Faculty of Education

Assessment Task Cover Sheet

Unit Co-ord./Lecturer	Brett Stephenson/Helen Chick	**OFFICE USE ONLY** Assessment received:
Tutor:(if applicable)		
Student ID	078395	
Student Name	Emma Stubbs (Previously Salisbury)	
Unit Code	EMT627	
Unit Name	Grade 7-9 Students as Mathematics Learners	
Assessment Task Title/Number	Assessment Task 3 (Please see additional submissions, for Artefacts)	
Word Count	1973 (Excluding References)	

I declare that all material in this assessment task is my own work except where there is clear acknowledgement or reference to the work of others **and** I have complied and agreed to the University statement on Plagiarism and Academic Integrity on the University website at www.utas.edu.au/plagiarism *

Signed E.Stubbs Date 25/05/2016

*By submitting this assessment task and cover sheet electronically, in whatever form, you are deemed to have made the declaration set out above.

Assessor's feedback:

Assessor: ***Brett Stephenson/Helen Chick***

The assessment artefact chosen is a year seven test during a measurement unit focusing on conversion of units of measurement and specifically in regards to perimeter and area. This assessment focuses on the key learning area to establish the formulas for areas of rectangles, triangles and parallelograms, and use these in problem-solving (Australian Curriculum Assessment and Reporting Authority [ACARA], 2015, P.11).

This assessment task is designed to assess understanding of measurement. It has a particular emphasis on conversion of units of measurement and requires the students to convert larger units of measurement for example kilometres (km) to smaller units of measurement (m) and vice versa. The test starts with asking the students to covert units of measurement as part of a series of multiple choice questions. Often multiple choice questions are limiting, as sometimes students are able to guess correctly, however if well constructed, as in this test, multiple choice questions may uncover hidden gaps in understanding (Nicol, 2007).

The multiple choice questions are complimented by question 11, which asks the students to do the conversions themselves. This has good diagnostic capacity as it allows the teacher to see if students just guessed at the multiple choice questions. Question 11 also has the added benefit of testing how students can understand conversions using decimals. It also may allow teachers to gauge the level of understanding as students may be able to convert from larger (km) to smaller (m) but they may not be able to reverse the process. This will highlight whether students have the deep relational understanding of the base 10 system or whether they have just memorised that to convert km to m you need to multiply the number by 1000, without any deep knowledge as to why.

Question two is also a good question to gauge understanding, as it combines the understanding of how to work out the perimeter and choosing the correct units of measurement. While combining the two areas of understanding, this question would provide the teacher with more information on the student if it had been a problem question, rather than multiple choice. If there was a rectangle with a width of 2km and a length of 300m, this would assess both understandings. The students would have to demonstrate that they knew the formula for working out perimeter and also to complete the conversion into the same units of measurement.

This test also combines a number of different types of questions including multiple choice, worded problems and an explanation problem. This is a particular

strength of the test, as it may also highlight any students that may have learning difficulties, previously going unnoticed. The written explanation question, number 10, allows the student to display to the teacher what the meaning of perimeter is and by showing an example, the teacher can assess whether the student does have a full understanding. Improvements to this may have been to ask the students to explain what area is and how the formulas work. This adjustment may further help the teacher to assess and separate the higher achieving students, and to provide them with more challenging extension work.

The layout of the test is also one of its strengths, by starting the test with the easier multiple choice questions and then progressively moving towards more difficult questions relating to composite shapes, the students are able to refresh their memory and build confidence and work towards the harder questions (Maloney & Beilock, 2012). By having an explanation question at the beginning of the test, the students are required to reflect on their own understanding of perimeter, which in turn will help them answer questions as the test continues.

One weakness of this test however, is the questions relating to area on page two. Question 12 and 14 both have the formulas to use for each case written in as part of the question. As this is a test that is conducted directly after the unit on measurement, the students should be able to remember these formulas. This test does lose some of its diagnostic capacity by not allowing the students to select the appropriate formula for the shape presented. Again, by providing this information some student may just be able to make a guess and get the correct answer. For example in question 12, the formula is provided on the test, and the student may simply guess which value to use for the 'height' part of the formula, without the teacher being able to assess understanding. An improvement to this type of question is to ask students to correctly label a shape with the information required, for example that the height of a parallelogram is its vertical height rather than its side length, and why they believe this. This type of explanation question may reveal far more gaps in understanding, and show whether a student has a deep relational understanding or just a 'veneer' understanding of the topic being tested.

Another problem with this form of assessment is that it only provides a mark and grade awarded rather than detailed feedback and scope for focusing on and improving learning outcomes of the student being tested (Bangert-Drowns, Kulik, Kulik & Morgan, 1991).

The marking scheme for this test is a score out of the total mark of 34, each section or question has its score outlined below. This particular test increases with difficulty as the student moves through the test. While page one is a majority of multiple choice questions, each worth one mark, other questions are worth multiple marks. This allows the students to receive partial marks for applying the correct reasoning even if the answer is incorrect. One mark questions within the test, require only a basic understanding, whereas the more difficult questions on page three, worth four marks, require a deeper relational understanding of the problem and multiple steps to work out the answer. For example, question 17b is worth a total of 4 marks. One mark is awarded for the correct reasoning as to how to work out the answer, one mark each for the correct formulas for area of a triangle and rectangle and one mark for the correct answer and units.

Grade	E	D	C	B	A
SOLO Taxonomy	Pre-Structural		Uni-structural	Multi-Structural	Relational/ Extended Abstract
Description	Well Below Standard	Below Standard	At Standard	Above Standard	Well Above Standard
Mark required (Out of 34)	Below 9	10-17	17	22	27

The C grade is the at standard level that is required of students to achieve. The C grade is set at 50 percent of questions correct. The Well Below standard level is set at 9 or below marks out of the 34, whereas the below standard is set at between 10-17. The distinction between the two grades is that to be at the D level grade the student is required to attempt the questions and setting the grade to start at 10 marks, rules out the possibility of students just correctly guessing the multiple choice questions. To achieve either the A or B grade students need to have attempted all questions on the test. The distinction between the two is that the A grade requires the majority of the last page to be completed and correct.

The open-ended enquiry task is outlined as follows. An alternative assessment task may be an open ended inquiry into area and perimeter, which requires students to demonstrate their understanding by making choices and then justifying that choice. This task assesses the students' understanding of conversion of units, perimeter and area of different shapes through students justifying their choices.

Due to popular demand of the students, the school is creating a new playground in the grounds. The total area of the playground space is $12m^2$ but it does need to be fenced. Develop five possible playground shapes, all with the area of $12m^2$, with different perimeters. Draw them on your grid paper (1 square = $1m^2$) and then use the pricing guide provided to work out which is the cheapest option. An explanation should be given as to which one you will choose to use. The perimeter of the playground requires corner pillars, stability posts every meter and three levels of horizontal wood planks.

The students have also voted that they want a sand pit in the playground with a depth of 60cm. The principal says the total budget for the design stage of the project is $750. Design the playground and budget for the best design to keep your classmates happy.

Create a poster with all your information and an explanation to the principal as to which playground design we should use.

This task requires students to fully understand perimeter and area and how shapes may have the same area but different perimeters. Students are also required to make a judgement on which playground the school should build based on a number of key information sets and pricing. This assessment task allows the students to critically evaluate the pricing of the playground and encourages students to think about ways of making it cheaper for the school. By asking the students to develop five different playground perimeters, students are required to test out a different shape for the playground, demonstrating their deep relational understanding of area for different shapes. By providing the total area, $12m^2$, and asking what shapes would have this area students are demonstrating their understanding of how shapes may have the same area, but can look very different.

Once students have developed their five playground designs, they are then required to justify which they will be proceeding with, based on their initial thoughts.

This part of the task allows the teacher to assess whether students can rule out the extreme shapes, which may be easier to achieve the perimeter from the starting area of $12m^2$, for playground as they would not be suitable for the purpose. This also allows the teacher to assess the level of understanding of the relationship between area and perimeter. This question also allows for extension activities for the higher achieving students, as the teacher could ask how many different playgrounds could be created with an area of $12m^2$.

This inquiry task also requires the students to convert the units of measurement and also adds the additional challenge of working with money and budgets. The student can still continue with the task, even if they have made a mistake with converting units, however it allows the teacher to diagnose those students that could not complete the unit conversion.

While this task does cover the same content as the original test, it goes about it in a different way. Students are often more successful when it comes to open-ended inquiry tasks rather than sit-down tests. An inquiry task, such as this one, allows the teacher to assess all levels of understanding and provides the teacher with information about the level each of the students have reached in their understanding (Fry, 2014). This inquiry based assessment has a greater level of diagnostic capacity than the original artefact with its single question and answer format. It allows the teacher to fully assess the students' deep relational understanding of the content by the number of different shapes they can come up with for the playground. Most importantly this task requires the students to make decisions based on the data that they have worked out and then to justify their decision. Being asked for a justification for the playground choice allows the teacher to gauge the understanding of the student, to a greater extent than the original test. This task combines all aspects of the original test and the content learned but also gets the students to think outside the box when it comes to creating the playground space.

The marking scheme for this alternate assessment piece is more detailed than the original and allows the teacher to assess the students on a number of criteria and understanding on many levels. From the rubric below, the students are given detailed feedback on their current understanding and may encourage the student to address gaps in their own knowledge (Wilkie, 2016)

Grade	E	D	C	B	A
SOLO Taxonomy	Pre-Structural		Uni-structural	Multi-Structural	Relational/ Extended Abstract
Description	Well Below Standard	Below Standard	At Standard	Above Standard	Well Above Standard
Development of Playgrounds Shape	Less than Four playgrounds, only rectangle design and or incorrect shapes for the area $12m^2$	Five different Playground Designs provided, with some incorrect lengths and or less than five provided with correct lengths	Five Playground Designs provided limited use of different shapes other than rectangle. Some duplication, i.e. 3x4 shape and 4x3 shape used	Five different Playground Designs provided, different shapes provided	Five different Playground Designs provided, different shapes selected and or decimals used to provide overall comparison.
Use of Formulas and Calculations using Supplied Data	Many errors in calculations of perimeter and substantial errors/or incomplete calculations of costings. Sand Pit not considered	Some errors in calculations of perimeter and many errors in calculating costings of playgrounds. Sandpit not considered	Correct calculations of perimeter used for all playgrounds, some errors in calculating cost. Sandpit design considered	Correct calculations of perimeter used for all playgrounds, majority of costing calculations correct. Sandpit design incorporate	Correct calculations of perimeter used for all playgrounds, correct calculation of all costs using price guide with little or no error.

			but incorrect calculations or not considered	d with errors	Sandpit design incorporated with minimal errors
Selection of Playground	No reasoning provided for playground selection.	Insufficient reasoning provided for playground choice, in relation to budgeted figures.	Satisfactory reasoning about playground chosen, in relation to calculations, little mention of other designs.	Sound reasoning of playground choice in regards to budget. Mentioned other designs and their effectiveness	Excellent reasoning of playground choice and sandpit design with budget provided. Considered effectiveness of each design.

References

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