion with all nine participants, to facilitate a flexible and unstructured exchange of ideas that elicited information generated from their interactions in the interview setting (Gibbs, 1997; Packer-Muti, 2010). A group of this size was appropriate for encouraging an exchange of individual ideas while capturing the inherently diverse perspectives of participants about a topic (Onwuegbuzie et al., 2010). The curriculum supervisor member of the research team assumed the role of focus group facilitator, and monitored the interactions to identify and manage dominant personalities who might influence the thought processes of others, as well as to recognize whether participants' contributions mirrored groupthink to create a cohesive voice. Simultaneously, a second researcher observed the environment and participants' exchanges and recorded the participants' moods and observable nonverbal communication in order to enrich descriptions and interpretations that verbal data alone could not provide (Fonteyn et al., 2008). Both researchers made jottings during the interview in order to capture their thoughts and observations (Patton, 2002).

The discussion was guided by a protocol comprising twenty main questions in three areas that emerged from reconnaissance prior to the research as well as the research literature. The three areas were: (i) teacher understanding of the M-SBA, (ii) teacher preparedness for managing the M-SBA, and (iii) perceived effects of the M-SBA on teaching and learning. Patton (2015) advocated the use of an interview protocol, which can also be applied to focus group discussions. The protocol helps researchers craft questions that are aligned with their research questions that are clear, devoid of jargon, and of a good quality, and to sequence them so that they elicit the required relevant and meaningful answers that articulate participants' perspectives (Patton, 2015). The protocol also guides researchers during the interaction with participants. Table 1 provides a matrix that aligns the focus group discussion questions with the research questions.

Table 1

Focus group discussion questions matrix.

Question	RQ 1	RQ 2	RQ 3
Teachers' understanding of the M-SBA			
1. How did you find out about the M-SBA? How do you feel about the way it was introduced to teachers and students?	X		
2. If you knew about the M-SBA before it was introduced, what were your understanding of its nature, goals and purpose?	X		
3. How has your understanding of the nature, goals and purpose of the M-SBA changed since it was introduced?	X	X	
4. When did you first receive any orientation/training for the introduction and management of the M-SBA, and from whom?	X	X	
5. If you participated in any orientation/training for the management of the M-SBA before its introduction, what was the nature of it? Describe your experience.	X	X	
Teachers' preparation for managing the M-SBA			
6. What resources/materials were you provided relating to the M-SBA ahead of its introduction, and by whom?		X	
7. If you participated in any training for the M-SBA since its introduction, what was the nature of it? Describe your experience.		X	
8. If you participated in any orientation/training for the management of the M-SBA, how did it enlighten your theoretical understanding of assessment in general, and SBA in particular?		X	
9. If you participated in any orientation/training for the management of the M-SBA, how did it enlighten your understanding of your role in the assessment process?		X	X
10. If you participated in any orientation/training for the management of the M-SBA, how did it affect your assessment capabilities?		X	X
11. If you participated in any orientation/training for the management of the M-SBA, what practical suggestions for management did you glean?		X	X
12. What types of support do you still need to successfully manage the M-SBA, and from whom? Describe the nature of the support.		X	X

Question	RQ 1	RQ 2	RQ 3
Perceived effects of M-SBA on teaching and learning			
13. If you participated in any orientation/training for the management of the M-SBA, how did it affect your ability to select teaching models that integrate M-SBA activities into classroom instruction?			X
14. In what ways do you believe that the introduction of the M-SBA enhances the current mathematics curriculum and students' experience of it?			X
15. How has implementing the M-SBA affected your instructional practices up to this point?			X
16. What benefits do you [as teacher] anticipate deriving from the M-SBA as a fixed component of the mathematics curriculum?			X
17. How has implementing the M-SBA affected your students up to this point?			X
18. What benefits do you expect your students to derive from the M-SBA experience in the future?			X
19. What are some issues you anticipate could compromise the expected benefits of M-SBA to teaching and learning?			X
20. Having the experience up to this point of managing the M-SBA, what concerns do you hold about the M-SBA, in general?			X

Participants were encouraged to share their thoughts freely and were probed for elaboration and clarification of unexpected, interesting and peculiar responses. An independent professional audiotaped the discussion, with explicit permission from participants. Subsequently, the discussion was transcribed by researchers and emailed to participants for member checking to ensure its accuracy, for clarification and elaboration, and to improve credibility of findings (Lincoln & Guba, 1985).

Data Analysis

Data analysis began with researchers repeatedly listening to the audio-recorded discussion and simultaneously reading the transcript in order to become intimately familiar with the data, and to detect nuances in participants' experiences and perspectives. Thematic analysis (Braun & Clarke, 2012) was used to identify patterns that audio recordings and transcripts cannot provide individually. Initial line by line coding of the transcript permitted researchers to label relevant words, phrases or sentences that became codes, without restricting the number of emerging codes (Charmaz, 2006). Focused coding followed, which allowed the 53 emerging codes to be reduced to 11 categories aligned with the research questions based on their similarity or congruence; selective coding then permitted retention of themes that fit these criteria. The approach

to coding followed the master coder process (Syed & Nelson, 2015), in which one researcher analysed the complete dataset, followed by a second researcher (a reliability coder) coding segments of the data independently to establish inter-rater reliability. Codes and themes from the two researchers were then compared in order to determine nuances in their interpretations of segments of texts and the emerging codes and themes; they negotiated agreement on the final themes emerging from the data.

Ethical Considerations

The nature of the present study required participants to voluntarily provide information openly. Therefore, critical for the credibility and ethical validity of this research that involved human subjects was the informed consent process. Participants were informed about the purpose and rationale of the study, the methods and procedures that would engage participants, the potential benefits and risks to them, the voluntary nature of their participation. They were also informed of their right to withdraw or not participate. They were also assured of their privacy and confidentiality through the use of pseudonyms, the nature of the information being sought, and how the information would be used (Creswell, 2013; Merriam, 1998; Miles & Huberman, 1994). These issues were addressed with participants prior to data collection, in writing, when they were invited to participate, and again at the start of the focus group discussion. They all signed an informed consent form indicating their agreement with the disclosed information and procedure for data collection.

Delimitation of the Study

The study was delimited to Trinidad and Tobago, one of the Anglophone Caribbean countries that have implemented the M-SBA. It involved teachers from one of the eight educational districts in Trinidad and Tobago. The researchers were directly responsible for providing instructional support to teachers in that district. The study was further delimited to the nine teacher-implementers who were actively preparing students for the revised CSEC Mathematics 2018 examination.

Limitations of the Study

As with all research, the present study was limited in some ways. For example, the focus on one Caribbean country, Trinidad and Tobago, brings into question the generalizability of the findings reported here regarding the widespread implementation of the M-SBA across the Caribbean. Similarly, the small sample of teachers might be considered inadequate to truly capture the breadth of experiences of actual teacher-implementers of the M-SBA across the approximately 150 secondary schools in Trinidad and Tobago. Further, this qualitative study with a phenomenological design provided only a glimpse into these participants' experiences and perspectives on an educational innovation at a

particular time, which may change over time as their efficacy in managing the M-SBA grows with experience.

FINDINGS

The results of data analysis are presented under three themes that align with the research questions: teachers' understanding of the M-SBA and its purpose; effects of implementation on teaching and learning; teacher preparedness for implementation. These themes are elaborated through participants' voices through direct quotes from the focus group discussion.

Teachers' Understanding of the M-SBA

Lack of teacher input. Participants reported that their understanding of the M-SBA was sketchy at the beginning of the implementation process, and this had not improved much at the time of the focus group discussion. As the primary implementers of the innovation, they believed that teachers were not widely consulted about the M-SBA, and too few teachers had been given the opportunity to examine the proposal and provide feedback to the CXC. Even though some teachers had the opportunity to review and comment on the proposed M-SBA, as a teaching fraternity, they did not have any reports on the feedback to the CXC. One participant reported: "[some teachers] were asked to give feedback on the proposal. That was not consultation". Another added: "There was no consultation for us to vent or give ideas or anything of the sort". One of the younger teachers added: "Surely if something as big as an SBA was coming, we would have consultation". Participants agreed that the lack of information about the M-SBA concerned them because they did not understand the nature of the assessment, the rationale for its implementation, and how it would impact their teaching and workload.

Dissemination of information. Participants appeared further aggrieved by the notification process and claimed that they had received notice of the implementation of the M-SBA through various sources. One participant reported: "I heard about the SBA from teachers during marking CSEC a few years ago but we didn't hear anything further so we didn't pay attention to it". One participant reported that formal notice of its implementation was sent to schools via email in 2016, with instructions that they were to prepare students for examinations in 2018. One participant, however, conceded that there had been some dissemination: "I heard about it from my HOD. I haven't seen the email. The HOD went for training and we got copies of the workshop handouts". Another participant was informed about the implementation by a teacher at another school.

Inadequate orientation. Participants agreed that they were not provided with sufficient information about the nature and format of the M-SBA and found it difficult to interpret the nature of it in order to be able to guide students appropriately. One participant claimed: "I only know what was given to me by our [Head of Department], and I don't feel that it's very clear. I feel that we need training to do this". Consequently, they felt that they were being rushed to implement an innovation that they were ill-informed about and ill-prepared to integrate into instructional activities.

Inadequate resource materials. Information which participants were expecting to receive from the CXC concerning the M-SBA included specimen projects and rubrics. However, participants who attended the one workshop reported that the sample M-SBA projects and rubric were inadequate and so ambiguous that they did not clarify participants' understanding of the nature of the M-SBA. They claimed to experience a general sense of uncertainty about the M-SBA because CXC continuously updates its guidelines, and without concrete evidence of the format of the M-SBA, they were unclear about what to take to their students. For example, the participants were concerned about managing the large number of M-SBAs because mathematics is a compulsory subject and mathematics classes tend to be larger than other curriculum subject areas. Yet, they had heard rumblings from other teachers that students would be allowed to complete the M-SBA in groups; at the time of the discussion, they had received no official documentation to support this claim and were uncertain about its veracity. One participant opined: "Something as simple as making a choice whether to do the SBA individually or as a group – that is still not clear". Another continued: "How do I mark the students? Do they submit one paper? Do they all get the same mark? What's happening? We got nothing clearer than that". Yet another participant chimed in, with frustration: "Or every student handing up? Won't all members of a group have the same SBA? Then, in terms of grading it, what is going to happen there"?

Participants also raised concern about what they described as a flawed specimen M-SBA that was included in the syllabus: "All we have is the syllabus and the specimen that is included at the back of the syllabus ... the example has flaws". One participant referred to it as "a bad example". Therefore, they expected to gain insight into the format of the M-SBA during the workshop but were disappointed to report that even that sample was significantly flawed. They left the workshop feeling disappointed with the experience and unprepared to guide their students. One participant reported that she sought assistance from teachers in other curriculum subjects who had been managing SBAs for many years: "I took it upon myself to create a model for my students so they'd have a sort of example. I collaborated with other departments and they suggested that students get a separate copybook in which they could write out ... I have adopted this technique thus far. ... I have to measure my model with the non-example [flawed sample] and the so-called rubric that we have". While the other participants commended her for her proactive approach and

acknowledged her contribution as good advice moving forward, they remained displeased with the CXC's and Ministry of Education's general disdain for them as professionals.

Teachers' Preparedness for Managing the M-SBA

Nature of the M-SBA. Participants unanimously agreed that they were not prepared to manage the M-SBA, even though it had been talked about by the CXC for a number of years prior to 2018. Besides the lack of information about the nature of the M-SBA, participants were concerned about the absence of training to improve their instructional skills and their assessment competence, and the administrative role that managing the M-SBA introduced into their practice in the area of grading. Besides receiving inadequate information about the nature of the M-SBA, participants unanimously agreed that managing the M-SBA required deliberate and focused training to prepare them beforehand. They argued that because they had not been provided with sufficient advance notification by the CXC, they had not sought out opportunities for professional development in assessment. Moreover, they claimed that the CXC and the Ministry of Education did not provide adequate training in the single workshop for teachers. Consequently, they did not feel confident in their ability to efficaciously guide students and manage the M-SBA.

Inadequate training. Unanimously, participants perceived that the workshop hosted by the CXC and Ministry of Education was for disseminating information rather than training. One participant opined: "Teachers' ability must also increase through training. There should be enough workshops, not just one. As it is now, we leave the workshops no wiser than before. We still don't know what is happening". They agreed that additional training in specific areas was critical for their success in managing the M-SBA. Participants who attended the workshop noted the poor teacher attendance and were generally dissatisfied with the outcomes of the workshop, up to that time. They opined that many schools did not receive timely notification about the workshop; two of the participants had not attended the workshop for that reason. Their concerns about training were two-fold: (i) their ability to integrate teaching and learning activities into their instruction that would support students' completion of the M-SBA, and (ii) their own competencies in assessing students' work in this format. They agreed that these aspects of their work were under-developed and needed attention in preparation for the M-SBA implementation.

Managing students. Participants acknowledged how demanding managing individual M-SBA would be for classes that often exceeded 30 students, but were even more alarmed at the prospect of managing group M-SBA. They all acknowledged that whether they were

managing individual or group M-SBA, the prospect of chasing behind students to insist that they submit their work for review and to meet deadlines was daunting: "You hear numerous other teachers complaining about running down students for SBA. If you leave it up to the students, you will never get the SBA on time. It is a lot of work on the teachers' part". Consequently, though initially group projects appeared to be less demanding on the teacher, students who work in groups could prove equally or more challenging to manage. One participant added: "I do see myself having to be more organized and planned to keep track of students' work".

One participant shared his concern about the diversity in his students' ability and proclivity for mathematics, which received endorsement from other participants. Students at his school were placed in mixed-ability classes, and while some students could work independently of the teacher, others needed constant supervision and support. He was concerned about his competence in creating and guiding mixed-ability groups within his classes, especially without specific and clear guidelines about group M-SBAs from the CXC. He questioned how he could group them so that they would work together well and learn from each other during the process and that their individual contributions to the M-SBA would produce an acceptable outcome. This concern supported participants' claim that they were not prepared to support students' research projects because they had not had exposure to training for supervising research projects, and they had not been exposed previously to similar forms of assessment. They agreed that ongoing support for teachers in this regard was the responsibility of the CXC and the Ministry of Education for successful implementation of the M-SBA to be realized.

Academic integrity. The aforementioned concern is linked to other concerns about the diversity among schools in Trinidad and Tobago, and the apparent differences among these schools and students within them. The primary concern was differential access to resources across different types of schools, which could affect teachers' ability to support student learning. Another concern was the readiness of students from different schools to learn. One participant opined: "[Some] schools were underprivileged and the private schools had all the resources". She claimed that the attitude of teachers at different schools with respect to the level of teacher input in students' work could affect students' grades: "There'd be one school where the teacher gives the title, say, probably a nice booklet where the students just have to fill in the blanks while at another school, there will be little or no help". This concern reflected participants' concerns about academic integrity among teachers and within institutions, which could affect students' assessment grades. One participant elaborated on this point and boldly stated: "Yes, there will be cheating, especially if we have this group-work thing". There was a common sentiment among participants that all schools want their students to succeed, and this created an environment that could invite opportunities for cheating, on the part of the teacher and the student.

Effect of the M-SBA on Teaching and Learning

Management and administration. Participants' perspectives on how managing the M-SBA affected their teaching were both positive and negative. They voiced their concerns about actually grading the M-SBA, which included iteratively reviewing submissions in order to monitor students' progress and providing formative feedback for improvements. They did not feel adequately prepared to integrate teaching and learning activities that would support students in completing the M-SBA into their teaching time, especially if this required them to review content that was covered in previous grade levels. They perceived that managing the M-SBA, coupled with their lesson preparation and actual teaching, increased demands on them. They based this conclusion on the experiences of other subject teachers, as well as their own observations of their colleagues' management of SBAs in other subjects. In short, participants felt that managing the M-SBA without proper training would be too demanding on them.

Participants reported that managing the SBA was proving to be burdensome. Their practice, at that time, was to dedicate an entire lesson to students working on the M-SBA rather than allocating time during lesson, at regular intervals, to allow students to work on them. They perceived that this approach slowed down the teaching-learning process; but they had not yet figured out how to integrate the M-SBA into regular instruction. In fact, one participant reported: "I don't even have enough time to go through with my class much less start an SBA". Another participant added: "It is upon me now to find time to go through and plan for an SBA when I have other classes to plan for as well". They all agreed that they knew that this approach was an inefficient use of teaching time, and probably hindered rather than helped their students achieve the intended learning outcomes. They articulated their hope that once they became more familiar with the nature of the M-SBA and more efficient at managing it, they could better organize their lessons to more readily identify the mathematics content related to their students' research topic, and to highlight this to students during instruction. This would mean that they could more easily focus time during their lessons to allow students to work developmentally on their M-SBAs. One participant reported: "I do see myself having to be more organized to keep track of students' work." Their unfamiliarity with M-SBA and inadequate preparation time hindered their planning for integrating it into their lessons. Further, their students were not exposed to project work in their earlier years and also appeared to struggle with managing the M-SBA.

Expanding students' skills. They reported that the nature of the M-SBA required teachers to help students relate mathematical concepts to real life so that students "not

only deal with mathematics in the classroom but also outside". Another participant suggested: "The M-SBA will help [students] see mathematics from a different perspective in terms of their everyday lives and living as a whole". One participant suggested that the M-SBA would help students "make better decisions outside the classroom". Therefore, teachers must know their curriculum in order to be able to make these connections and decisions themselves; they would have to revisit their content knowledge and pedagogical approaches.

They believed that the M-SBA provided students with a practical approach to learning and doing mathematics, rather than the traditional approach of teacher-telling that most of them had become used to. One participant was concerned that students "were not exposed to writing projects at the lower levels", and the M-SBA required students to learn how to communicate their thinking about mathematics in report form, rather than in traditional paper-and-pencil assessments with multiple problems to solve. The M-SBA, they believed, would develop students' ability to communicate and discuss mathematical ideas in the future. However, participants were all concerned about the toll this would take on students who, they believed, "were already overburdened" with their other subjects, all of which had SBA components. Participants agreed that students would become overwhelmed by all the work and their interest would wane. It was in this light that they raised concerns about having to "add to [the] job description the word *nagger*", because they foresaw having to "ru[n] down students to get them to come and do the [M-SBA]".

Student commitment. There seemed to be a consensus that students were not yet committed to the M-SBA and that there was general apathy towards it because they did not appreciate its relevance to their future. They based their assertions on their own experiences, and on the experiences of colleagues in other subjects who had difficulty in monitoring students' work due to students' poor time-management skills and their overall negative attitude towards timely submission of projects. Their concerns were supported by comments from their students. One participant reported: "[Students] did not appreciate the relevance of the M-SBA in their real lives". Another participant reported: "Some students are going to approach the SBA as just another thing that they have to do in order to pass [CSEC mathematics]". Yet another participant lamented that she had to repeatedly remind her students of that, because she believed that they must be self-motivated to achieve. They all were concerned that students would withhold effort on the M-SBA until they were in Grade 10, just prior to sitting the CSEC mathematics examination. In fact, one of the younger teachers noted that at her school, the Grade 9 students had not started the M-SBA; so students are not enthusiastic about it and "[it] hasn't registered in their heads as yet".

Overall, the findings suggest that in 2016, when teachers were first officially informed about the formal implementation of the M-SBA, they lacked sufficient information about its nature and format, primarily because of the manner in which information was disseminated by CXC and the Ministry of Education and the inadequate sample M-SBA projects they received. They also felt rushed to begin the implementation before they had been adequately apprised of their role in the assessment; nor had they been trained to guide and monitor students' project work and provide meaningful feedback for improvement. They also did not understand how to format and score the M-SBA using samples and rubrics provided by the CXC, and still had to think through how the assessment would affect their workload. They considered themselves ill-equipped and ill-prepared to integrate the M-SBA into instruction and to assess students competently.

DISCUSSION OF FINDINGS

Success in CSEC Mathematics in Trinidad and Tobago is a requirement for employment and access to higher education; therefore, attention to the perspectives of contributors to student assessment outcomes is justified. This paper reports on a study built on three main outcomes in understanding the perspectives of a group of teachers in Trinidad and Tobago on the integration of a school-based assessment component into the CSEC Mathematics in 2016 for the first time. These are: teachers' understanding of the M-SBA, their preparedness to implement the M-SBA in their instruction, and the perceived benefits of the M-SBA to teaching and learning. Overall, findings suggest that while teachers generally appreciated the role of the M-SBA in developing 21st century skills of creative and critical thinking, problem solving and decision making, they foresaw numerous challenges to their managing of the M-SBA and assessing students competently and efficaciously.

Formative assessments, like the M-SBA, provide teachers with insight into the curricula they teach, and improve their assessment competencies. Parke and Lane (1996), Black and Wiliam (1998a) and Brown (2011) considered this imperative for improving teaching and learning. Participants in the present study seemed to echo these sentiments. They readily acknowledged the potential for improvements in teaching and learning, because the M-SBA would provide them with continuous insight into and feedback on their students' mathematical understanding by integrating activities related to the M-SBA into instruction. This is a benefit that the National Research Council (2005) identified, and Black and Wiliam (1998b) considered critical to struggling or low achievers.

Based on their understanding of the M-SBA, at that time, participants viewed it as a deliberate attempt to develop students' mathematical understanding and appreciation of mathematical applications in the real world, and important skills that students would

require in their daily lives beyond school. They specifically commended the inquiry-based nature of M-SBA with its attention to developing the thinking, inquiry, problem-solving, decision-making and mathematical communication skills through the real-world investigative, goals articulated in the CSEC Mathematics syllabus (2016), which it is not possible to evaluate in traditional assessments. However, participants voiced concerns about student interest in and commitment to completing the M-SBA – a concern Tong and Adamson (2015) recognized in their Hong Kong study – and the implications for their practice. Participants foresaw having to pursue students who would not be able to meet deadlines because students would have to submit an SBA for all the CSEC subjects they were pursuing, which could range between five and 10 in some schools. Tong and Adamson (2015) also recognized this as a reasonable concern for students who do struggle with managing their work and meeting deadlines. A related concern embedded in the perceived psychological burden students would experience having to produce another SBA is that it contributed so little (20%) to their final grade, and without the consequence of failing CSEC Mathematics if they earn a low score.

The reality of managing the M-SBA – tracking students' progress, providing timely and meaningful feedback to students, coupled with additional administrative responsibilities that included grading M-SBA, managing paperwork related to grading, submitting grades to CXC, and selecting moderation samples – was also a significant factor affecting teachers' preparedness to manage M-SBAs (Majid, 2011). Managing the M-SBA becomes even more burdensome for teachers who are unfamiliar with SBAs and have not been trained to manage and assess them (John 2002).

Teachers, given the primary role they play in the implementation of the M-SBA, can be major barriers to its successful implementation, especially when their knowledge about and understanding of such innovations are incomplete. This point was highlighted in the findings when participants in the present study said that they had received little information about the M-SBA before it was implemented by the CXC. They had insufficient time to assess its benefits to them and their students and to assess its impact on their practice. The role of consultation, dissemination of information, and feedback from (potential) users/ teachers in the success of educational innovations has been highlighted by Cheung (2001), Black and Wiliam (2008a) and Stanford, et al. (2015). John (2002), Cheah (2010), Kitashvali (2014) and Awoniyi (2016) include in these innovations those relating to assessment, such as SBAs. The M-SBA was a major change to the CXC's assessment of CSEC Mathematics that changed the expectations of teachers. Therefore, the discontent articulated by participants in the present study relating to limited consultation with teachers, inadequate and untimely information disseminated by the CXC and the Ministry of Education, as well as the informal channels through which they received information, was justified.

Facilitating the adoption of an innovation requires deploying scaffolds throughout the change process, starting before and continuing during the dissemination of information. Stanford et al. (2015) highlighted the importance of workshops and resource materials to support adopters of innovations, which contribute significantly to the success of the innovation. However, according to participants in this study, they did not receive such support before the M-SBA was implemented by the CXC. They reportedly heard of only one workshop to orient them to the M-SBA, and not all of them attended the workshop because they had not received official notification about it. Those who attended reportedly left without completely understanding the nature and purpose of the M-SBA. The supporting resource materials were minimally helpful and provided poor exemplars that contained numerous inaccuracies. The workshop had not addressed their training needs regarding their new role as assessors of the M-SBA. Taking everything into consideration, the workshop did little to strengthen their assessment competence. These findings echo those reported in various educational contexts by Yip and Cheung (2005), Lukman and Uwadiogwu (2012), Byabato and Kisamo (2014), Singh et al. (2017), Williamson (2017), and Amoako et al. (2019). The imperative for addressing these concerns is the fact that assessment outcomes lead to judgement about students' abilities (Aduloju, et al, 2016). Further, a justification for examining teachers' perspectives on the M-SBA is that CSEC Mathematics is an access point for employment and higher education in Trinidad and Tobago.

The case has already been made for the critical role of dissemination of information and supporting materials in the success of any educational innovation. This can be extended to the successful preparation of teachers to adopt an innovation. Researchers such as Cheah (2010) and Awoniyi (2016) noted that teachers' confidence in their ability to manage SBAs suffered as a result of feelings of unpreparedness. Participants in the present study who had attended the M-SBA workshop reportedly felt unprepared to manage the M-SBA. Related to this is teachers' ability to teach mathematics in ways that allow them to integrate the skills and concepts students need in order to complete their M-SBA. This responsibility requires substantial planning for integrating the M-SBA into instruction, at least in the early stages of adoption in which the participants were engaged, a factor that affects their workload. Such concerns are not limited to the participants in the present study, as is evident in reports of researchers such as Byabato & Kisamo (2014), Kapambwe (2010), Raman and Yamat (2014), Williamson (2017), and Yip and Cheung (2005).

Teacher preparedness to manage SBAs includes their ability to monitor and guide students appropriately and to assess them fairly and impartially. Participants in the present study associated fairness in assessment with their competence in designing tasks and rubrics that were valid and reliable, and that would not disadvantage their students

who were quite diverse in their interests, learning needs, achievement history, and personal backgrounds. These concerns mirror those reported by teachers in studies by Kapambwe (2010), and Raman and Yamat (2014). These included their concerns about managing M-SBAs for individual students in large classes that exceeded 30 students, especially in large mixed-ability classes in which some students require more support and intervention than others. Tong and Adamson (2015) noted the latter point in their study as well. Although the CXC permits the M-SBA to be conducted in groups, this does not reduce the burden on the teacher to monitor the learning and development of each student and to provide feedback that would be meaningful to each student in the group.

Diversity among schools can also affect the perceived fairness of the M-SBA where diversity in school contexts can differentially affect student outcomes, a point noted by Williamson (2017). Participants in the present study raised this issue because their schools differed in terms of their access to resources and parental and community support for students. Furthermore, pass rates in CSEC Mathematics among their schools ranged between 5% and 100%. They connected fairness to teacher impartiality and ethical assessment practices, cautioning that there were rumours within the teaching community that teachers at some schools would manufacture or inflate grades or excessively assist students with the M-SBA, thereby manipulating students' overall CSEC Mathematics grades. Although such claims have not been substantiated in Trinidad and Tobago, there have been some rumours that cheating had occurred in the SBAs in other curriculum subjects. The concern about cheating is not unique to Trinidad and Tobago, as evidenced by reported studies in Hong Kong (Cheung, 2001), Malaysia (Velloo, et al., 2015) and Awoniyi (2016). Cheung (2001) and Velloo et al. (2015) advocate teacher professional development in assessment as a way to limit the possibility of unethical practices in the management of SBAs.

As Black and Wiliam (2001) opined, in the early stages of adoption of an educational innovation, teachers can struggle with managing the change process if they are not adequately and appropriately supported throughout the adoption process. Repeatedly, participants in the present study indicated that they were struggling with integrating the M-SBA into their instruction. They wondered how they would cope with the additional demands on their time to plan with and for their students, monitor their students' progress, provide the much needed and valuable feedback, and assess the final outcome. All this, as they perceived it, directly increased their workload. Researchers Yip and Cheung (2005), Kapambwe (2010), Byabato and Kisamo (2014), Raman and Yamat (2014), and Williamson (2017) also noted similar concerns among teachers in their respective studies.

Throughout the interview with participants, they acknowledge the need for professional development to prepare them for managing the M-SBA, which was an innovation for them

even though SBAs had been integrated into almost all CSEC subjects. This perspective is congruent with the research literature that suggests that assessment-focused professional development that can develop teachers' literacy and improve their ability to meaningfully integrate formative assessment into their practice to improve teaching and learning (Bennett, 2011; Black et al., 2004; Cheah, 2010; Darling-Hammond et al., 2009; Stiggins, 1995). However, they offered no explanations for not taking personal responsibility for developing their assessment competence even after the implementation of M-SBA. They did not commit to pursuing professional development on their own or networking with other mathematics teachers, within or outside their schools. They were content to wait for the input of perceived experts external to their schools, through additional workshops and resource materials from the CXC and the Ministry of Education.

CONCLUSION

The findings of present study indicate that teachers were conflicted about the CXC's implementation of the M-SBA with respect to benefits to their own practice and their students' learning. They agreed that the rationale and anticipated learning outcomes for the M-SBA provided by the CXC were laudable, particularly because of the narrow impression about students' mathematical knowledge and abilities derived from high-stakes public examinations. They were also greatly concerned about how adopting the M-SBA would affect their own practice and the time needed to prepare for instruction and assessment. However, they believed that they needed focused professional development to adequately equip them to effectively integrate the M-SBA. They acknowledged reaching out to colleagues for guidance but did not recognize this as opportunities to network and collaborate with other mathematics teachers and teachers of other disciplines in order to create teacher learning communities to support any professional development endeavour (Saunders et al., 2009).

The M-SBA is still in the early stages of adoption, having been examined for the first time in 2018, and mathematics teachers have some catching up to do with their colleagues in other curriculum subjects who have been managing SBAs for many years. Therefore, the need for teachers to engage in ongoing professional development to enhance their assessment literacy is paramount, particularly because of the rich support in the research literature about the substantial influence of such exposure on teaching and learning. It is clear that while workshops and resource materials can provide some support for teachers, they often do not provide them with the level of interaction that teachers need for learning. Therefore, teachers need to create networks and learning communities within their schools and across Trinidad and Tobago to benefit from ongoing and regular collaboration with other teachers to further support their learning and their practice.

Teachers can use available ICTs to create teacher networks, and create learning communities within and outside their schools with teachers in other disciplines to learn from their experiences with managing SBAs.

Though the teachers in the present study appeared to passively approach their professional development to become assessment literate, particularly with respect to the M-SBA as a formative assessment, it is likely that the limited information, orientation and supporting resource materials they received had negatively affected their perspectives on the M-SBA. The CXC and the Ministry of Education would be advised to adopt a more focused approach to professional development that provides opportunities for teachers across Trinidad and Tobago to share their learning and experiences with each other during this early phase of implementing the M-SBA. However, teachers must spearhead their own development by actively seeking opportunities or lobbying the CXC and the Ministry of Education to design and facilitate workshops and other forms of professional development to develop their assessment literacy and competencies.

As final reflection on the present study, the authors believe that despite the limitations of the research, its narrow focus on Trinidad and Tobago, small sample size, and strict qualitative approach, it also offers significant benefits to its readers. In the absence of true generalisability of the findings introduced by contextual differences among English-speaking Caribbean countries, the in-depth study of the perspectives of even this small group of teachers offers insight to CXC and regional Ministries of Education into what teachers perceive could scaffold their implementation of the M-SBA in the future. These findings reported here provide a benchmark for comparing changing teachers' perspectives over time as the M-SBA becomes normalised.

REFERENCES

- Achong, D. (2019, September 28). *Teachers SBA case dismissed. Trinidad and Tobago Guardian*. <http://www.guardian.co.tt/news/teachers-sba-case-dismissed-6.2.932090.8198bb3688>
- Aduloju, M.O., Adikwu, O., & Agi, C.I. (2016) School based assessment: Implication for national development. *Open Access Library Journal*, 3: e2392. <http://dx.doi.org/10.4236/oalib.1102392>
- Alaba, A. A. (2012). Teachers' perception of school-based assessment in Nigerian secondary schools. *Mediterranean Journal of Social Sciences*, 3 (1), 99-109.

- Amoako, I., Asamoah, D., & Bortey, J. (2019). Knowledge of formative assessment practices among senior high school mathematics teachers in Ghana. *American Journal of Humanities and Social Sciences Research*, 3 (3), 8-13.
- Ariffin, A. (2014). Ideal vs. reality: Evidences from senior teachers' experiences on the Malaysian school-based assessment system (SBA). In C. Hashim, (Ed.), *Issues in Value-Based Education in Malaysia* (pp. 130-143). IIUM Press.
- Awoniyi, F. C. (2016). The understanding of senior high school mathematics teachers of school-based assessment and its challenges in the Cape Coast metropolis. *British Journal of Education*, 4 (10), 22-38.
- Bennett, R. (2011). Formative assessment: A critical review. *Assessment in Education: Principles, Policy & Practice*, 18 (1), 5-25.
- Black, P. & Wiliam, D. (1998a). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan*, 80 (2), 139-144, 146-148.
- Black, P., & Wiliam, D. (1998b). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice*, 5 (1), 7-73.
- Black, P., Harrison, C., Lee, C., Marshall, B., & Wiliam, D. (2004). Working inside the black box: Assessment for learning in the classroom. *Phi Delta Kappan*, 86 (1), 9-21.
- Boud, D., & Falchikov, N. (2006). Aligning assessment with long-term learning. *Assessment and Evaluation in Higher Education*, 31(4), 399-413.
- Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology, vol. 2. Research designs: Quantitative, qualitative, neuropsychological, and biological* (pp. 57-71). American Psychological Association.
- Brinkmann, S., & Kvale, S. (2015). *Interviews: Learning the craft of qualitative research interviewing* (3rd ed.). SAGE.
- Brown, G.T.L. (2011). School based assessment methods: Development and implementation. *Journal of Assessment Paradigms* 1(1), 30-32.
- Burke, K. (2011). *From standards to rubrics in six steps: Tools for assessing student learning*. Corwin.

- Byabato, S. & Kisamo, K. (2014). Implementation of school-based continuous assessment in Tanzanian Ordinary Secondary Schools and its implications on the quality of education. *Developing Country Studies*. 4 (6), 55-62.
<http://www.iiste.org/Journals/index.php/DCS/article/viewFile/11781/12138>
- Caribbean Examinations Council. (2013). *CXC SBA handbook for teachers*.
https://www.cxc.org/SiteAssets/MANUALS/SBA_Handbook_for_Teachers4Feb13.pdf
- Caribbean Examinations Council. (2015a). *School based assessment manual for principals*.
https://www.cxc.org/SiteAssets/MANUALS/MAN_%20EAS%20SBA%20Manual%202015v2.pdf
- Caribbean Examinations Council. (2015b). *Caribbean secondary education certificate mathematics syllabus*. CXC.
- Caribbean Examinations Council. (2016a). *Caribbean secondary education certificate mathematics syllabus*. CXC.
- Caribbean Examinations Council. (2018). *Annual report 2018*.
<https://www.cxc.org/annual-reports/2018/5.html>
- Chappuis, S., & Chappuis J. (2008). The best value in formative assessment. *Educational Leadership*, 65 (4), 14-19.
- Charmaz, K. (2006) *Constructing grounded theory: A practical guide through qualitative analysis*. SAGE.
- Cheah, U. H. (2010). Assessment in primary mathematics classrooms in Malaysia. Paper presented at Fourth APEC-Tsukuba International Conference: Innovation of mathematics teaching and learning through lesson study – connection between assessment and subject matter. Tokyo.
- Cheung D., (2001). School-based assessment in public examinations: Identifying the concerns of teachers. *Education Journal*, 29 (2), 105-123.
- Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE.
- Darling-Hammond, L. (2017). Teacher education around the world: What can we learn from international practice? *European Journal of Teacher Education*, 40 (3), 291-309.

- Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, A., & Orphanos, S. (2009). *Professional learning in the learning profession: A status report on teacher development in the United States and abroad*. National Staff Development Council.
- De Lisle, J. (2013). Exploring the value of integrated findings in a multiphase mixed methods evaluation of the continuous assessment program in the Republic of Trinidad and Tobago. *International Journal of Multiple Research Approaches*, 7 (1), 27-49.
- De Lisle, J. (2015). The promise and reality of formative assessment practice in a continuous assessment scheme: The case of Trinidad and Tobago. *Assessment in Education: Principles, Policy & Practice*, 22 (1), 79-103.
- Dikli, S. (2003). Assessment at a distance: Traditional vs. alternative assessments. *Turkish Online Journal of Educational Technology-TOJET*, 2 (3), 13-19.
- Fonteyn, M. E., Vettese, M., Lancaster, D. R., & Bauer-Wu, S. (2008). Developing a codebook to guide content analysis of expressive writing transcripts. *Applied Nursing Research*, 21 (3), 165-168.
- Gibbs, A. (1997). Focus groups. *Social Research Update*, 19 (8), 1-8.
- Groenewald, T. (2004). A phenomenological research design illustrated. *International Journal of Qualitative Methods*, 3 (1), 42-55.
- Heritage, M. (2007). Formative assessment: What do teachers need to know and do?. *Phi Delta Kappan*, 89 (2), 140-145.
- John, I. (2002). Using assessment strategies to inform student learning. Paper presented at the AARE Conference in Brisbane. RMIT University.
- Kapambwe, W. M. (2010). The implementation of school based continuous assessment (CA) in Zambia. *Educational Research and Reviews*, 5 (3), 99-107.
- Kitiashvili, A. (2014). Teachers' attitudes toward assessment of student learning and teacher assessment practices in general educational institutions: The case of Georgia. *Improving Schools*, 17 (2), 163-175.
- Lincoln, Y.S., & Guba, E.G. (1985). *Naturalistic inquiry*. SAGE.

- Lukman, S. A., & Uwadiegwu, A. A. (2012). School based assessment as an innovation in Nigerian educational system: The implementation challenges. *Knowledge Review*, 25 (1), 123-127.
- Majid F., A (2011). School based assessment in Malaysian schools: The concerns of the English teachers. *Journal of US-China Education Review*, 8 (10), 393-402.
- Malakolunthu, S., & Hoon, S. K. (2010). Teacher perspectives of school-based assessment in a secondary school in Kuala Lumpur. *Procedia-Social and Behavioral Sciences*, 9, 1170-1176.
- 'Massa Day' not done – teacher (2017, May 13). *Barbados Today*. Retrieved from <https://www.barbadostoday.bb/2017/04/13/massa-day-not-done-teacher/>
- McMillan, J. H. (2000). Fundamental assessment principles for teachers and school administrators. *Practical Assessment, Research & Evaluation*, 7 (11), 78-93.
- Merriam, S. B. (1998). *Qualitative research and case study applications in educational settings*. Jossey-Bass.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded source book*. SAGE.
- Mueller, J. (2016). Authentic assessment toolbox. <http://jfmuller.faculty.noctrl.edu/toolbox/index.htm>
- Nair, G. K., Setia, R., Samad, N. Z., Zahri, R. N., Luqman, A., Vadeveloo, T., & Ngah, H. C. (2014). Teachers' knowledge and issues in the implementation of school-based assessment: A case of schools in Terengganu. *Asian Social Science*, 10 (3), 186-194.
- National Research Council. (2005). *How students learn: Science in the classroom*. National Academies Press.
- Onwuegbuzie, A. J., Leech, N. L., & Collins, K. M. (2010). Innovative data collection strategies in qualitative research. *The Qualitative Report*, 15 (3), 696-726.
- Organisation for Economic Co-operation and Development. (2005). *OECD policy brief. Formative assessment: Improving learning in secondary classrooms*. <https://www.oecd.org/education/ceri/35661078.pdf>
- Packer-Muti, B. (2010). Conducting a focus group. *The Qualitative Report*, 15 (4), 1023-1026.

- Parke, C. S. & Lane, S. (1996). Learning from performance assessments in mathematics. *Journal of Educational Leadership*, 54 (4), 26-29.
- Patton, M. Q. (2002). Qualitative interviewing. *Qualitative Research and Evaluation Methods*, 3 (1), 344-347.
- Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). SAGE.
- Perrenoud, P. (1998). From formative evaluation to a controlled regulation of learning processes: Towards a wider conceptual field. *Assessment in Education: Principles, Policy & Practice*, 5 (1), 85-102.
- Raman K., & Yamat H., (2014). English teachers' voices on the challenges of school-based assessment. *Frontiers of Language and Teaching*, 5 (1), 66-74.
- Rogers, E.M. (2003). *Diffusion of innovations* (5th ed.). Free Press. (Original work published 1962).
- Saunders, W. M., Goldenberg, C. N., & Gallimore, R. (2009). Increasing achievement by focusing grade-level teams on improving classroom learning: A prospective, quasi-experimental study of Title I schools. *American Educational Research Journal*, 46 (4), 1006-1033.
- Singh, P., Supramaniam, K., & Hoon, T. S. (2017). Re-assess or risk the slow death of school based assessment. *Pertanika Journal of Social Sciences & Humanities*, 25 (S), 71-80.
- Stanford, C., Cole, R., Froyd, J., Friedrichsen, D., Khatri, R., & Henderson, C. (2015). Supporting sustained adoption of education innovations: The designing for sustained adoption assessment instrument. *International Journal of STEM Education*, 3 (1), 1.
- Stiggins, R. J. (1995). Assessment literacy for the 21st century. *Phi Delta Kappan*, 77 (3), 238.
- Stiggins, R. J. (2005). From formative assessment to assessment for learning: A path to success in standard-based schools. *Phi Delta Kapan*, 87 (4), 324-328.
- Stiggins, R., & Chappuis, J. (2006). What a difference a word makes. *Journal of Staff Development*, 27 (1), 10-14.

- Syed, M., & Nelson, S. C. (2015). Guidelines for establishing reliability when coding narrative data. *Emerging Adulthood, 3* (6), 375-387.
- T&T gov't warns of implication for teachers as they threaten not to mark SBAs (2018, April 27). *Jamaica Observer*.
http://www.jamaicaobserver.com/latestnews/T%26T_govt_warns_of_implication_for_teachers_as_they_threaten_not_to_mark_SBAs?profile=1228
- Tong, S. Y. A., & Adamson, B. (2015). Student voices in school-based assessment. *Australian Journal of Teacher Education, 40* (2), 2.
- Veloo, A., Krishnasamy, H. N., & Md-Ali, R. (2015). Teachers' knowledge and readiness towards implementation of school based assessment in secondary schools. *International Education Studies, 8* (11), 193-203.
- Williamson, C. (2017). Teachers' role in school-based assessment as part of public examinations. *US-China Education Review, 7* (6), 301-307.
- Yip, D. Y., & Cheung, D. (2005). Teachers' concerns on school-based assessment of practical work. *Journal of Biological Education, 39* (4), 156-162.