Assessment for Learning Techniques in the Pacific Island Context: What are Teachers' Views?

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This study investigated teachers' views, all from a Pacific Island context, of assessment practices as it relates to mathematics learning in early childhood, primary, and secondary settings. Based on the analysis of these views, collected via a written survey (n=25) from invited workshop participants in Nauru, a series of four mathematics assessment workshops was designed where the participants engaged in the creation of authentic assessment tasks that are linked to the teaching/learning cycle. Post-surveys and in-depth interviews with six teachers explored their views about using authentic assessment in Nauru. The teachers' views concern the purpose of assessment and their current assessment practices.

Worldwide, educators have struggled to find a balance between assessment and engagement in learning tasks. In recent years, efforts towards finding meaningful assessment practices have shifted the debate to the benefits of different forms of assessment (White & Anderson, 2012). The Department of Education, Nauru Government (2013), has developed a Prep (age 5 years) to Year 10 (age 16 years) Nauruan Mathematics Syllabus, which details student-centred practices that focus on knowing individual student's conceptual understanding. Traditionally, assessment practices in Nauru have focussed on *assessment of learning* strategies, in the form of end-of-term paper-based tests. In the light of these pockets of change, the Department of Education, Nauru embarked on a series of four three-hour professional development sessions that targeted student-centred learning and *assessment for learning* strategies in the mathematics classroom. Before implementing a targeted assessment strategy in Nauru, teachers' views on assessment and the suitability of *assessment for learning* practices was investigated. Their perceptions form the basis of this paper.

Traditionally, the primary purpose of mathematics assessments has been as a measurement of achievement (Siemon et al., 2015). Generally, assessment means "to identify in measurable terms the knowledge, skills and beliefs of an individual or group" (Serow, Callingham, & Muir, 2016, p. 240). In many countries, assessment has been a summative process used to evaluate the achievement of outcomes at the end of a teaching period. While this is an important function, current research indicates that this approach fails to provide information to fully support student learning. Recently, Brown (2016, p. 89) stated "assessment serves multiple purposes within all societies, including improved teaching and learning, certification of student performance, and evaluation of schools and teachers". Whilst Brown connects the purpose of assessment to the improvement of teaching and learning within the classroom, according to Zevenbergen, Mousley, and Sullivan (2001), many current assessment practices are quite removed from what is happening in the classroom and as such their validity is questionable. Different forms of assessment are needed to more fully assess students' knowledge and understanding (Saxe, Gearhart, Franke, Howard, & Crockett, 1999). White and Anderson (2012) urge teachers to carefully consider students' strategies and justifications when responding to open-ended contextualised tasks.

New assessment terminology has been adopted to reflect changing views. Summative assessment has become aligned with the phrase *assessment of learning*, while formative assessment is associated with *assessment for learning*. While these two terms do provide useful lenses for assessment discussion, there is crossover between the two formats (Wiliam,

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2011). Summative assessments have generally been comparative measures, or assessments of learning. Student feedback is focused on comparing their knowledge to that of other students. This contradicts research, which indicates that students benefit most from feedback based on their own progress (Wiliam, 2011). Harlen and Deakin Crick (2002, p. 15) urge educators to be aware that "students who are compared unfavourably and publicly with their peers hold low self-esteem in relation to learning, avoid risks and use less effective and more superficial learning strategies".

Formative assessments typically provide information that is specific to an individual student's knowledge and understanding. "Formative assessment could be conceived of as involving three main processes (seeing where learners are in their learning, where they are going, how to get there)" (Wiliam, 2011, p. 12). All assessment should support student learning by not only providing information about a gap in learning but also indicating what kinds of instruction should take place. Ideally, learners are actively engaged throughout the whole ongoing cycle of learning and assessment. Assessment that motivates students' learning should be differentiated, include different levels of tasks, be challenging but achievable, and provide ongoing feedback (Harlen & Deakin Crick, 2002).

Nauru Context

Nauru is an island country located in Micronesia in the South Pacific with a population of 10 000. The country was known as a major supplier of phosphate but this has diminished to a negligible amount and left much of the inland country uninhabitable. There are currently very few opportunities for any industry on the island (Serow et al., 2016). "Quality education is generally considered to be a key determinant in building social capital and consequently improving economic and social development" (Serow et al., 2016, p. 18). Nauruan teachers have typically experienced and use traditional teacher-directed approaches in pedagogy and assessment (Fussell et al., 2016). Summative tests and exams have been both valued and mandated by the education system. The importance of summative assessment in Nauru is emphasised through the high-stakes scholarship exams that occur in Year 8 and Year 9, which are the gateway to education in either Fiji or Australia.

Cultural differences play an important role in teacher development and must be considered when developing and conducting professional development. To lay down appropriate building blocks for the future of education, professional development must balance local and global contexts (Sullivan et al., 2015). Working with the teachers in partnership to achieve agreed upon goals is the most appropriate approach in Oceania (Sullivan et al., 2015).

With this background, the research questions, which provide an avenue for exploring shared understandings and goals, for this study were:

1. What are Pacific Island teachers' perceptions of the purpose for and strategies of assessment of mathematics learning in Nauru, before engaging in assessment for learning workshops?
2. What are teachers' reflections on the current assessment practices in the Nauruan education system, before and after participation in the four-day workshop program?

Method

The Department of Education (DOE), Nauru Government, has been collaborating with an Australian university to provide teacher education and professional development over the past six years. Through this process, DOE Nauru requested a series of mathematics assessment workshops for teachers of primary and secondary mathematics. Clarke's four

Principles of Assessment are relevant twenty years on, and provide a framework that and underpin the key goal and design of the workshops and analysis of data (Clarke, 1996).

- Assessment is an exchange of information,
- Assessment must optimise students' expression of their learning,
- Assessment must have instructional value, and
- Assessment must anticipate action.

Participants and Context

The workshop series was advertised through flyers that were distributed to all Nauruan schools. Teachers of any level, Prep–Year 12, were welcome to attend. Thirty-five teachers attended the first workshop and 25 completed the series of four workshops. The number of survey respondents and their current teaching area is detailed in Table 1 below. While there were only 23 pre-workshop surveys collected, there were 35 teachers in attendance at the first workshop.

Table 1
Survey Respondents

Respondents	P–Year 2	Years 3–6	Years 7– 9	Years 10–12	Total
Pre-survey	7	9	4	3	23
Post Survey	8	7	7	3	25

Schools in Nauru have limited resources and have used somewhat traditional approaches to teaching and assessment. Emphasis has been given to formal tests and exams to compare students across the system and to evaluate teachers. Professional development opportunities have been limited for teachers in Nauru. It is also worth noting that English is a second language for most of the teachers and students on Nauru. This may be reflected in direct quotes from surveys and interviews but does not detract from the overall competence of the teachers.

Project Structure

Teachers participated in four three-hour workshops focussed on mathematics assessment. Information sheets and consent forms were provided to willing participants. The pre-survey was completed prior to the commencement of the first workshop. Workshops combined discussions, practical activities, theory and guided reflection. The activities explored the purpose of assessment, designing assessment and assessment for learning through the main strands of mathematics number, algebra, measurement, geometry, statistics and probability. Opportunities for application across the whole range of year levels were modelled throughout. Clear connections with learning and assessment were discussed with each activity. The significance of supporting and assessing student conceptual understanding was always evident. Post-surveys and interviews were conducted after the fourth workshop.

Data Sources and Analysis

Pre-surveys, post surveys and interviews provided data about understandings and use of assessment by the participating teachers. This paper will report on two survey questions:

1. What is the purpose of assessment?
2. How would you describe your current assessment practices in Mathematics?

The interview data is in response to open-ended questions asking the participants to further respond to questions one and two above after the final workshop session. The responses were

analysed qualitatively through the Clarke assessment framework using a thematic clustering approach (Miles & Huberman, 1994) that forms the basis of the integrated results and discussion below.

Results and Discussion

For research question one: What are Pacific Island teachers' perceptions of purpose and strategies of assessment of mathematics learning in Nauru, before engaging in assessment for learning workshops?

The responses to the pre-survey items indicated that the perceived purpose of assessment is to check for student understanding. Specific mention was made by half of the teachers about determining students' strengths and weaknesses and to subsequently plan "remedial" work as needed. In addition, the majority stated that one purpose is to evaluate teaching strategies. Only 25% of the teachers alluded to measurement of conceptual understanding, with the majority referring to content, skills and procedures. All but one of the Prep–Year 2 teachers used short phrases in their descriptions and related exclusively to narrow skills such as counting. While secondary teachers used more verbose descriptions, these related to a narrow definition of assessment. A typical response being, "assessment helps here to see what they have understood and how they cope with the problems see if they achieve the aims and objectives". Some teachers did have broader, more inclusive understandings of the purpose of assessment. For example, to "find out what concepts each child has grasped, reflect on teaching methods and change as needed; determine strategies each child uses. Uses to determine student understanding and assess personal teaching."

Generally, post-survey responses, were characterised by richer more inclusive language. Forty-four percent of the teachers mentioned "conceptual understanding" specifically with an additional 24% addressing the need to determine the level of knowledge with understanding. There was also an increased realisation of the connection between assessment and learning. Students were more often viewed as partners in the process and there was recognition of specific feedback to aid development.

During the interviews, participants spoke about the importance of determining student conceptual understanding from assessment. All interviewees indicated that they had expanded their ideas about the purpose of assessment. Monica stated, "it has really opened my mind and broaden my ideas on what assessment has to give and I will use. I've collected a whole bunch of information and I will use them and I will share my ideas to those who were not here." Emily indicated that she mainly used the marks from tests to inform her about students' ability. She stated: "to my understanding, I thought that if a student got 90 out of 100, that was very good or excellent, but no that's not it … Assessment is where you try and find out what the student understands about that concept of maths and what you can do to help that student."

Other participants spoke about benefits of assessment for students including learning, use of strategies and the enhancement of thinking skills. Sarah spoke about the dual purpose of open-ended activities as informing teachers about students' understanding, as well as supporting student learning. Sarah stated, "the most interesting part of this workshop, that I've learnt, is about assessment trying to help the children to be critical thinkers". Likewise, Harry spoke about the advantage of using assessment tasks to enhance the development of thinking skills, stating:

> I have learnt about using activities that are very interactive, allowing students to participate instead of looking for just one answer like we used in the text ...Yeah the assessment that I've learnt in the workshop really allows kids to get to the next level of thinking, we need to allow children to analyse ... like the one that I used at school, it's basically asking for one answer mostly on a knowledge level like the lower level, Bloom's Taxonomy."

For research question two: What are teachers' reflections on the current assessment practices in the Nauruan education system, before and after participation in the four-day workshop program?

The respondents rated their satisfaction with their current system of assessment in the pre and post surveys as contained in Table 2 below.

Table 2
Current System Assessment Practice Level of Satisfaction

Survey	Good/Okay	Needs improvement	Identified problems
Pre	44%	28%	28%
Post	9%	41%	50%

The pre-survey responses lacked specific detail; they read as lists of methods. This was particularly evident in the Prep–Year 2 category. For example, one Prep–Year 2 participant wrote as follows: "Assess using flash cards, hands-on activities, making patterns, tracing, drawing, sorting". While the range of assessments indicated an understanding that assessment can be more than formal tests, the simple list provided by almost all teachers in this group may also reveal a surface-level use of these methods.

Some of the Year 3–6 teachers mentioned formative and summative tests however, the types of assessments were limited. One participant wrote: "Assesses through everyday teaching through oral questions, and formative/summative assessments (test/exams)". More than 40% of this group focussed exclusively on tests and exams as their primary assessment tools. One response was: *"*tests at the end of the week, end of term tests, end of year exams, checklists." The Year 7–9 responses about current assessment practices were mixed. Some focussed on traditional assessment methods; for example, one participant wrote: "oral and written activities, homework, quiz, test, exams". In contrast, one teacher responded: "I currently assess using student centred approaches, oral assessment, written assessment – worksheets, in-class activities, blackboard work, sight words (mathematical terms)." One participant discussed using assessment to see if students have met the goals of lesson and provided an example about the distributive law. The description was very technical and did not seem to consider what students may or may not understand. The Year 10–12 group presented the most sophisticated descriptions of current assessment practice. Respondents discussed using multiple formats, including group activities and specifically alluded to the importance of assessing prior knowledge. One teacher wrote:

> Assess prior knowledge of students using either a diagnostic test, questioning groups or through class discussion. Use a practical task to assess a concept in real life, use tests/exams to assess theoretical knowledge.

The post-survey responses provided more in-depth descriptions of classroom assessment. For example, the Prep–Year 2 group wrote about student portfolios, open-ended activities, reversibility problems, concrete tasks, and anecdotal assessment. In addition, they mentioned the importance of analysing data, making assessments inclusive, using a broad range of strategies and "designing assessments that the students do not know are assessments" (assessment *for* learning). The Year 3–6 group discussed using more practical approaches to assessment than they had previously done. Descriptions included the mention of games, concrete activities, different strategies, use of classroom activities and including a formative assessment. This group also stressed the importance of individual student progress and diversity. In futuristic terms:

> assessment will be based on class activities; will assess while students are learning. I will work on each individual's progress and achievement; using different strategies and write about their learning; less on formal assessment more outcomes-based.

The Year 7–9 group focussed on student-centred approaches rather than content. Eighty-six percent of the respondents discussed the use of open-ended, practical tasks that engage students' interest. Emphasis was given to knowing individual student's strengths and weaknesses, approaches to problem-solving and overall progress. One participant wrote: "assessment will be more on all levels of knowledge, problem-solving and communicating mathematical ideas. Also, open-ended and reversed tasks … observing students on interactive activities." Similarly, one teacher responded: "I will design open-ended assessment where students will be able to show maths skills and their reasoning."

The Year 10–12 respondents highlighted the significance of open-ended activities and the use of reversal problems to show the "real" level of understanding. A balanced approach was alluded to, by one teacher, who indicated that open–ended questions may be used alongside more traditional tests and quizzes. Discussion centred on student-led work and the use of individual interviews. In addition, this group spoke about lessening the worry for students doing assessments, as indicated by, a need for "less emphasis on tests, more on activities, and this will be less worrying for students."

The post-interview responses were characterised by reflections on current assessment strategies and ideas for the future. Teresa shared:

> I think the thing I learnt … hands-on activities instead of the print-outs. Say for example, I did one last term to do with shapes, I assess their understanding of shapes instead of doing like using concrete materials, I just printed, give them print-out they do tracing, then they name the shapes, I think it's better I give them the shapes … and they show me, then they'll trace it themselves.

Emily spoke about being required to develop student portfolios and not knowing what to put into them:

> I was told to put together a student folio for maths, but I never actually started it because I didn't know what it was supposed to look like. I was just told to put student work samples in a folder … I just found out with the workshop that there are actually things, activities that you provide the students and with those activities you get, you write down how they did the open-ended activities.

Felicity explained at length about elements of the workshop that she intends to put into direct practice in her teaching. She was clearly a skilled teacher who exhibited good assessment skills prior to the workshops. Felicity explained that it is important to ensure that assessments are defined well. Similarly, Monica stated:

> I've learnt that it's important that the kids get a clear, we give them the task that is clear so that they'll be able to understand … like we take it for granted that whatever we ask the kids they know according to what we're thinking, but I've learnt that it's very important to give clear instructions to the kids when we assess.

Furthermore, Monica indicated that assessment tasks need to be adjusted to the students' context and needs, not necessarily translated verbatim from given resources. Sarah explained that current assessment practices are mainly traditional, like the ones they had also experienced.

> the assessment is mostly like we are, teachers nowadays, they're actually doing what they used to do, what used to be done to them when they were in school. So, they're used to that. It's like a culture, like they're used to those questions, we are used to getting and giving questions that are straight forward ... nowadays we are just bringing those old remedies that we used to use before.

Following the workshops, Sarah favoured the use of more open-ended activities and stated that "you actually encourage children to think for themselves". In addition, Sarah is concerned that students are appropriately supported to develop understanding:

> Instead of placing emphasis on the remedial activities, select activities that will try and build up and develop the student before they move on to the next level. So, when we move on, like when I was a

> student, when we move on to the next level, some of the concept that we are supposed to get on the lower level, we haven't grasped it completely before we move on.

Harry agreed that the development of thinking skills is a crucial part of assessment; in fact, he is concerned that many students are limited by current practices:

> I think (by) allowing children to be thinkers rather than just looking for one answer at the end of the assessment. Yeah, this workshop actually opened windows of understanding on how to assess the students their right to learn rather than just limit them to what they know is best for them, but there are better ways to assessing them and bringing the children to the next level. And I think that's what the parents of Nauru are not aware of. What I have learned, is that to use more open-ended activities than just supervised tests, we now have a variety of, range of assessment skills that we can use in the classroom to make learning more alive and more meaningful to children.

The data analysis revealed that while the teachers developed a deeper understanding of assessment purpose and implementation, they were not yet embracing all of the principles espoused in Clarke's framework (Clark, 1996). Teachers began to recognise that appropriate assessment must provide multiple opportunities and ways for students to show their learning. In addition, they majority of teachers expressed the value of assessment for informing instruction. In contrast few teachers were able to embrace two key principles: (a) assessment is an exchange of information, and (b) assessment must anticipate action (Clarke, 2016).

Conclusion

The participants have shared some interesting insights into Pacific Island ways of teaching, and they describe this as mostly teacher-directed in nature, and assessment predominantly being summative in the form of formal tests. The design of end-of-term tests is often in the form of closed or short answer questions concerning facts and procedural items that are familiar and routine in these contexts. In contrast, the relatively new Nauruan Mathematics Curriculum emphasises conceptual understanding beyond knowing procedures and skills. There is evidence that the reliance on summative tests is reducing the interactive nature of assessment in Nauru. The views expressed by the participants in this study, reiterate assessment in mathematics in the Nauruan context in this light, however, teachers who participated in the targeted *assessment for learning* workshops demonstrated a preparedness to adopt student-centred practices and associated assessment for learning strategies in the mathematics classroom.

Of particular interest was the teachers' high level of interest and motivation to incorporate open-ended mathematics tasks. The teachers in Nauru acknowledged the potential of tasks that have multiple correct responses, and those that allow the use of multiple approaches/strategies. Their views echoed studies in the Australian context, (Zevenbergen et al., 2001) which identified that for many teachers, the use of open-ended tasks not only provided excellent teaching and learning opportunities, but also provided valuable assessment information. The Nauruan teachers acknowledged, at varying levels, the advantages of open-ended tasks, including: student engagement and multiple entry points, thus allowing students to participate at their own level and use different strategies. In addition, open-ended tasks allow for ongoing assessment and the potential to provide deep insight into student understanding. The workshops are only a beginning in the journey that Nauruan teachers must take to more fully engage with assessment according to Clarke's assessment framework (Clarke, 1996). Ultimately, the teachers in Nauru are open to consider strategies that aim to develop deeper conceptual understanding. Serow, Callingham, and Tout (2016, p. 251) stated that our "children deserve the right to have mathematics assessment tasks that allow them to demonstrate "what they know", engage them, and consider their interests in an environment that does not cause stress". The teachers in this

Pacific Island have the same goal, and future research will consider culturally responsive strategies for sustainable capacity building in the area of meaningful assessment in Pacific Island nations.

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