



RESEARCH ARTICLE

CLASSROOM ASSESSMENT FOR TEACHER CHANGE: A PRELIMINARY SURVEY OF TEACHER PERCEPTION, BELIEFS, AND PRACTICES IN GHANA

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ABSTRACT

This paper reports on a questionnaire based exploratory study of teacher perception, beliefs and current assessment practices with regard to the implementation of a curriculum reform 'policy statement', *School-Based-Assessment* (SBA), in Senior High School Mathematics classrooms in Ghana. The objective of the study was to inform the theory and design of professional development programme for teachers in an on-going formative assessment project in line with the SBA. A twenty-one self-designed items questionnaire having face and content validity covered teachers' beliefs, perceptions, and current classroom assessment practices. By a multi-stage convenient sampling, 126 teachers were recruited out of which 77 successfully completed the study. By descriptive statistical analysis, the study established evidence that mathematics classrooms are currently mainly dominated by high-flying summative and 'shadow' formative assessments as a link to the nationwide external examination. Hence, there is a strong need for teachers to undertake a professional development in formative assessment so that they might be very effective in the SBA.

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INTRODUCTION

Teachers' knowledge, beliefs, and classroom assessment practices have been thorny issues in the context of curriculum reform in many years in research literature [e.g. (Griffin, Murray, Care, Thomas, & Perri, 2010; Shulman & Shulman, 2004; Suurtamm, Koch, & Arden, 2010)]. The success of any educational reform depends on the quality of teacher professional development and effective classroom assessment. According to Crooks (2001), the more one knows about what and how students are learning; the better one can plan learning activities to structure teaching. Effective assessment begins with clear goals; and before teachers can assess how well their students are learning, they must first identify and clarify what they are trying to teach. What teachers do depends on their beliefs i.e. personal philosophy of teaching and learning which in effect influences practices in the classroom. Thus, no one can provide teachers with rules that will tell them what to do from one moment to another in complex and fluid reality of a classroom but it depends on the teacher's own skill, experience, professional knowledge and insight (Angelo & Cross, 1993). Angelo and Cross moreover pointed out that Classroom Assessment being both a teaching approach and a

set of techniques is "learner-centred, teacher-directed, mutually beneficial, formative, context-specific, on going, and firmly rooted in good practice" (Angelo & Cross, 1993, p. 4). The bedrock of this study followed from Mogen Niss's thought of assessment in mathematics education as: The judging of mathematical capability, performance, and achievement—all three notions to be taken in their broadest sense— of students whether as individuals or groups, with the notion of "student" ranging from Kindergarten pupils to PhD students. Assessment thus addresses the outcome of mathematics teaching at the *student level*. (Niss, 1993, p. 3). In this light, the outcome in this study was delimited to high school mathematics, instruction and assessment. Traditionally, summative tests and examinations are used to judge student performance and as indicators of quality in the evaluation of educational reforms (Niss, 1993). In the last three decades, the literature has sought to re-explore the formative role of assessment in schools (Black & William, 1998a; 1998b; Bond, 1995). It had been observed that the field of mathematics education has seen considerable developments in areas of ideals, goals, theory and practice, but assessment practices have since lagged behind (Niss, 1993). For example, while mathematics instruction has even seen remarkable expansion in working forms and student activities, contrarily, not parallel, commensurable developments in assessment have arisen. This mismatch has

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created a gap between contemporary mathematics teaching and traditional assessment and it is a critical issue for mathematics educators. Currently, Assessment of students' performance and achievement is changing for many reasons. Changes in the skills and knowledge needed for success in understanding of how students learn, and in the relationship between assessment and instruction are modern goals for students and schools (Bond, 1995). This assessment reform or revolution has brought about much discussion about the design of assessment tasks and systems that will provide valid and useful information for a variety of purposes, from giving immediate feedback to teachers and individual students to large-scale monitoring and evaluation of educational systems in many countries around the world (Morgan & Watson, 2002; Swan, Improving the Design and Balance of Mathematics Assessment, 1993).

In secondary mathematics education today, as in other disciplines, curriculum reformers have focused on various assessment approaches with the aim of improving students' mathematics performance as well as to enhance the quality and balance of teachers' classroom assessment. The background to this perhaps, is although Traditional Assessment (TA) modes receive the most attention since they are summative, large-scale, legislated, and also purposed to rank students' performance; they rather put students in pursuit of grades than of learning. In reality, some notable negative backwash effects of TA modes are that they do not function to:

- Provide genuine assistance to the individual learner in monitoring and improving his or her acquisition of mathematical insight and power;
- help the individual teacher in monitoring and improving His or her teaching, guidance, supervision, and counselling;
- Assist curriculum planners and authorities, textbook authors, and in-service teacher trainers in adequately shaping the framework for mathematics instruction (Niss, 1993, p. 5).

Starting from the past decade, learning has not only changed but changed to a large extent in the direction of more co-operative learning using authentic situations with real life problems as a motivation move (Dochy, Segers, van de Bossche, & Gijbels, 2003; Hughes, 1993). Similarly, teaching has also changed with the emergent need for monitoring its quality and the related teacher professional development by means of alternative assessment practices, such as the use of portfolios (Arter & Spandel, 1992; Gearhart & Herman, 1995; Knight, 1992; Strijbos, Meeus, & Libotton, 2007; Tillema & Smith, 2007). Therefore, teachers' existing orientations towards mathematics learning and teaching by transmission (in which giving explanations, examples and exercises dominate work), must give way to novel learning situations in which students rather work together on 'interconnected and challenging' tasks, tasks that confront common difficulties (Swan, 2008). Consequently, assessment strategies must change to tie assessment design and content to new outcomes and purposes for assessment (Bond, Herman, & Arter, 1994 as cited in Bond, 1995). It is assumed that the goal of teaching mathematics is to help all students develop mathematical power: i.e. possess mathematical reasoning, communication,

problem solving, and connections (NCTM, 1991). This can only arise if classroom activities and assessment practices encourage self-regulated learning (Nicol & Macfarlane-Dick, 2006). Then, providing Formative feedback on performance would enable students to restructure their understanding/skills and build powerful ideas and capabilities. Thus, Morgan and Watson (2002) propose multidimensional assessment practices that allow opportunities for all students to demonstrate what they know and can do.

Ghanaian Classroom Assessment: Practices and Beliefs

In Ghana, Assessments in the educational system are almost exclusively of the formal, summative type. Research findings (Abledu, 1999; Agbemaka, 2001; Eshun & Agbemaka, 2000) indicate that the prevailing low levels of achievement in mathematics are in part due to these modes of assessment since they do not provide students the opportunity to make conceptual connections and reflect on understanding; but they rather make them acquire narrow skills in pursuits of grades instead of quality learning. However, the use of small group cooperative learning and alternative assessments positively affect the students' mathematics performance in terms of achievement to an appreciable extent (Agbemaka, 2015). Recently, a new initiative—School-Based Assessment (SBA) has been introduced to enhance the role of formative assessment in the pre-university education system (CRDD, 2007). The key goal of School-Based Assessment (SBA) is to improve the modes, and the assessment methods of schools; a "core-competence" approach, similar to criterion referencing, is to be adopted. Teachers can use different modes of broad-based assessment including observation of students' performance in the classroom, participation in project work, and investigation to promote learning in a more flexible but deeper manner. This intends to help teachers raise the mathematical proficiencies of all students (Lappan & Phillips, 2008). The definitive principle underpinning formative assessment constitutes the SBA. Perhaps, Ghanaian teachers' preference for the Assessment of Learning (summative assessment) closely follows the demands in the National external examination, which is administered annually by the West African Examination Council (WAEC). These examinations are a strong driving force in the West African sub-region to English as Second Language Nations. In Ghana per se, WAEC exams are the only means of matriculation into tertiary or other post secondary institutions. This context leads to learners focusing all their energies into 'narrow' acquisition of skills that they need for passing these exams, neglecting the development of many mathematical processes. Any attempts by a teacher to extend beyond this is resisted by students as 'not in the syllabus' and therefore not of interest. In the external assessment, candidates receive only a single final grade, which offers no clue as to how their actual strengths and weaknesses are, and thus, giving no formative feedback to either the students or their teachers. In the end too many candidates attain unacceptable grades and thus become disillusioned.

Changing assessment practices

Eventually, Assessment of student achievement is changing largely because today's students face a world that will demand

new knowledge and abilities. For instance, in the global economy of the 21st century, students will not only need to understand the basics, but also to think critically, to analyse, and to make inferences (Boston, 2002). Helping students to develop these skills will require changes in assessment at the school and classroom level, as well as giving new approaches to large scale, high-stake assessment as pointed out by the North Central Regional Educational Laboratory (NCREL, 1994) in the U.S. For many reasons, formative assessment has occupied an extended spectrum of Curriculum reform as well as Educational Research in Mathematics Education today. It is tightly linked with instructional practices (Boston, 2002); becomes a “centrifugal force” in contemporary classroom instruction, an outstanding learning goal for keeping learning on track, and to improve attainment and progress of students (Black & William, 1998a; 1998b; Guskey, 2003; SEDL, 1996; William, 2007). This is why in addition to assessing student achievement in various subjects; the National Assessment of Educational Progress (NAEP) in Florida also collects information from students, teachers, and schools to help provide contextual information about the assessments and factors that may be related to students’ learning. However, evidence of surveys of teacher practice in UK shows that formative assessment is not at present a strong feature of classroom work. There is ample evidence however, that the introduction of formative assessment will raise the scores of students on normal conventional tests, if most teachers make significant changes (Black, Harrison, Lee, Marshall, & William, 2003). According to them, a key reason why teachers must take formative assessment seriously is that “any non-trivial change in the classroom teaching involves the teacher both in taking risks and, at least during the process of change, and in extra work” (p.2). In so doing, teachers will find it worth their while to take on changes that are involved in improving formative assessment (Black *et al.*, 2003).

Professional Development (PD) for teachers in reforms

Teachers are central to any meaningful educational change and their multi-faceted roles in curriculum reform need to be emphasised (Little, 1994). Research with primary school teachers reveals that teachers are both implementers and subversives of change (Davies, 1993; Komba, Nkumbi, & Warioba, 2006). It is therefore believed that, for the betterment of internal school assessment (an idea emerging from curriculum research and development) the teacher’s belief and thinking must converge or coincide with that of the curriculum developer. To achieve that it will require a conceded generation of collaborative work to update teacher knowledge and competencies through PD workshop(s). In the end if the majority of teachers, not only those who already possess the idea, will forge along with the change process, then the professional self-image and research knowledge of the teacher would change to make the teacher a researcher. By that, teachers would then adapt or adopt new roles as part of the systemic reform efforts through the process of professional learning. It is only by this means that they can accept and effect the expected change in a reform.

Method

This research was conducted in the Central Region (CR) of Ghana between the months of February and May 2012. The

region has 53 schools, which are unevenly distributed; across 17 political districts with around 530 teachers. It was a Questionnaire-based exploratory research sought to develop an up-to-date analysis of teacher perceptions, beliefs and the current state of assessment practices that will help define problems and suggest hypotheses for design of a PD for an ongoing formative assessment project. The overarching question was “what are the emerging concerns in Ghana’s new educational reform that led to the introduction of School-Based-Assessment (SBA)? To what extent will the introduction of School-Based-Assessment motivate teachers to adopt principles of formative assessment into their classroom?” The following research questions guided the investigation:

- i. What kind of assessment practices do teachers of mathematics in SHS currently use in their classrooms?
- ii. How are teachers prepared for the introduction of School-Based Assessment in to their classrooms?
- iii. How is feedback provided to students?
- iv. What are teachers views regarding the policy of introducing formative assessment?

Participants

One hundred and twenty-six (126) high school mathematics teachers were recruited through a convenient disproportional sampling technique. This is a non-probability sampling (Cohen, Manion, & Morrison, 2011, p. 155), where every member in the wider population did not have an equal chance of being included in the sample. The geography of qualifications of teachers in the sample had (age) range of 33 years with the minimum age being 22 years. The education levels of the teachers who participated in this study consisted of bachelor’s degree, other graduate courses and master's degree. The assumption was that age, highest education (qualification) and length of teaching service have influence on perception, belief and practice.

Procedure

A 21-item questionnaire was designed by the researcher about teachers’ perceptions, beliefs and current classroom assessment practices. The resulting instrument had three parts. The first part contained 8 demographic questions. The second part contained 10 semantic differential rating scale items (Thomas, 2009) some of which involved ranking, some involved Likert-type rating scales, and two involved short open-ended questions. The questions in the second part comprised ten Likert-type items most of which were traditional assessment strategies with few alternative techniques interspersed between them. They explored teacher beliefs, practices, and views on classroom assessment. The third part asked teachers to describe their use of any alternative assessment strategies. Items 9, 10, 12, & 17 addressed Research Question (RQ) i; items 18, 19 & 20 for RQ ii; 15, 16 & 21 for RQ iii and 13, & 14 addressed RQ iv. The questionnaire was self-administered to the schools but was not filled in the researcher’s absence, to ensure privacy as well as eliminating undue pressure. The distribution lasted for 8 working days commencing from the first to the last district. On

few occasions, the Schools-Heads themselves charged their Head of Department (mathematics) for expedite distribution and prompt submission of the completed questionnaires. In sum, the mean time spent in each school was sixty- (60) minutes. Nonetheless, an incidental sample of five (5) teachers who on an errand from other parts of the country were also engaged advantageously to enrich the data.

Data Processing and Analysis

The data collected were analysed in two folds: the objective data were categorized into district, factors, or opinions and quantitatively analysed by descriptive statistics of frequency distributions, percentages, and skewness in order to assess the beliefs and perceptions that have emerged (see Tables 1 through 7). The open-ended questions were analysed qualitatively by categorising the emergent teacher views into themes (see Table 2). These questions gave further investigation with the view of identifying antecedents. Selected responses were used to explore and add systematic explanations to the quantitative results. The themes that emerged represent general teachers’ beliefs which are reported in percentage points.

RESULTS

Out of the 126 questionnaires distributed to 8 females and 118 males, 77 (6 females; 71 males) constituting about 61% were successfully returned. The education levels of the 77 participants consisted of 72 teachers with a bachelor’s degree, 2 teachers who had taken graduate courses and 3 earned a master's degree. Despite all ethical assurances offered, some participants were reluctant to provide their names and contact details, but preferred to remain anonymous. ‘Teachers were said to have a range of personal, political and social factors that influence their professional identities’ (Nolan, 2006). Tables1, through 7 indicate various results that addressed the sub research questions. Tables 1a and 1b illustrate traditional assessment practices and beliefs.

Table 1(a). Teachers’ beliefs of traditional mathematics test (N = 77)

Definitely inadequate (1)	Inadequate (2)	Adequate (3)	Definitely adequate (4)	No response (0)
2	33	38	1	3
2.6%	42.9%	49.4%	1.3%	3.9%

Table 1(b). Teachers can only assess students by using traditional mathematics tests’(N = 77)

Strongly disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)	No response (0)
16	45	11	1	4
20.8%	58.4%	14.3%	1.3%	5.2 %

The emergent themes (*common perceptions*) in each reason category are presented in the Table 2.

Table 3 presents the frequencies, and percentages of mainly used techniques (Likert-type items). The scaffold responses are 1= not at all, 2 = rarely, 3= often, 4 = regularly depicting current practices.

Table 2. The emergent themes about traditional maths test (N=77 less 4)

Emergent Theme Against the Statement (A _i) (n = 61)		%
A ₁	traditional test alone cannot assess the knowledge the child has acquired in the development profile: cognitive, psychomotor and affective domains;	32.5
A ₂	assessment of students must always be varied e.g. games, investigations, project work, oral presentation, practical;	19.5
A ₃	Students can be assessed in different ways outside Traditional Assessment e.g. contributions in class (observation);	20.5
A ₄	assessment must be both formative and summative	6.5
Emergent Themes For the Statement (F _i) (n = 12)		
F ₁	there are other mathematics assessment strategies that can be used but due to our population in class test is preferred;	3.9
F ₂	Student population and lack of materials prohibit use of other forms of assessments;	3.9
F ₃	the use of traditional maths tests allows individuals to exhibit his/her talents more than any other form of assessment	6.5
F ₄	test is not an end in itself but more convenient	1.3

Table 3. Frequency Percentage distribution of mainly used techniques (N= 77)

Value	0	1	2	3	4
Label	No Res	Not at all	Rarely	Often	Regularly
Hmwk/DQ	1(1.3%)	0(0.0%)	5(6.5%)	35(45.5%)	36(46.8%)
P-n-P test	1(1.3%)	1(1.3%)	12(15.6%)	42(54.6%)	21(27.3%)
Oral task	2(2.6%)	10(13.0%)	28(36.4%)	22(28.6%)	15(19.5%)
Multi choice	0(0.0%)	5(6.5%)	35(45.5%)	23(29.9%)	14(18.2%)
PfmmnceTask	5(6.5%)	8(10.4%)	28(36.4%)	32(41.6%)	4(5.2%)
Project	3(3.9%)	8(10.4%)	38(49.4%)	24(31.2%)	4(5.2%)
Open-end	5(6.5%)	11(14.3%)	37(48.1%)	22(28.6%)	2(2.6%)
Small-group	3(3.9%)	6(7.8%)	26(33.8%)	33(42.9%)	9(11.7%)
Journal	4(5.2%)	32(41.6%)	24(31.2%)	13(16.9%)	4(5.2%)
Portfolio	3(3.9%)	19(24.7%)	30(39.0%)	16(20.8%)	9(11.7%)

Note: Res= response; Hmwk/DQ=homework/diagnostic quiz; P-n-P= pen and paper; Pfmnce=performance

Table 4 presents the teachers’ positions about *professional development needs*.

Table 4. Teacher’s feeling about meeting professional development needs in last 12 months

Response	Freq.	Percent (%)	Cum %
Valid			
0 = no response	1	1.3	1.3
1 = Yes fully met	2	2.6	3.9
2=yes, to some extent	62	80.5	84.4
3= No, not met	12	15.6	100.0
Total	77	100.0	

Table 5summarises the views about how alternative means are used to provide feedback to students apart from the regular pencil-and –paper tests.

Table 5. The distribution of respondent views on alternative assessment techniques

Response (res)	Freq	Percent (%)	Cum (%)
valid			
0= no res	3	3.9	3.9
1=No	24	31.2	35.1
2=Yes	50	64.9	100
Total	77	100	

Table 6 presents the corollary, which shows teachers’ preference for suggested alternative assessment methods as a priori to knowledge in the School-Based Assessment.

Table 6. Alternative Assessment Suggested Methods for Formative Assessment in SBA (N=77)

Alternative Suggested Methods	Been used	%	Plan to use	%	Not used	%	Total%
1 Oral task/presentation	29	37.6	10	13.0	38	49.4	100
2 Practical tasks	38	49.35	9	11.68	30	38.96	100*
3 Observation	34	44.16	10	12.98	33	42.86	100*
4 Small group work	51	66.2	7	9.1	19	24.7	100
5 Student journals	5	6.5	24	31.2	48	62.3	100
6 Student Portfolio	10	13.0	20	26.0	47	61.0	100
7 Diagnostic Quiz	43	55.8	10	13.0	24	31.2	100
8 Interview	22	28.6	15	19.5	40	51.9	100
9 Self-assessment	22	28.6	13	16.9	42	54.5	100
10 Peer-assessment	24	31.2	14	18.2	39	50.6	100
11 Open-ended task	24	31.2	11	14.3	42	54.5	100
12 Closed-ended task	23	29.9	12	15.6	42	54.5	100
13 Project work	44	57.1	9	11.7	24	31.2	100
14 Other	1	1.3	3	3.9	72	94.8	100

Note: The categories are not necessary mutually exclusive

*2 decimal places approximation resulted into a 0.01 absolute error.

Table 7 shows the case summaries of the teachers' professional needs.

Table 7. Need of Professional Development/Training in Formative Assessment Strategies for the Implementation of the SBA

label	1= I don't need any	2= I need a little	3= I can't tell	4= I need a great deal
count	3 (3.89%)*	32 (41.56%)	12 (15.58%)	30 (38.96%)*

* 2 decimal place approximation resulted into a 0.01 absolute error

DISCUSSION

The findings reflect the views of teachers on their beliefs and practices and how informed they are about the changes that are being made to classroom assessment. Percentage counts show the agreement level to various variables. Primarily, my assumption was that age, highest education (qualification) and length of teaching service might be intervening variables, which would have a correlation with perspectives and practices but they never did. It is worth noting also that, though it was not the focus of this phase, gender disparity was visible; 6 (a little less 8 %) female teachers returned the questionnaires. The items were contextual opinions of teachers about the extent to which assessment methods affect aspects of the educational process and, teaching and learning of mathematics in particular. A futuristic approach is to facilitate Professional Development of teachers in formative and authentic assessment strategies in core mathematics at the lower level of the High School. Hence, two questions sought to identify teachers who teach at year 1 and year 2. The results indicated that as many as 49 (64 %) teachers teach both core and elective mathematics and run through years 1 to 3. However, 20 (26%) teach only core mathematics in years 1 & 2, but 6 teach only year 1 core mathematics (7.8 %). The answer to the question 'what kinds of assessment practices do teachers of mathematics in SHS currently use in their classrooms?' Although no clear cut practice was indicated, finding was skewed against strict traditional modes (see table 1a, about 72% disagreed). It was also revealed in their opinion about traditional mathematics test as adequate assessment tool for mathematics achievement. The results indicate that far more than half of the participants, 61 (79.2%), were at various levels of disagreement while 4 (about 5%) remained silent (Table 1b). Conversely, they have almost a split opinion regarding whether tests are adequate or inadequate tool (Table 1a). Further, they explained their perspectives by giving brief

reasons and it became clear that the teachers were aware of tests not being the only means by which students can be assessed (see Table 2). From Table 2, 61 of 77 (79.2%) respondents believe that test is not an adequate tool while 12 of 77 (15.6%) think otherwise. Nonetheless, 4 of 77 (5.2%) could not give any reasons although 2 of the 4 ticked disagree but could not substantiate that position/decision taken. This perhaps was just to conform to the "norm" or "tradition" that was in existence in the academic community. A contradictory response was that the same teacher disagreed with the statement 'Teachers can only assess students by using traditional mathematics tests' but later concluded: "test is not an end in itself". This type of situation sometimes arises when a teacher's held belief from past experience conflicts with what in reality exists in the school community which the teacher later joins. In this wise it may imply that, the teacher may be saying that test is not the only way of assessing in theory but in the surrounding circumstances, test is the only one possible. The beliefs found confirmed research findings that illustrate examples of changes that occur in teachers' beliefs, which have been developed in university studies and changed in the reality of classroom practices (Cooney, 1985; Raymond, 1997). They (authors) observed that while university studies emphasise the development of academic knowledge, practice at school is mainly built on teacher's craft knowledge.

In fact, craft knowledge is based on social learning and peer influence that result from the multiplicity of communities in which a teacher practices. Because of the community spirit and participation in social practices, initial beliefs from university often in opposition to school priorities/practices are with time transformed (Postari & Georgidou-Kabouridis, 2007). According to Chapman (2001), even if the primary belief structure of mathematics teachers remains unchanged, teaching behaviour can be modified to an acceptable level of harmony. Many teacher educators raise concern about teacher

beliefs. Recently, Jeppe Scott asserted that there is gap between differences in perceived teachers' beliefs and in perspectives and he made effort in his work to close up these up gaps. When, trying to bridge the 'so-called' gap, Scott (2002) remarked that the focus of classroom research on teacher's belief is not to state congruence or conflict between beliefs and practices, but to disentangle the ways in which—from teachers' perspective—the multiple communities interact and frame the emergence of different objects of his or her activity. Inasmuch as I support Chapman (2001) and Scott (2002), my concern is 'How do we disentangle SHS teachers' beliefs from the traditions of dominant measurement-driven assessment in the schools to more formative assessment which will focus on the provision of effective problem-solving skills and quality feedback to the learners?' The peculiar issue is, the teachers have varied academic backgrounds and are working in different contexts but their beliefs and assessment practices seem remarkably homogeneous (about 79% against 16%). Exploring views about the question: 'How is feedback provided to students? Does this help them reflect on and improve their competencies?' Other strategies such as project work, oral presentations, and investigations are some of the emergent strategies the teachers have suggested to be employed for provision of effective feedback. Effective feedback is to bring enthusiasm into the mathematics classroom (Cockburn, 2009) and also make learners self reliant (Dewey, 1902). Nevertheless, some major constraints identified by three respondents who have preference for tests were that although they were aware of the existence of other strategies, large student population in addition to lack of quality learning materials inhibit the application of the alternative forms. Besides, the scope of teaching and learning of mathematics and the facilities in Ghana make test the best choice.

Teachers mainly used Assessment Techniques during Instruction

Overall indication in Table 2 shows that a little less than half the respondents regularly used homework/diagnostic quizzes as the main traditional assessment strategy and at least every teacher employs these in instruction to assess students learning. Apart from homework, any pen-and-paper test is often a dominant strategy (54.6%) with very little or no usage of alternative assessment strategies such as journal and portfolio. These results really confirm the assertion that Ghana SHS mathematics classrooms lend themselves to only to measurement of achievement under examination conditions. Nonetheless there are good signs of overturning the strict, conservative traditional methods and moving to provision of meaningful formative assessment strategies.

Preparation into SBA Policy

The following two questions helped to direct the discussion about the SBA policy:

How are teachers prepared for the introduction of School-Based Assessment into their classrooms? What are teachers views regarding the policy of introducing formative assessment? From the foregone discussions it is obvious that

the teachers are constrained by the educational policy. Although, the SBA 'policy' is not yet in full implementation at the SHS level (according to the CRDD) the teachers are quite informed about its composition and demand and therefore are prepared to enrich their summative assessment skills with a more formative assessment competency (all linking with external assessment— WASSCE). The teachers provided answers to the item about how informed they are about the policy which were scaled from '1= poorly informed' to '4 = very informed'. The result indicated poorly informed as 14.3%, of respondents, somehow informed as 20.8%; informed was 40.3%, and very informed, 23.4. One teacher provided no answer. This result was negatively skewed indicating the teachers gained currency with curriculum matters in the region. And that their understanding and/or responding appropriately to these changes in the institutional culture would possibly contribute directly to achieving the required change in assessment of learning. Table 4 shows that a little over 83% of the respondents felt they have met their PD needs either fully or in part. However, the greater proportion, 80.5% of the number only met their professional needs to some extent. Consequently, the teachers who answered 'No' were articulate, open-minded and pointed out that in reality they needed regular in-service training to be current with new assessment modes. It is now demanding to find out if changes in assessment paradigm were covered and the extent to which they use alternative, formative assessment strategies. No reasons were indicated to tell whether the information about the SBA policy was disseminated and/or how teachers themselves were informed about changes in the education system.

Use of Alternative Assessment strategies

Addressing whether they have been employing any other assessment technique(s) as alternatives to provide feedback to students apart from the regular pen-and-paper tests, the teachers' standpoints skewed negatively as far more than half of the sample, 61.5%, agreed in affirmative. Actually, reflecting on their positions, the teachers are ready for any transformation so that they can be effective in transmitting the required mathematical content knowledge and using appropriate pedagogical knowledge in the various school cultures. The teachers who have been employing some alternative formative assessment strategies did not only show support for a PD but also indicated the means through which they were encouraged to sustain use of the strategies that have been adopted. They further indicated "reading from literature" as one key source from which other teachers could be encouraged to seek information from. Besides reading, "colleague observation" was another strategy suggested to be used to log other teachers on to the use of alternative assessment techniques. Adversely, they seemed not to be in favour of instituting a school policy as a means of imposing alternative formative assessment. This expectation resonates with the earlier indications that a policy is a driving force to teachers as it will make it mandatory to effect a shift and so many of the respondents are not pleased with this. The result in Table 6 indicates that, to some extent, some of the teachers show interest in formative assessment through the use of small-group work (66.2%), project work (57.1%) and

diagnostic quiz (55.8%) more than the other suggested modes with the exception of one teacher who claimed to have another mode which was not stated. This has increased the researcher's interest towards a project in Formative Assessment.

Needs Assessment for Professional Development (P D)

For any fruitful professional training to be achieved, a needs assessment is required for effective planning. In the last 12 months, 62 out of 77 respondents (i.e. 80.5%) declared they had their needs met to some extent. Needs such as in-service training, periodic workshops, financial support for a PD, together with provision of Teaching/Learning Materials among others were the key ones listed. It was also shown that only 12 of 77 (15.6%) could not tell whether they need PD/training. Document analysis revealed the 12 teachers were those who indicated their preference for tests earlier. Perhaps they might have already equipped themselves with all necessary assessment strategies. From Table 7 indication of choices for some degrees of the need for a Professional Development have perfect positive correlation. Anyone would have expected the teachers to look down upon the PD idea, but rather PD appears a sine qua non for effectiveness in use of formative assessment practices as regards the demands in the School-Based Assessment.

Concluding Remarks

This study establishes evidence that the High School mathematics classrooms, typical in the Central Region of Ghana but perhaps general to the country, are currently mainly dominated by high-flying summative and 'shadow' formative assessments as a link to the nationwide external examination conducted by the WAEC. By shadow, it meant not consistent and their accountability purpose promotes assessment of learning more than assessment for learning. They also lead to narrowing of the curriculum, since teaching and learning focus on superficial factual knowledge and practising basic exam skills. Shavelson, Black, William, and Coffey (n.d) stress that teaching and learning which focus on superficial factual knowledge only make learners not concentrate on subject matter but on test taking skills and cheating on test. In this study, the class tests, quizzes and any other pen-and-paper exercise that the teachers employ are deemed to perform formative functions of assessment while end of term and end of year examinations serve summative accountability purposes; but they all turn WAEC-like. The findings also imply that the overall idea of introducing SBA is useful since it has outlined a wide range of alternative strategies to align formative and summative assessment in the Ghanaian educational system. From the evidence gathered, different teachers elicited different positions on the use of some alternative assessment strategies but a push through professional training programmes may promote better integration in classroom assessment. In conclusion, although summative information can be used for formative purposes it cannot provide qualitative feedback for promoting learning. It therefore reaffirms that to improve internal school assessment emerging from curriculum research and development, the teacher's belief and thinking must converge or coincide with that of the curriculum developer. For this reason, there is a strong need for mathematics teachers

in Ghanaian Senior High Schools to undertake professional development so that they might be very effective in the SBA. Often, external pressure in the form of policy or changes to traditional beliefs and practices usually give schools their identities. The introduction of the School-Based Assessment is an external pressure which will induce teachers in Ghana to modify their instructional behaviour once they are convinced that tests are not an end in itself they are required by policy to make amendments. The world is changing with technological advancement so there should be more practical-based, satisfactory and authentic assessment of students' learning to provide opportunity for the student to exhibit talents and higher meta-cognitive skills, in other words, to raise students' mathematical proficiencies (Lappan & Phillips, 2008).

Some Misunderstandings and Challenges

The researcher explained how-to complete the questionnaire as a means to attain credibility and dependability. However, few misrepresentations and misunderstandings were perceived. One limitation noticed of this exploratory work was its phenomenal nature of the perspectives based on the teachers' responses from different school cultures. It was also observed that some of the respondents were uncomfortable to provide their personal contact details. Even though, the rationale for the contact details was explicitly explained at the end page of the questionnaire. The lead teacher was detailed to further dissemination the information, yet very few teachers were defensive. The cover letter also explicitly conveyed assurances and other ethical security in addition to establishing official rapport, trust, sensitivity, and discretion with especially those who were not familiar with the researcher and/or research processes. Subsequently, this ethical dilemma (e.g. disturbed about contact details), might be one of the reasons why the response rate was below expectation. The concept/terminology 'formative assessment' might have been construed imperfectly by few teachers; as mirrored in their follow up phone calls to me. The teachers' alternative interpretations of the term presumably might be an external treat to validity. It could prejudice the participants and to avoid leaving the items unattended to, a participant could probably tick any response just to fill the gap. If this assertion is true then subsequent phases would ameliorate. The theory of formative assessment apparently has been loosely used in diverse ways by many researchers in the literature (Elwood, 2006) so good information is always necessary.

Implications

The findings of this study show that there are some major implications for further research, first, were the teachers who responded to the questionnaire representative of high school teachers from 10 different regions of Ghana? Second, the findings raise questions about actual classroom teacher practices and whether they are similar to what have been reported? Finally, if summative assessment practice is the dominant current assessment practice then formative assessment needs to be seriously addressed for enhancement of mathematics learning. Indeed, there is need for an effective plan for PD for in-service teachers accordingly. A literature search has provided a string of references about useful

principles/techniques of design research on school mathematics, and formative assessment strategies.

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