Excerpt of a Graduate Teacher Performance Assessment

Reflection

Differentiated instruction addresses the various rates of learning and styles to help all students achieve curriculum outcomes and create positive attitudes towards learning (Konza, 2008). As such, in my third lesson with the class, I incorporated a group investigation activity to help students derive formulas related to angle properties of polygons. The range of learning activities such as team work and use of simulations in this exploratory activity helped to address the diverse range of student learning needs and encouraged peer-assisted learning (1.3.1, 1.5.1, 3.3.1) (See Appendix 4: Sequence 1 Lesson Plans) (See Appendix 7: Polygon Investigation Activity). Upon reflection and feedback from my supervising teacher, we both felt that this lesson was highly effective in engaging the class and provided adequate time and opportunities for different learners to explore the concept.

TES is aware of the need to differentiate teaching to meet the different learning needs of all students.

Thus, through lesson sequence 1, I illustrated the development of my teaching knowledge and skills through Standard 1 and Standard 3 through collecting data from conversation, surveys and reflection to better understand how my students learn and using this knowledge to trial a range of teaching strategies to differentiate my teaching to improve its efficiency.

Lesson Sequence

The following lesson sequence on 5.3. Surds demonstrates my achievement of Standard 5: Assess, provide feedback and report on student learning through a collection and recount of evidence. The skill of providing and receiving feedback on student performance is focused as according to Hattie (2009), feedback has the greatest influence on furthering student outcomes.

Through discussion with my supervising teacher and other staff members, and in accordance with the Year 10 scope and sequence, I was recommended to move onto the extension topic 5.3 Surds after completing the 5.2 Properties of Geometrical Figures. As such, towards the end of the 5.2 topic, I announced to the class that we would be learning about surds and engaged in a class discussion to gauge their understanding of the content. Through this discussion, I had learnt that most students felt confident with surd operations due to work in previous years and many expressed their disinterest in the topic due to their familiarity.

TES collaborates and plans with supervising teacher and staff to plan and develop teaching activities.

Sequence 1 Lesson Plans

Lesson 3 – Deductive Geometry – Quadrilaterals

Teacher Education Student				**School**	
Lesson duration	80 minutes	**Year**	10	**Class**	
Curriculum area	Stage 5.2 Properties of Geometrical Figures	**Topic**	Quadrilaterals	**Date**	Term 4, Wednesday 18/10/2017 (Period 1+2)
Lesson Title/Focus	Properties of Geometrical Figures – Quadrilaterals				
Syllabus Outcomes	A student: MA5.2-1WM Selects appropriate notations and conventions to communicate mathematical ideas and solutions MA5.2-1WM Interprets mathematical or real-life situations, systematically applying appropriate strategies to solve problems MA5.2-3 WM Constructs arguments to prove and justify results MA5.2-1 MG Calculates the angle sum of any polygon and uses minimum conditions to prove triangles are congruent or similar				
Syllabus Content	Apply logical reasoning, including the use of congruence and similarity, to proofs and numerical exercises involving plane shapes (ACMMG244) •use dynamic geometry software to investigate the constancy of the exterior angle sum of polygons for different polygons (Reasoning) •apply the result for the interior angle sum of a triangle to find, by dissection, the interior angle sum of polygons with more than three sides • use dynamic geometry software to investigate the interior angle sum of different polygons (Reasoning) • express in algebraic terms the interior angle sum of a polygon with n sides, eg (Communicating) •apply interior and exterior angle sum results for polygons to find the sizes of unknown angles				

Lesson Intentions

By the end of this lesson, students will be able to:

- Recognise different types of polygons
- Define the exterior and interior angle of polygons
- Investigate the angle sum of polygons

Assumed knowledge

- MA5.2-1WM Selects appropriate notations and conventions to communicate mathematical ideas and solutions
- MA5.2-1WM Interprets mathematical or real-life situations, systematically applying appropriate strategies to solve problems
- MA5.2-3 WM Constructs arguments to prove and justify results
- Familiarity with congruent and similar triangle proofs and concepts

Differentiation

Visual learners: Slides; worked examples on board; deriving activity involves visualising; use of simulations

Auditory learners: Teacher communicates verbally to students; group/class discussion.

Kinaesthetic learners: Independent learning through doing questions with /without peer assistance; students are given opportunity to demonstrate their understanding on the board;
deriving activity allows students to investigate concepts with their peers and online platforms;
changing variables in the simulation to aid understanding

Low literacy abilities: The information is presented visually and verbally to provide more opportunities to expose the information to the students. There is a focus on using mathematical terminology when communicating in the classroom. A safe learning is fostered to encourage students to discuss and share their thoughts to improve their literacy.

Higher ability students: Students are taught additional theory and provided extension questions to work on.

TES develops lessons that meet the different learning styles and abilities of students.

Focus for	**Literacy** Students engage their listening and comprehension capabilities through teacher directed instruction, class discussions and pair/group activities. Students practice expressing their opinions using the appropriate language. Students are expected to record down mathematical terminology.	**Numeracy** Students are required to critically analyse a range of shapes to determine their congruency/similarity. Students are required to communicate using the appropriate mathematical conventions and apply appropriate mathematical techniques.	**ICT** Powerpoint is used to visually present the information in a more efficient manner. Angle simulations help students explore and build their knowledge.

Resources

- SmartBoard/Projector
- Powerpoint 10M5-3
- Stationery: Whiteboard markers, writing utensils, calculator
- Textbook
- Worksheet – Deriving Angle Sum Formulas

SIMULATIONS

- Simulation Interior Angles NCTM https://illuminations.nctm.org/Activity.aspx?id=3546
- (Alternative) Simulation Interior Angles: http://www.mathopenref.com/polygoninteriorangles.html
- (Alternate simulation) GeoGebra Interior Angles triangles: https://www.geogebra.org/m/zEF3vNYS
- Simulation Exterior Angles: http://www.mathopenref.com/polygonexteriorangles.html
- Sum Exterior Angles: https://www.geogebra.org/m/KWb7RrTu

WHS

- The teacher should ensure the classroom arrangement does not have tripping hazards to prevent accidents when students navigate around the classroom.

Teaching and Learning Sequence			
Timing	**What teacher does and says**	**What students do and say**	**Assessment and feedback strategies**
Introduction 10 minutes	**<u>Do Now/Introduction– 10 minutes</u>** - Put presentation on SmartBoard -Welcome students as they enter. -Ask students to collect both worksheets on their way in -Ask students to get out their workbook/writing utensils and complete the 'Do Now: Matching' while they wait -Once students have settled in, ask them to put down their pens and go through lesson objectives	-Students collect the worksheets as they enter -Students unpack and prepare for class -Students start working on the worksheet	
Body 65 minutes	**<u>Homework Check and Revision of questions – 25 minutes</u>** -Mark roll and check homework. -Ask students which questions they had trouble with -Ask for volunteers/randomly select students to complete problems on the board *Time can be flexible in this section – leaving more time for activity*	-Students announce whether or not they have completed their homework -Students share questions they are not sure about -Students work with the teacher to answer the questions	Formative assessment. Verbal feedback is given.

Body 65 minutes	**<u>Deriving formulas to calculate angles of a polygon – 40 minutes</u>** <u>15 minutes:</u> -Go through answers for the matching worksheet. -Define types of polygons. Ask students to copy down examples. -Model how to fill the first two columns of the deriving worksheet. <u>25 minutes:</u> -Instruct students to work independently or with their peers to discover the pattern to derive the formula. -Encourage students to try to use the simulations to help their understanding -Walk around to check student progress and help them answer discussion questions ALTERNATIVELY: If by the last 20 minutes students are able to complete the discussion questions. Go through discussion with class. Can also assign set 1 questions for homework.	-Students mark their worksheet -Students fill in worksheet -Students work on activity independently or with their peers	Formative assessment. Verbal feedback is given. Formative assessment. Verbal feedback is given.
Conclusion 5 minutes	**<u>Homework reminder – 5 minutes</u>** -Remind students to complete discussion question for next lesson to discuss. -Ask students to pack up and wait for the bell behind their desks.	-Student copy down homework -Students pack up and wait for the bell.	

Polygon Investigation Activity

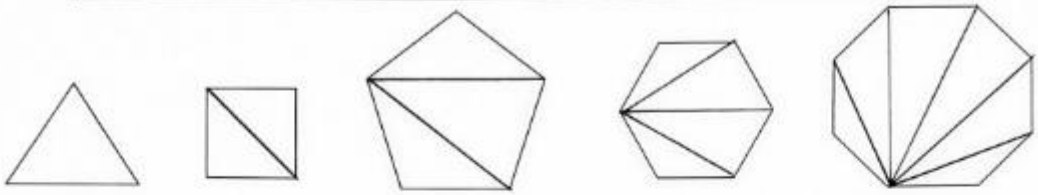
Standards addressed:
1.3.1 Addresses student diversity
1.5.1 Differentiates teaching
3.3.1 Uses a range of teaching strategies

The following activity accommodates for the range of student learning preferences and needs incorporating elements of team work, critical thinking and use of simulations and visuals to help understand the theory.

TES develops lesson with visuals to differentiate lesson activity.

Sample:

INVESTIGATION: DERIVING ANGLE SUM FORMULAS



Now complete the table:

Name of Polygon	No. of sides	No. of triangles	Sum of interior angles	Interior Angle	Exterior angle	Sum of exterior angles
Triangle	3	1	180°	60°	120°	360°
Parallelogram	4	2	$180° \times 2 = 360°$	$\frac{360°}{4} = 90°$	$180° - 90° = 90°$	$90° \times 4 = 360°$
Pentagon	5	3	$180° \times 3 = 540°$	$\frac{540°}{5} = 108°$	$180° - 108° = 72°$	$72° \times 5 = 360°$
Hexagon	6	4	$180° \times 4 = 720°$	$\frac{720°}{6} = 120°$	$180° - 120° = 60°$	$60° \times 6 = 360°$
Octagon	8	6	$180° \times 6 = 1080°$	$\frac{1080}{8} = 135°$	$180° - 135° = 45°$	$45° \times 8 = 360°$
Decagon	10	8	1440°	144°	36°	360°
Undecagon	11	9	1620°	147.27°	32.72°	360°
n-gon where n = number of sides	n	n-2	$180(n-2)$	$\frac{180(n-2)}{n}$	$180° - \frac{180(n-2)}{n} = 180 - \frac{180n}{n} + \frac{360}{n} = 180 - 180 + \frac{360}{n} = \frac{360}{n}$	$\frac{360}{n} \times n = 360°$