Secondary school mathematics teachers' views of assessment: some insights from the caribbean

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There appears to be a lack of information about what teachers at large believe and understand about assessment and how this may impact on their instruction in mathematics and subsequently on students learning of mathematics. In an effort to address this issue, this paper explores views about assessment held by a small sample of secondary teachers in St. Vincent. The results indicate that the teachers perceived limitations in traditional assessment methods.

Introduction

When I think back to 4th September 1981, I vividly recall my first mathematics session at Teachers' College. Sixty of us were given a written test, on the basis of which we were put into ability groups for instruction.

There has been increasing concern that written tests assess only a sample of the mathematics felt to be important (Baird and Mitchell, 1986; Caribbean Examination Council, 1990; NCTM, 1989; 1993). This has resulted in the move towards other forms of assessment such as projects, portfolios and journals. While these alternatives are positive developments there is need for more research in the area of assessment of mathematics. For example, little is yet known about teachers' views of assessment, and how these impact on students' learning (Ernest, 1989; Southwell and Khamis, 1992).

The value of knowing about teachers' views of assessment

Teaching and learning at the school level are often bound up with the initiation and socialisation of teachers into subject subcultural settings (Goodson, 1985). Each subculture operates within its own set of norms, beliefs and values. As mathematics teachers, we bring to the classroom and develop within it our own set of beliefs, including beliefs about assessment. While there seems to be much research conducted on teachers' views of the nature of mathematics and the teaching and learning of mathematics (Webb, 1992; Grouws, 1992), an ERIC search for literature related to teachers' views of the assessment of mathematics failed to reveal any.

The focus on teachers' views of assessment in mathematics is significant because what we as teachers do grows out of our understanding of how learning takes place (Baroody, 1987; Siemon, 1989; Webb, 1992). An understanding of teachers' assessment ideas also provides a basis for gauging their likely acceptance of alternative assessment strategies. As Ernest (1989) noted, reforms in teaching would only take place when those deeply held beliefs about learning and teaching are confronted and changed. Webb (1992) endorsed this view, suggesting that because teachers are engaged in assessment activities a large percentage of their working day, they will have a strong impact on students' learning through these practices.

This paper aims to throw some small rays of light on secondary teachers' views of assessment.

Methodology

The data reported in this paper is part of a larger study that focuses on exploring the use of alternative assessment approaches in mathematics. This research was conducted in St. Vincent during the latter part of 1996.

Instrument

A teachers' views of assessment in mathematics questionnaire (see Appendix 1) was designed to gather (i) background information, (ii) information relating to reasons for assessing, (iii) usage of different assessment approaches, and (iv) ideas about whether they considered there was a need to reconsider assessment in mathematics.

Sample

The subjects for this aspect of the study were twenty (n=20) secondary school mathematics teachers from 15 schools in St. Vincent. Three of the teachers were female, and teaching experience ranged from one term to more than fifteen years with a mean of 10.3 years.

Results and Discussion

Teachers' responses to the questionnaire are categorised and discussed in terms of their (i) acceptance of current assessment methods, (ii) reasons for assessing, (iii) views about whether assessment should be reconsidered, (iv) use of various assessment approaches, (v) description of assessment, and (vi) thoughts about the need for improvements to the present system.

Teachers' acceptance of current assessment methods.

One of the teachers was non-committal about the methods used, thirteen were reasonably satisfied or quite satisfied, while six were unhappy with them. These six felt that present methods were too narrow, did not tap into students' mathematical thinking, and restricted teaching accordingly. They wanted to see a greater range of assessment methods used. The comments of one teacher illustrates some of these concerns:

> "the traditional methods of teaching and assessing the subject seem not to be as effective as they were before. We cannot truly assess students' performance until these obstacles of learning be removed...Students should be challenged and shown the inter-relatedness of mathematics. Assessment techniques should not only include written tests but observations, discussions, SBA and interviews".

The majority of teachers who were satisfied with current assessment practices seemed to base this on a belief that written test and examination results provide a true indication of student achievement and understanding. For instance, one teacher wrote,

> "they [present methods] normally give a relatively accurate measurement of students' performance and of the effectiveness of the teachers' strategies".

One of the thirteen satisfied teachers wanted even more of the same. He said,

> "Since I manage the assessment, I am satisfied. I would like to see final term exams in all terms. Students need as much reinforcement and repetition in a subject such as mathematics where a solid foundation is absolutely necessary".

Three of the thirteen satisfied teachers seemed to contradict themselves. One, for example, while claiming to be happy with present methods, nevertheless wished to see a change in the balance of regional and school assessment. This teacher responded,

> "Yes, a series of in-course tests is done each term. Thirty percent of this goes to the final mark at the end of the year. I hope CXC [Caribbean Examination Council] will introduce SBA [school-based assessments] in mathematics for the examination".

Reasons for Assessing

On the basis of a content analysis of the responses, the sixty responses to Question 2 were categorised as shown in Table 1.

Table 1 Teachers' claimed reasons for assessing

Category	No of responses
• Diagnosis of	
(a) what a student knows or monitoring students' progress	18
(b) what difficulties students encounter	2
• Providing feedback for students; self-assessment	7
• Obtaining instructional feedback for	
(a) planning and informing instruction	11
(b) monitoring or testing effectiveness of teaching	7
• Grading	3
• Measuring students' attainment	5
• Providing opportunities for creative and critical thinking	3
• Reporting	1
• Motivating students	3

Of interest, Table 1 reveals that the teachers in St. Vincent perceived the main reasons for assessing students' mathematical learning as, diagnosing both what they know and difficulties they are having, monitoring students' progress and obtaining feedback to inform their instruction practices as being. Although issues of selection and qualification - aspects of summative assessment - have dominated testing in St.Vincent, these teachers did not suggest these as reasons for assessing. The issues of grading, motivating students and providing opportunities for creative and critical thinking were perceived by three teachers in each case as reasons for assessing. While the tradition of grading will remain with us in St. Vincent, many secondary school mathematics teachers appear to be looking beyond this emphasis, to identify students' actual understanding.

Reconsideration of assessment

Although thirteen of the twenty teachers questioned suggested they were satisfied with the present assessment methods, all the respondents felt that assessment should be reconsidered. They felt that the present focus on right and wrong answers was too restricting and did not take account of students' procedures, logical thinking and reasoning. Further, it did not allow consideration of the usefulness of mathematics or allow it to arise out of practical or real life situations. One teacher claimed that mathematics

> "seems to be a 'cut-and-dry' matter, where pupils follow rules and formulae or some sleight-of-hand method without understanding why. Additionally, routined time assessment measures how quickly students can respond but not necessarily how well they can think and apply their knowledge...assessment should not be limited to paper-and-pencil tests".

The teachers felt that the present system should be broadened to include assessment approaches that provide opportunities for:

- practical work as well as observations on the various approaches students use to arrive at their solutions,
- encouraging discussion between teacher and pupils and between pupils themselves,
- continuous assessment throughout a child's school career rather than performance on a single external examination, and
- the inclusion of higher order thinking and the development of creativity.

The arguments presented here point to the need for serious reconsideration of the assessment practices by mathematics teachers and educators in St. Vincent.

Frequency of use of various assessment approaches

Teachers' reported use of various assessment methods are summarised in Table 2.

Analysis of the data presented in Table 2 shows the dominance of written tests as the primary means of assessment; all teachers used it. Grimison (1992) noted that this is a clear indication of the classroom subculture at work. Clarke, Clarke and Lovitt (1990) argued that this dependence on a single form of assessment has not only shaped teachers attitudes but also their teaching practices. The old adage *if the only tool you have is a hammer, everything you see will look like a nail* seems to aptly describe assessment based on a single approach. Thus, to get around the hammer-nail problem a full range of approaches needs to be considered.

Table 2 Frequency in using assessment approaches

Assessment Approach	Daily	Once per week	Monthly	Not applicable
* Interviews	8	2		10
Debates		1		19
* Quizzes	3	7	6	4
* Oral presentation	8	4	2	6
Projects			5	15
Investigations	2	4	2	12
* Students self-assessment	5	2	4	9
Peer assessment	3	2	4	11
* Written tests	1	9	10	
Portfolios		1		19
Journals		1	1	18
* Observation	14			6

* approaches more readily used

Looking at the data presented in Table 2, one may be struck by the variety of approaches used by the teachers. While all teachers use tests, sixteen also use quizzes, fourteen use oral presentations and observations, and over half use students' self-assessment. These other approaches represent a few ways in which teachers can examine the depth of ideas that students hold about certain concepts and thereby gain a clearer picture of students' understanding. Thus, this finding may be an explanation as to why so many teachers felt that the traditional written form of assessment needs to be reconsidered.

Although the observation of students is carried out daily by teachers, it was surprising to note that six of the twenty teachers indicated that this approach was not applicable for assessment purposes. Further, the results showed that these teachers did not see debates, portfolios or journals as potential assessment techniques.

One assessment approach not included in Table 2 but mentioned several times by some of these teachers as a significant alternative is that of continuous assessment in the form of School Based Assessment (SBA). SBAs could be considered as investigations and or projects, however, twelve and fifteen of the twenty respondents did not consider investigations and projects respectively as applicable to the assessment of mathematics.

Words associated with Assessment

Teachers were asked to use descriptors to indicate their perceptions of assessment in mathematics. An analysis of their responses showed that the teachers used both the final external examinations and their school examinations as referents when describing their feelings about the assessment of mathematics.

Some teachers associated assessment with stream-lining students and preparing them for the job market. Others focussed upon assessment as skill-testing, that is, as determining students' ability to calculate, memorise tables and formulae, and to work accurately within a limited time.

Another important finding was the linkage of assessment with feelings of anxiety. Teachers feared that not only were tests too difficult or in some cases too easy but that they sometimes tended to be biased or one-sided. Additionally, some teachers felt that tests were brain teasers and definitely outside many students' ability to pass.

There were some teachers who were concerned that their assessment practices were restricted by syllabuses, and the focus on written tests and long examinations. They felt that one of the ideas students were getting about assessment of mathematical learning was that it was a competition.

Views about the need to improve the present system of assessment.

Another major dimension of teachers' views of a subject is their response to change. The respondents views about whether there is a need to improve the current assessment system are summarised in Table 3.

Table 3 Teachers' responses to need for changes

Responses	No. of respondents
No change required	2
No response	5
Not eager to change but willing to adopt other approaches	2
Changes needed	11

Although just six of the twenty teachers had previously indicated their dissatisfaction with the current assessment practices, eleven teachers thought changes were needed.

Table 3 reveals that two of the teachers surveyed indicated emphatically the need for things to remain constant while two other teachers were not eager to change their present practice but were willing to trial other approaches. This kind of response, according to Fullan (1982), is natural because many teachers fear changes, sometimes because innovations do not consider the subjective realities of teachers, that is, their views and perceptions. In the words of one respondent:

> "when learning is released from the bondage of a system which excludes us from being partners in decision-making activities, to one that includes our views and input, then and only then, will we more readily be open to changes."

Of the eleven teachers who indicated a desire for changes in the way assessment is presently being done in St. Vincent, five highlighted the need for broadening the range of assessment approaches to include SBAs, practical work/individual projects, group work, oral presentation, interviews and quizzes. Three of the other teachers indicated a need for better assessment in terms of having a higher pass mark and "increasing the percentage of the in-course test marks to 50% of the final mark".

Interestingly, of the five teachers who offered no response about the need for change, four wrote previously that assessment should be reconsidered.

Conclusions

On the basis of the findings presented here, when one thinks about secondary school mathematics teachers in St. Vincent and innovations in mathematics education the picture is far from being gloomy. Rather than being resistant to any change in the traditional manner of assessment many teachers already seem to be exploring alternative forms. However, as suggested by Fullan (1982), once teachers have examined their feelings and reflected upon their practices, many trials of new approaches will need to occur gradually to convince them to adopt these approaches. Additionally, teachers will require strong support systems to assist them in the transition.

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APPENDIX: The Teacher Assessment Questionnaire

Dear Friends,

I am in the process of conducting research in the area of assessment in mathematics. Your participation is greatly appreciated. Please note that your views and opinions will be valuable contributions to this study and that all responses are confidential.

Teachers' Views of the Assessment of Mathematics in Secondary Schools

Please answer either by ticking the appropriate column or by writing in the spaces provided.

- Are you happy with the assessment method(s) currently being used in your school? Give reason(s) for your response.
- In your opinion, what are the three most important reasons for assessing mathematical learning? Give reasons to support your responses.
- Should we, as mathematics teachers, reconsider assessment? Why/why not?
- How often do you use the following approaches when assessing students? Indicate your response with a tick.

Assessment Approach	Daily	Once per week	Monthly	Not applicable
Interviews				
Debates				
Quizzes				
Oral presentation				
Projects				
Investigations				
Students self-assessment				
Peer assessment				
Written tests				
Portfolios				
Journals				
Observation				

- When you think of assessment what words come to mind?
- What changes, if any, would you make to the present system of assessment? Give reasons for your response.

Personal Background

Gender: Male/Female

Number of years teaching experience

0 - 4 ☐ 5 - 9 ☐ 15+ ☐

Name of School

Thank you for your cooperation.