

Planning a Teaching and Learning Sequence

Patrick

The overall learning sequence of intended teaching focuses on the child's understanding of measurement by comparing and ordering objects as well as using informal units of measurement and estimation skills. My intended learning sequence will focus on delivering lessons two, five and seven of the measurement focus unit. The last lesson will allow the children to practically apply their knowledge in a real-life situation by going on a class excursion to the zoo. To create a synergy between the focus child's intended mathematical knowledge and skills and the learning sequence, I have drawn on the Australian Curriculum foundation and year one curriculum for measurement as well as the national numeracy progressions document. My extension of prior learning will focus on developing the focus child's understanding of the use of appropriate informal units to measure, understanding consistency in units of measurement, estimating units, and using the same units for comparison (Booker et al., 2020). The learning focuses on Macdonald's (2018) three key concepts of mathematics as children understand "Objects and events have attributes that can be measured. Measurement can be used to compare objects and events. Formal and informal units can be used to measure objects and events" (p. 218). My learning sequence is underpinned by teaching theories and pedagogies to develop the student's overall learning experience. All three learning experiences are underpinned by a situated learning theory as children are challenged to use their critical thinking in group activities. The learning experiences are also underpinned by problem-solving pedagogy where the children are practically applying learnt concepts in question situations where they use critical thinking to solve problems (Booker et al., 2020). The learning is also based upon a constructivism theory as children think differently to adults as are able to "construct their own knowledge" (MacDonald, 2018, p. 32). This can be seen throughout the learning experiences as children are given choice in their learning to understand mathematical skills and concepts.

<p style="text-align: center;">Sequence of teaching and learning</p> <p style="text-align: center;">Experience 2 – Measuring and comparing objects using informal units</p>	<p style="text-align: center;">Points to remember</p>
<p>Introduction:</p> <ul style="list-style-type: none"> • Read picture books to build the field of knowledge on using informal units of measurement • How Big is a Foot by Rolf Myller (found in Booker et al., 2020) • Six Feet Long and Three Feet Wide by Jeannie Billington (found in Booker et al., 2020) 	<p>Resources:</p> <p>Story 1 Link – (https://www.youtube.com/watch?v=5S-Dgk7ml40)</p> <p>Story 2 Link – (https://www.youtube.com/watch?v=R_5xyf2BxoY)</p> <ul style="list-style-type: none"> - Cardboard boxes or storage boxes - String, Scissors, - Paper to record sizes or objects
<p>Experiences:</p> <ul style="list-style-type: none"> • Learning Experience aim: “measure and compare the lengths and capacities of pairs of objects using uniform informal units” (ACARA, 2018a, ACMMG019) • Create a space for items to fit inside (could use boxes). Measure the size of the box using a piece of string. Using the same string, indirectly compare the size of objects around the classroom and decide which objects would fit inside the designated space. 	<p>Key vocabulary:</p> <p>Measure, compare, length, informal units</p> <p>Key questions:</p>
<p>Conclusion:</p> <ul style="list-style-type: none"> • To conclude the learning experience, the students will have gained a greater understanding of using informal units of measurement. The students will have consistency in units of measurement and use the same units for comparison (Booker et al., 2020). • The students will have finished by creating a reflective page explaining their findings. 	<p>How many different ways can you measure the size of the box?</p> <p>Is this a reliable method of recording size? Why or why not?</p> <p>(Callingham, 2008).</p>

Observations/assessment focus:

The teacher can record observations and assessments of the children's learning through in-class observations of children's mathematical language as well as a reflective journal to record each child's findings using informal units of measurement. The teacher can also assess the child's ability to use correct mathematical reasoning to describe the comparisons of objects.

Differentiation:

As the teacher, providing differentiation in the learning experience the students will have "learning environments that are both safe and challenging for each student" (Tomlinson, 2005, p. 263).

Sequence of teaching and learning Experience 5 – Estimating size and using informal units measure length, mass, or capacity		Points to remember															
<p>Introduction:</p> <ul style="list-style-type: none"> • Short activity – Estimating Mass? Class estimation and group solve • How many pencils fit in a paint pot? • How many balls fit in the ball bin? 		<p>Resources:</p> <p>Class estimation resources</p> <p>Estimation sheets for students to fill in</p> <ul style="list-style-type: none"> • Classroom resources • Informal unit measurement items <ul style="list-style-type: none"> • String • Hands • Basketballs • Drink bottle • Paintbrush <p>Key vocabulary:</p> <p>Estimate, length, mass, capacity, width, and height.</p> <p>Key questions:</p> <p>What is your estimation as to how wide the classroom is? Why do think that?</p> <p>If you know that you are one window tall, how can you use that measurement to measure the height of the classroom?</p>															
<p>Experiences:</p> <p>Learning Aim: “estimate the total number of units needed to measure and use multiple informal units to measure length, mass or capacity” (ACARA, 2018b, p. 32).</p> <ul style="list-style-type: none"> • Estimation activity – Estimating objects in the classroom to a mathematical attribute such as length, mass, width, and height. • Estimate the size before using informal units of measurement • Using benchmarks (a known reference) the child can estimate the size (Booker et al., 2020). • The child can also break objects into parts such as the classroom being three windows wide so they can measure one window and multiply by three (Booker et al., 2020). • Use information units to measure the objects (Booker et al., 2020). <table border="1"> <thead> <tr> <th>Investigation</th> <th>Attribute</th> <th>Object</th> <th>Estimation</th> <th>Measurement</th> </tr> </thead> <tbody> <tr> <td>How wide is the classroom?</td> <td>Length</td> <td>Classroom</td> <td>6 Sammy’s Long</td> <td>4 Sammy’s Long</td> </tr> <tr> <td>How heavy is a chair</td> <td>Mass</td> <td>Chair</td> <td>5 Basketballs’ heavy</td> <td>3 basketballs’ heavy</td> </tr> </tbody> </table>			Investigation	Attribute	Object	Estimation	Measurement	How wide is the classroom?	Length	Classroom	6 Sammy’s Long	4 Sammy’s Long	How heavy is a chair	Mass	Chair	5 Basketballs’ heavy	3 basketballs’ heavy
Investigation	Attribute		Object	Estimation	Measurement												
How wide is the classroom?	Length	Classroom	6 Sammy’s Long	4 Sammy’s Long													
How heavy is a chair	Mass	Chair	5 Basketballs’ heavy	3 basketballs’ heavy													
<p>Conclusion:</p> <ul style="list-style-type: none"> • The children will understand estimation and further understanding of informal units • The students will fill in estimation tables to measure their findings 																	
<p>Observations/assessment focus:</p> <p>The teacher can record the children's understanding of the estimation of the objects using observations. They can also assess the child's understanding of informal units to check they use appropriate informal units and have consistency in units of measurement. The teacher can record these findings using a book creator to summarise the children’s learning.</p>		<p>Differentiation:</p> <p>As the teacher, I will ensure that “teaching and learning routines include whole class, small group, and individual attention” (Tomlinson, 2005, p. 263).</p>															

<p style="text-align: center;">Sequence of teaching and learning</p> <p style="text-align: center;">Experience 7 – Zoo Learning Experience: Estimating and Measuring using Informal Units</p>	<p style="text-align: center;">Points to remember</p>
<p>Introduction:</p> <ul style="list-style-type: none"> • Comparing and ordering zoo animals as using size. Smallest to largest. • Comparing and ordering zoo enclosures largest to smallest. <p>Short Activity Aim: compare objects and explain how they have been ordered using comparative language (shorter, longer, lighter, heavier)” (ACARA, 2018b, p. 32)</p>	<p>Resources:</p> <p>Zoo excursion Clipboards Paper to record learning iPads for photography</p>
<p>Experiences:</p> <p>Learning Aim: estimate the total number of units needed to measure and use multiple informal units to measure length, mass, or capacity” (ACARA, 2018b, p. 32) and “measure and compare the lengths and capacities of pairs of objects using uniform informal units” (ACARA, 2018a, ACMMG019).</p> <ul style="list-style-type: none"> • Estimating and measuring using informal units • The students will take photos at the zoo standing next to enclosures and animals at the zoo. • The students will then estimate the size of the enclosure in comparison to the picture using the body as an informal unit • The teacher will ask questions such as Is the enclosure larger than our classroom? Would the enclosure fit in to our gym? How many people could fit in the enclosure? • The students can then measure using informal units of measurement to consider How many adults tall/wide is the enclosure or animal? How many children tall/wide is the enclosure or animal? 	<p>Key vocabulary:</p> <p>Length, height, width, smallest, largest, compare, estimate</p> <p>Key questions:</p> <p>Use questioning throughout learning experience to allow children to learn from each other and scaffold each other’s learning (Booker et al., 2020).</p> <p>What is one way you could measure the size of the giraffe? Estimate how tall you think the panda enclosure is?</p>
<p>Conclusion:</p> <ul style="list-style-type: none"> • The students will have made practical connections between estimation, and measuring using informal units. • The students will record their learning by doing a video clip explaining the size of animals and enclosures 	
<p>Observations/assessment focus:</p> <p>The teacher will create STEM journals from the children’s zoo visit using their recorded observations of learning as a basis for the journal. The teacher can also draw upon past learning to document the children’s understanding of mathematical concepts and mathematical thinking.</p>	<p>Differentiation:</p> <p>As the teacher, I will ensure “learning goals are clearly designated and pursued to ensure focus on the essential knowledge, understanding, and skill in a topic or discipline” (Tomlinson, 2005, p. 263).</p>

Justification of pedagogy and learning theories:

All three learning experiences are underpinned by a situated learning pedagogy. This allows children to be challenged to use their critical thinking in group activities to feed off each other's knowledge and questioning. The situated learning theory focuses on providing children with a chance to engage in real-life problem-solving situations. By using informal units to measure, the students can use real-life situations to practice using informal units of measurement (Booker et al., 2020). The learning experiences also focus on using a problem-solving pedagogy to allow children to investigate learning and encourage deeper exploration of mathematical concepts and ideas throughout their learning (Booker et al., 2020). Lastly, the learning experiences are underpinned by a constructivism theory, the theory is based upon the belief that "that children do not think in the same way as adults, and that children use different cognitive processes and skills to construct their knowledge" (MacDonald, 2018, p.32). Overall, the constructivist approach views children as competent learners and states, "Children's prior knowledge and experiences influence their thinking and reasoning" (MacDonald, 2020, p. 34).

Justification of Formative Assessment and Inquiry Journals:

As a teacher, formative assessment plays a major role in evaluating student progress and informing teaching and learning. Jacobbe et al. (2017) state the importance of formative assessment and how it helps teachers develop "mathematical understanding and use that data to inform instruction and support student progress towards learning goals" (p. 1). To assist educators with formative assessment, technology and inquiry journals such as book creator can be influential in recording students learning. Jacobbe et al. (2017) also states the benefits of technology for formative assessment as it allows "student understanding to be easily tracked over time, enabling the outcomes and feedback to be shared with parents and students online, and [captures] individual student's problem-solving processes versus final answers" (p. 4). Martin (2015) explains the importance of writing answers as a tool for demonstrating learning in mathematics and how it helps children explain their ideas and demonstrate their mathematical understandings and misunderstandings.

References:

- Australian Curriculum, Assessment and Reporting Authority [ACARA]. (2018a). Foundation to year 10 curriculum: Mathematics. Retrieved from <https://australiancurriculum.edu.au/f-10-curriculum/mathematics/>
- Australian Curriculum, Assessment and Reporting Authority [ACARA]. (2018b). National Numeracy Learning Progression. Retrieved from <https://www.australiancurriculum.edu.au/media/3635/national-numeracy-learning-progression.pdf>
- Booker, G., Bond, D., & Seah, R. (2020). Teaching primary mathematics (6th ed.). Melbourne: Pearson Australia.
- Callingham, R. (2008). Dialogue and Feedback: Assessment in the Primary Mathematics Classroom. *Australian Primary Mathematics Classroom*, 13(3), 18–21.
- Jacobbe, T., Mitten, C., & Jacobbe, E. (2017). What do they understand?: Using technology to facilitate formative assessment. *Australian Primary Mathematics Classroom*, 22(1), 9–12. <https://doi.org/10.3316/informit.735255489608507>
- MacDonald, A. (2018). *Mathematics in early childhood education*. Oxford University Press.
- Martin, C. L. (2015). Writing as a Tool to Demonstrate Mathematical Understanding: Writing in Mathematics. *School Science and Mathematics*, 115(6), 302–313. <https://doi.org/10.1111/ssm.12131>
- Tomlinson, C. A. (2005). Grading and Differentiation: Paradox or Good Practice? *Theory into Practice*, 44(3), 262–269. https://doi.org/10.1207/s15430421tip4403_11