

Students' Reflections on Portfolio Assessment in Mathematics in Fiji

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Abstract

This paper presents findings from a study that utilized students' portfolio entries to provide initial insights into students' views about portfolio assessment. Two Fijian Year 9 mathematics teachers implemented portfolios as a means of assessing student learning for the topic 'Measurement'. While students in one teacher's class had noted advantages in terms of learning new content and skills, their difficulties with portfolio assessment were often bounded by various mathematical content. Students in the other teacher's class provided insight into their perspectives on value of portfolio assessment. Apart from stating the various areas of content, which they either liked or disliked, students in the latter class pointed out many other benefits of portfolio assessment.

Assessment in mathematics, and generally in other subjects as well, has traditionally been 'measurement-driven'. This is used for the purpose of ranking students and to keep accountability of the educational system (Watt, 2005; Popham, 2014; Carless & Lam, 2014; Wyatt-Smith & Klenowski, 2014). With developments in mathematics education, these methods and purposes have continuously been challenged (National Research Council (NRC), 2000, 2001, 2005). The use of 'measurement-driven' assessment had often led to a teacher-led type of instruction. In recent years, views of mathematical learning and assessment have shifted significantly worldwide. For example, the socio-constructivist approach to learning challenges the importance given to formal assessment (Cowie

2005; Heritage 2014; Earl & Timperley, 2014; Smith, Hill, Cowie & Gilmore, 2014; Willis & Cowie, 2014) and introduces a need for a shift to other forms of assessment (Wyatt-Smith, Klenowski & Colbert, 2014; Popham 2014; Looney, 2014). Over reliance on one form of assessment could disadvantage some students because of differences in learner characteristics. Some students who do not do well on traditional assessments are able to display their knowledge, skills or abilities more effectively through other methods (Watt, 2005; Klenowski, 2009). Although traditional mathematics tests provided reliability and comparability (Popham, 2014), there is a need to explore alternative assessment methods of assessing mathematical learning.

This paper reports on findings from a study that involved two Year-9 Fijian mathematics teachers and fifty one students. The main aim of this paper is to report on how this group of students viewed portfolio assessment. As part of their portfolio assessment, students were asked to write short reflections on what they liked and disliked about this form of assessment, which was new to them. These reflections also included their thoughts on their mathematical learning. The paper provides useful insights into students' perceptions of portfolio assessment, including how portfolios could be used to tap into students' reflective thinking. The findings have implications for how mathematics teachers could use portfolio assessment to improve classroom instruction in mathematics amidst an environment dominated by traditional assessments.

Theoretical Orientation

A recent shift in the paradigm for assessment based on socio-cultural ideas of learning and its assessment has led to calls for assessments that could allow for active participation from learners (Sheppard, 2000). This new view supports the interrelationship between teaching, learning and assessment and argues that 'children learn best by doing' (Payne, 2003: 10). The socio-cultural view of learning and assessment gives prominence to an assessment ideology that has often been captured under the umbrella term 'formative assessment' (Black & Wiliam, 1998). A revised version of the seminal model on formative assessment (Black & Wiliam, 1998; Sadler, 1989) offers five actions that comprise effective formative assessments: (a) clarifying and sharing learning intentions and success criteria with learners; (b) engineering effective classroom discussions, activities and tasks that elicit evidence of student achievement; (c) providing feedback that moves the learners on; (d) activating students as owners of their own learning; and (e) activating students as instructional resources

for one another (Wiliam, 2007). Seen from a socio-cultural lens, formative assessments place emphasis on enhancing rather than measuring learning (Cowie, 2005).

In our study, the focus was on students' participation and learning, including the metacognitive components of students' thinking. We drew on the socio-cultural view of learning to explain the events in our study. Willis and Cowie (2014) suggest that assessment for learning is a situated practice. They see classroom interaction as important. Willis and Cowie (2014) see assessment as a form of 'generative dancing'. They conceptualize learning, teaching and assessment as represented in the cultural practices situated within social contexts, from which, and within which learners draw upon explicit and tacit forms of knowing in order to successfully participate in the specific activity. Seen this way, teachers need to see themselves as choreographers who focus on interaction as a means to understand better what their students are learning and doing. According to Klenowski (2002) and Willis and Cowie (2014), when learning is seen as involving interaction and participation in activity rather than a purely cognitive activity, our understanding of what counts as evidence of learning must change. Rather than trying to see 'inside' a student's head to find out what a student is thinking, teachers must try and understand what students do and do not do with opportunities and resources to which they have access. This aspect was important for this study because portfolios can provide a wide range of opportunities for students to showcase their thinking, and to take ownership and control of their learning. While there are relatively fewer studies targeting learners' views on assessment, findings from Cowie's (2005) study suggest that students see cognitive as well as affective benefits from engaging in assessment.

Methodology

A broader aim of our study was to investigate the development and implementation of portfolio assessment in mathematics classrooms. The study is briefly described here.

We began with a two-day workshop on developing portfolio assessment for Year 9 mathematics classes. Twelve Fijian secondary mathematics teachers from two case study schools, who had no experience at all of portfolio assessments were part of this initial phase. In the second phase, we asked two Year 9 teachers to implement portfolio assessment in their Year 9 classes. Both teachers, named for reference as Gavin and Jenny, volunteered to do this. Portfolio assessment was based on the topic 'Measurement' and included subtopics such as 'money calculations', 'ra-

tios', 'rates', 'proportions' and 'percentages'. The data reported in this paper comes from the implementation phase of the study where we explored students' perceptions regarding the use and value of student portfolios as a means of assessing student learning.

One of the implicit aims of this research was to engage learners in the process of self-reflection, to look consistently at their own thoughts and behaviours and that of others in order to make improvements in their learning in areas where they may be required. This research encouraged teachers to allow students to reflect while participating in portfolio assessment. In order to gather information about students' reflections, we analysed the written statements contained in their individual portfolios. At the end of each entry, students were asked to write a personal statement about what they liked about the activity and what they did not like about the activity. The second question intended to find out what challenges or difficulties they faced, including anything that they may not have understood well. Furthermore, each student was asked to give his or her evaluation of the value and usefulness of the portfolio as a means of assessment, and of limitations of portfolio assessment from their personal experiences. An implicit aim was to see if portfolio assessment would provide a medium for students to think about their own learning in mathematics.

While a total of fifty-one students from both class submitted their portfolios, some students from Jenny's class did not write any personal reflection. The analysis of forty-three student portfolios, across both classes, containing written reflections is presented here. Students' perceptions of the helpfulness of portfolio assessment are presented followed by what students did not like about the portfolio assessment. These reflective writings gave us sufficient insight into students' perspectives about portfolios as a means of assessment.

Results

The findings reported here are from fifty-one students' portfolio assessments, which were collected and analyzed qualitatively. Out of the fifty one portfolios, thirty one were from Gavin's class and twenty were from Jenny's class. Some student portfolios were not able to be collected because some of the students were unable to complete them due to continued absences. These students, according to Gavin and Jenny, were still working on their remaining entries. Students from Gavin's class wrote personal reflections of about one paragraph each after each entry as well as one final reflection of approximately the same length. All thirty one

student portfolios from Gavin's class contained some form of students' personal statement.

Jenny collected 20 student portfolios from her 27 students. Her class wrote only one final reflection on the usefulness of portfolio assessment. Personal reflections after each entry were not done. One of the reasons could be that, as Jenny stated in one of the interviews, students were not allowed to choose a particular activity for each entry. A majority of Jenny's students gave in all the activities they did. Only a few students gave in a single activity as one entry. Out of the 20 students, eight did not write any reflection. The 12 students who gave reflections wrote almost half a page each on the usefulness of portfolio assessment. In this paper an analysis of the 43 student portfolios with written reflections is presented. In doing so, students' perceptions of helpfulness of portfolio assessment are presented followed by what students did not like about the portfolio assessment.

Students' Perceptions of Helpfulness

One of the major advantages reported from students' perspective was that they found portfolio assessment easy, enjoyable and interesting. The reasons given were mostly related to the learning of various content such as budgeting, finding percentages or ratios – in other words, these students found the activities that formed part of the portfolio assessment useful. Typical responses in favour of portfolio assessment included:

- 'I liked the activities on percentages' (Student 7, Gavin's class);
 - 'I liked the questions in the short test' (Student 8, Gavin's class);
 - 'It is very interesting to do a budget' (Student 11, Gavin's class);
- and
- 'Yes, I liked it because I learnt how to calculate, draw pie charts, and build my knowledge of social mathematics' (Student 1, Jenny's class).

Furthermore, more than half of the students from Gavin's class gave responses related to the short test entry. A majority of the students liked the idea of being awarded some marks for doing test corrections. Such responses were only true for students in Gavin's class. Gavin had agreed to award half marks of the possible full marks for each question which was wrongly answered if students provided a correct answer in the corrections submitted in the portfolio. This move by Gavin was very well liked by his students. Typical student responses included: 'The short test helped me realize my mistakes, and I got half marks as well' (Student 1,

Gavin's class); 'Some places where I got wrong, doing corrections made me overcome my mistakes' (Student 2, Gavin's class); 'I lost two marks, I did my corrections and got back one mark' (Student 5, Gavin's class); 'Interesting because I got marks on doing corrections' (Student 16, Gavin's class).

Another aspect of Gavin's implementation was noted in students' written reflections. This was related to the written reflections. Ten of the thirty one students wrote something in favour of the personal reflective statements. These students liked the idea of writing personal statements at the end of each activity where they explained why they chose a particular entry and what they liked or disliked about that entry. In their final written reflection, some of the students explicitly wrote in favour of this: 'One thing I liked about portfolio assessments was writing personal statements' (Student 15, Gavin's class); 'The thing that I enjoyed the most was the selection part, and explaining in a short paragraph' (Student 20, Gavin's class).

Moreover, students also liked portfolio assessment because of the activities that they had taken part in were related to their lives. As some students noted, 'It (budget) teaches me a lesson to use money wisely' (Student 9, Gavin's class); 'I liked portfolio assessment because I learnt a lot of things which I can use in my life, like making a budget' (Student 2, Jenny's class). Others liked the portfolio assessment because it allowed them to work with their peers. 'One thing I liked about this assessment was that we had to work in groups' (Student 15, Gavin's class), and 'We liked working in groups' (Student 3, Jenny's class), 'I got a friendly partner who helped me when I found things difficult' (Student 5, Gavin's class) were some of the responses.

Finally, all of the students in both classes found portfolio assessment to be something which they liked a lot. Some from Gavin's class wished they could be given a chance to continue with portfolio assessment. Their responses were linked to ideas presented above such as the relevance of the activities or liking the short test corrections activity. The following responses captured some of these sentiments:

- 'What I liked is that it was my first experience with this kind of assessment. I enjoyed every moment in doing the portfolio assessment' (Student 18, Gavin's class).
- 'I really love this assessment because this is one of the subjects I am really weak in so I think it is good idea for us to have another maths assessment like this one' (Student 19, Gavin's class).
- 'I loved doing this project' (Student 11, Gavin's class);

- 'This assessment was a wonderful experience for me' (Student 21, Gavin's class)

It must be noted that most of Jenny's students did not write any reflections at all. Out of those who did, their responses in favour of portfolio assessment were limited to the content and skills they learnt. On the other hand, Gavin's students' were able to provide a wide array of reasoning for liking the idea of portfolio assessment.

What Students' Did Not Like About Portfolio Assessment

Both groups had similar views about what they did not like about portfolio assessment. Almost all the reasons students gave were related to some areas of difficulty in the subject content, which they were unable to understand. There was no particular difficulty associated with portfolio assessment per se. When responding to the question of what they did not like about portfolio assessment, typical responses included: 'Test, we were confused with some questions' (Student 3, Jenny's class); 'Test, section B, question 3 was tough' (Student 1, Jenny's class); 'Didn't like the calculations with percentages and ratios' (Student 7, Jenny's class); 'Did not like dividing the fractions at first' (Student 2, Gavin's class).

Apart from the difficulties associated with understanding the content, a few students in Gavin's class were able to pick out an error in one of the multiple-choice questions in the short test. The students wrote about this in their final reflections to indicate their dislike of the test entry. 'What I didn't like was that one of the answers was not clear in the short test we did' (Student 23, Gavin's class); 'What I didn't like was that one multiple-choice didn't have any correct answer' (Student 27, Gavin's class).

Some students did not write anything negative about the portfolio assessment. The students in Gavin's class gave much detailed explanations for what they liked or disliked. In Jenny's class, on the other hand, eight of the twenty students did not write any personal reflections about their experiences. The twelve who did write, had limited focus in terms of the course content and the skills being emphasized. These reflections were consistent with the kind of focus Jenny had in her teaching, where she emphasized a lot on subject content. In Gavin's class, it could be noted students did relatively well in terms of writing personal stories about each entry as well as an overall evaluative piece on portfolio assessment. It must be noted that writing personal reflections is hardly part of any mathematics lesson in Fijian classrooms.

Discussion and Conclusion

This paper utilized students' personal portfolio entries to provide partial insights into students' views about portfolio assessment. Jenny's students noted advantages in terms of learning new content and skills; their difficulties were often bounded by these aspects as well. Students in Gavin's class, apart from detailing various areas of content that they either liked or disliked, pointed out many other benefits of portfolio assessment; these are gaining more marks through test corrections, getting an opportunity to write personal reflections, engaging in group and peer interactions, and reasons related to positive feelings and attitudes.

The findings confirm that portfolio assessment, when well implemented, does help students talk about their mathematical learning and development. From a social perspective, portfolio assessment did provide a suitable alternative to traditional assessments. Also, students talking about their own learning could be seen as an important medium of communication to the teacher as well as to the self about an individual's learning. In this study, portfolio assessment could be seen as providing the learners a medium of communication about their learning. From a sociocultural perspective, the role of communication in learning is critical.

The current study has its limitations. Firstly, the study involved only a small sample of students. This sample was not a random one either. Secondly, the researchers had to rely on the two case study teachers to implement portfolio assessment after a short training period. While our case study teachers did a reasonable job at implementing portfolio assessment, we are aware that effective implementation of portfolio assessments requires considerable time and expertise. Furthermore, as Klenowski (2002) argues, students also need some help and guidance in developing their reflective and evaluative skills. We relied entirely on our two case study teachers to provide students support in developing their portfolios and reflections. Given the relative lack of preparation of students in areas of self-evaluation, meaningful conversation, and reflective thinking skills, the limited student data nevertheless suggests that students in Gavin's class could write reflections about specific mathematical content and the overall usefulness of portfolios.

Hence, this study's findings suggest that portfolio assessments could provide a classroom environment that supports an active engagement of students in assessment. While more work would be needed in the area of students' perceptions of portfolio assessment, these initial students' insights into portfolios in mathematics are an important contribution of our study.

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