
THE RELATIONSHIP BETWEEN THE PURPORTED USE OF ASSESSMENT TECHNIQUES AND BELIEFS ABOUT THE USES OF ASSESSMENT

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The purpose of this study was to explore teacher's beliefs about the uses of assessment and their actual assessment practices. The sample consisted of 387 primary teachers. The results indicate that these teachers are using a wide variety of assessment methods, but assessment is predominately used to provide feedback for the teacher rather than the learner and parents. The types of assessment methods chosen appear to support these beliefs about the uses of assessment.

INTRODUCTION

The growing awareness of the links between assessment and learning has resulted in several critiques of existing practice and proposals for reforms at the international and national level. In the USA the almost exclusive use of multiple-choice pen-and-paper tests has been challenged (Murnane & Raizen, 1988; Marzano, Pickering & McTighe, 1994). The need for more varied types of assessment procedures has been called for. In the UK, national assessment involved the use of broadly based tests employing a wide range of modes of presentation and responses (DES, 1989), and in Australia there has been a call for developing and using additional modes of assessment besides the traditional pen-and-paper tests as it is believed that such testing cannot address all areas of the curriculum (*A National Statement on Mathematics in Australian Schools*, 1991). Changes in mathematical instruction seems to be influenced by teachers' beliefs about mathematics (Merseeth, 1993). Missing from the literature is information regarding the relationship between teachers' beliefs about assessment and assessment practices.

Types of Assessment

The debate of when, how and what to assess is still prevalent throughout educational literature. For example, NCTM Assessment Standards (1995) states that student assessment should be an integral part of instruction and multiple methods need to be employed. This is supported by Webb (1993) who believes that any single form of assessment fails to describe fully a student's knowledge about mathematics. Limiting assessment to pen-and-paper examinations results in assessment that is distorted as it fails to sample tasks where there are multiple answers, where there are many problem solving strategies, or where the skills cannot be demonstrated easily in pen-and-paper format (Haines & Izard, 1994). The implications for the classroom are that students need to write and talk about mathematics. The teacher must not only become proficient at utilising a variety of assessment practices such as checklists, but also regularly use these methods in order to gauge students' progress and improve classroom instruction (Grouws & Sherry, 1992).

A National Statement on Mathematics for Australian Schools (1991) identified a range of assessment practices, which can be used to gather information. They include: teacher observation and questioning; structured interviews with students; paper-and-pencil tests; oral tests; practical skills tests; work- or project-based assessment; collected samples of students' independent work; individual homework assignments; group reports; anecdotal records; self assessment and peer assessment. The assessment initiatives in the National Statement have been supported by a variety of publications such as the Board of Studies (1996) and the Department of Education, Queensland (1994). These publications illustrate how to incorporate different approaches to assessment in classroom

teaching at all levels. Thus assessment should be varied, provide starting points for further learning and be reported in a clear and precise manner.

In spite of the wealth of literature delineating differing assessment techniques and the range of professional development opportunities provided for teachers, the literature reports many instances where the assessment procedures utilised tend to be narrow. For example, Haines and Izard (1994) claim that there is a disturbing tendency to limit assessment to what is easy to assess rather than to what is important to assess. If one accepts the claim by Merseeth (1993) about the influences of beliefs on instruction, then it is more than likely that the wide range of assessment practices existing in schools is related to a similar range of beliefs about assessment and the uses of assessment.

Beliefs About the Uses of Assessment

Assessment appears to consist of three crucial components, one relating to the provision of valid evidence of learning achievement and another relating to the need for accountability. Assessment also provides feedback to teachers. These factors appear to influence the type of assessment implemented in the classroom. It is generally believed that teachers view test results as an indication of the effectiveness of their teaching (Grouws & Sherry, 1992). Thus assessment, teaching and learning are closely linked, with assessment being the more dominant component and in some instances acting as a catalyst for change. Clarke, Clarke & Lovitt (1990) claim that the major uses of assessment focus on three areas, the teacher, the student, and the parent. First, the teacher uses assessment to improve instruction by using students' responses to help identify (i) instructional strategies that are most successful; and, (ii) student learning behaviours that need to be "encouraged and developed or discouraged and replaced". Second, assessment informs students of their identified strengths and weaknesses and informs subsequent teachers of students' competencies. Finally, parents are informed of their child's behaviour so that they can give more effective support. The NCTM Assessment Standards (1995) delineates four purposes for assessment. These are promoting student growth, improving instruction, recognising accomplishments, and modifying programs. These purposes are teacher-learner focussed. The role of parents in the learning paradigm is not acknowledged in this document, yet it is believed that positive parent-teacher communication is a vital key in determining learning outcomes of children at school (Arthur, 1996; Greenberg, 1998). Philipou and Christou (1996) report that although teachers are aware of and accept contemporary ideas about assessment there is a gap between their knowledge and intentions on the one hand, and their actual practice. This probably indicates that assessment practices depend not only on knowledge and intentions, but also deeply held beliefs about assessment. This research reports on the relationship between primary school teachers' beliefs about the uses of assessment and current assessment practices.

METHODOLOGY

In part of a survey, primary teachers were asked to indicate their uses of assessment, the frequency with which they used various assessment techniques and to indicate whether or not the introduction of the Year 2 Net (a diagnostic instrument in early primary mathematics) had influenced their teaching and assessment of mathematics. The results of the Year 2 Net component are reported in Nisbet and Warren, 1999.

The questions pertaining to the uses of assessment focussed on three main areas, namely, the teacher, the pupils and the wider community including parents. There were also four general questions relating to purported assessment practice. One related to informal assessment versus formal assessment. Informal assessment is seen as the collection of assessment information coincident with instruction. By contrast, formal assessment involves an "assessment event" (Clarke, Clarke, & Lovitt, 1990). The other three questions related

to the types of assessment data teachers tended to collect, for example, observational data, and information about rules and facts. These four questions were embedded within the questionnaire itself and were used to confirm and illuminate information given within the assessment component. The assessment techniques chosen for the questionnaire are those recommended in the National Statement for Mathematics (1991), namely, observations, oral tests, practical work, interviews, timed tests, projects, assigned homework and assignments. Journals and investigations were also included as both have received considerable attention in the literature as useful assessment alternatives (e.g. Clarke, Clarke, & Lovitt, 1990; Waywood, 1994).

Fifteen hundred surveys were sent to a random selection of primary schools representing different school systems (government & catholic), socio-economic areas (high & low) and geographic locations (metropolitan, provincial & rural). The return rate was 26% (n = 387) and the resulting sample was representative of the different systems, socio-economic areas and geographic locations. The sample was also representative of school year levels.

RESULTS

The questionnaire contained items relating to three overall purposes of assessment, namely, to inform the teacher (6 questions), to inform the learner (4 questions) and to report to others (3 questions). Teachers were asked to indicate how often they used assessment for these purposes. To test the reliability of these components Cronbach as were calculated. These results indicated that the items were reliable for measuring informing the teacher (a = .78) and for informing the learner (a = .72). With regard to informing others a was .322. This could simply reflect the fact that only 3 items represented this component. Paired t tests were performed to compare the frequency of use of assessment (i) for informing the teacher, (ii) for informing the learner, and (iii) to report to others. The overall significance level was set at 0.05, and the Bonferroni Inequality (Stevens, 1992) was employed because three different analysis were conducted. The conservative application of this inequality required the planned Type 1 error for each analysis to be set at the family-wise level divided by the number of analyses (i.e. $.05 / 3 \approx 0.016$). All three paired t tests were significant at this level. A summary of the results of these paired t-tests is presented in Table 1.

Table 1
Paired t tests Between the Purposes of Assessment

	Inform the learner	Inform others
Inform the teacher	13.91**	28.56**
Inform the learner		14.91**

The results indicate that primary teachers seemed to use assessment more often to inform the teacher with regard to teaching than to inform the learner with regard to learning and that using assessment for reporting to others was not as important as informing teaching and learning.

Tables 2, 3 and 4 present the statements from the questionnaire relating to these three purposes and the frequency of use of assessment to fulfill the respective aspects of assessment.

The above results indicate that teachers believed the predominant uses of assessment were to identify individual students with problems and to evaluate the effectiveness of their teaching. They also used assessment to inform them about the ability levels of students and the progression of the class. Of less importance was the use of assessment to inform them about which students are working and planning for the next phase of teaching. The next cluster of statements related to the use of assessment to inform the learner. The statements and percentage frequency of agreement with each are presented in Table 3.

*Table 2**Percentage Frequency of Responses for Questions Relating to the Use of Assessment to Inform the Teacher (n=387)*

<i>I use assessment to</i>	Almost never	Seldom	Sometimes	Often	Very Often
Help me identify individual students with problems	0.5	0.5	7.5	44.7	46.7
Help me evaluate how effective my teaching has become	0.8	3.0	17.3	46.1	32.6
Inform me about the ability levels of the students	1.5	4.1	19.6	49.9	24.4
Judge how well the class is progressing	1.3	2.8	19.7	45.1	30.4
Inform me about which students are working	7.4	20.0	29.5	31.3	11.8
Help me plan the next phase in teaching	7.4	19.6	29.3	31.0	11.7

For the learner, primary teachers saw assessment as a positive experience, giving feedback on student's strengths and encouraging them to learn their work. Of less importance was the use of assessment for reward purposes or to inform students of their weaknesses.

*Table 3**Percentage Frequency of Responses for Questions Relating to the Use of Assessment to Inform the Learner (n=387)*

<i>I use assessment to</i>	Almost never	Seldom	Sometimes	Often	Very Often
Give students feedback on their strengths and abilities	1.3	2.3	20.8	55.4	20.0
Encourage students to learn their work	4.3	7.8	27.0	44.9	14.9
Provide rewards for successful students	10.4	18.9	30.1	27.5	12.4
inform the students about what they do not know	10.1	11.6	39.4	30.8	7.3

The statements relating to the use of assessment for reporting purposes were distributed throughout the questionnaire. Teachers were asked to indicate if they strongly disagreed, disagreed, unsure, agreed, or strongly agreed with these statements. The statements and percentage frequency of agreement with these statements are presented in Table 4.

*Table 4**Percentage Frequency of Responses for Questions Relating to the Use of Assessment for Reporting Purposes (n=387)*

Statement	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
Assessment is really important in terms of public accountability	3.8	18.2	7.3	57.6	12.4
The main reason why I assess is to meet the school's requirements	12.4	62.7	5.8	17.3	1.5
The main reason why I assess student performance is to inform parents	8.3	70.5	5.8	14.4	0.5

With regard to the wider community, it seems that the teachers' focus was on public accountability rather than meeting school requirements or informing parents. In fact there was a strong disagreement with both of these statements, with only 15% of the sample seeing informing parents as important. This could reflect the wording of the question and the inclusion of 'main'.

In the next section of the survey teachers were asked to report on how often they used a variety of assessment techniques. The results are presented in Table 5

Table 5
Percentage Frequency of Use of various Assessment Methods (n=387)

<i>How often do you use each of the following methods of assessment</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very Often</i>
Observation	1.0	1.8	15.5	37.6	43.1
Practical work	2.3	3.0	27.0	41.9	24.7
Oral testing	5.8	9.1	34.8	37.1	12.4
Investigations	2.5	9.6	40.2	34.6	11.9
Assigned homework	18.9	13.6	23.5	28.3	14.6
Informal interviews	6.3	18.0	38.3	27.2	8.6
Timed test	22.2	19.9	35.1	18.4	3.0
Projects	17.9	31.1	32.6	13.6	2.8
Journals	27.7	23.1	29.4	12.7	4.8
Assignments	26.6	26.8	31.1	12.2	2.0

The most frequently used method for assessing students in the primary schools seemed to be observations, with 80% of the sample indicating that they used this form of assessment often or very often. The next most commonly used form of assessment was practical work (66.6%) followed by oral testing (49.5%), investigations (46.5%), and assigned homework (42.9%). Of less importance was the use of timed tests, projects, assignments and journals with up to 50% of the sample using these forms of assessment either almost never or seldom.

Four general statements relating to assessment practice were also embedded within the questionnaire. Teachers were asked to indicate their agreement with these statements. Table 6 presents the percentage of agreement with these statements.

Table 6
Percentage of Agreement with Statements Relating to Assessment (n=387)

<i>Statement</i>	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Unsure</i>	<i>Agree</i>	<i>Strongly Agree</i>
Informal assessment is as important as formal assessment	0.3	2.0	1.5	62.9	33.3
The main tools I use for gathering data are timed tests rather than projects and investigations	15.6	57.9	3.8	21.2	0.5
It is worth spending time on collecting observational data on students	1.8	1.8	4.5	42.8	48.6
I tend more to test rules and facts than have students solve problems	7.9	32.5	44.8	12.5	1.5

The majority of primary teachers agreed that informal assessment was important. Their responses to the second statement confirmed that for them timed tests were not the principal tool used for assessing students. Teachers felt that it was worthwhile spending time collecting observational data and this was the most frequently used method of assessment (See Table 5). Nearly half of the sample seemed unsure just what type of mathematics they tended to assess more frequently. Was it rules and facts or problem solving? This is another source of concern that many teachers are not aware of the emphasis of their own assessment items.

In summary, the primary teachers predominantly used assessment to inform them as teachers about the status of their students (what can they do, what can't they do) and the effectiveness of their teaching. Of less importance was using assessment to help them with their ongoing planning. The most frequently used assessment methods were observations, practical work oral testing, investigations, and assigned homework. With regard to the learner, teachers feel that assessment is used mainly to inform the learner about what they can do rather than what they cannot do. This is in contrast with how they themselves use assessment. It could be conjectured that this represents a model of teaching where the teacher is in control of student learning. This is supported by the infrequent use of projects, journals, assignments, and tasks for which the student has the main control.

DISCUSSION

From the results of the survey, it seems that these primary teachers have adopted many of the suggestions presented in the National Statement on Mathematics. They are no longer relying heavily on pen-and-pencil tests to gather information (Haines & Izard, 1994). They seem to be proficient at using a number of assessment practices and are using these practices regularly to improve classroom instruction (Grouws & Sherry, 1992). These teachers also believed that the collection of assessment incident to instruction (informal assessment) was as important as the assessment event (informal instruction). For these teachers this does represent a change in practice and it seems that the introduction of the Year 2 Diagnostic Net has been a catalyst for this change (Nisbet & Warren, 1999).

Clarke, Clarke, & Lovitt (1990) claim that assessment is used to provide feedback to the teacher, the learner and parents. These results indicate that teachers feel that the feedback to them is more important than feedback to the learner with feedback to the parents playing an insignificant role in the uses of assessment. This study confirms that teachers do use assessment to inform their instruction by identifying successful instructional strategies and student learning behaviours. With regard to the learner, teachers seemed more concerned about informing them of their strengths and abilities (75.4%) rather than of their weaknesses (38.1%). This imbalance needs to be addressed. In order for students to apply the most effective strategies in mathematics they need to know where their mistakes are and why they are occurring. Most of the teachers believed that assessment is very important in terms of public accountability. Again the public accountability emphasis could reflect recent State initiatives such as the introduction of the Year 2 Diagnostic Net and the Year 6 Test. The role that teachers believed parents play in students' learning needs to be explored further as these primary teachers did not appear to believe that using assessment for reporting to parents was a prime concern. Yet, many educators believe that parents play an important role in providing effective support for student learning (Arthur, 1996; Clarke, Clarke & Lovitt, 1990; Greenberg, 1989). Of concern is teachers' inability to discriminate between facts/ rules and problem solving.

This study indicates that a relationship between beliefs about the uses of assessment and the frequency of use of various assessment techniques appears to exist. The reasons why teachers are failing to use methods such as project, journals, and assignments more frequently needs further exploration. Does this reflect a belief that assessment is mainly used to inform the teacher rather than to inform the learner and parents? All of these assessment methods can have significant learner and/or parent participation. Or do teachers simply see these forms of assessment as being unmanageable.

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