

Teaching and Learning Sequence

<p style="text-align: center;">Sequence of teaching and learning Experience 2: Am I Taller or Shorter?</p>	<p style="text-align: center;">Points to Remember</p>
<p>Learning intentions: <i>Students will...</i></p> <ul style="list-style-type: none"> • Describe length using everyday language (AC9MFM01 & uuM1) • Compare lengths by direct comparison (AC9MFM01 & uuM1) • Begin developing knowledge to communicate reasoning <p style="text-align: right;">(ACARA, 2022; ACARA, 2018b)</p>	<p>Resources:</p> <ul style="list-style-type: none"> - Book: ‘That’s not my... Taller and Shorter’ by Fiona Watt (2017) - White board for teacher to communicate instructions and/or findings from book - Writing utensils and/or technology for recording
<p>Introduction:</p> <ul style="list-style-type: none"> • Reading ‘That’s not my... Taller and Shorter’ By Fiona Watt; a book about animals’ height comparisons (See appendix) • The teacher may ask various questions whilst reading including those that ask the students to identify which animal is the biggest/smallest, before the page is read and answer is given (AC9MFM01 & uuM1) <p style="text-align: right;">(Russo & Russo, 2018) (ACARA, 2022; ACARA, 2018b)</p>	<p>Key vocabulary:</p> <ul style="list-style-type: none"> - Bigger/taller - Smaller/shorter - Height - Order - Align - Starting point <p>Key questions: Which object is the tallest/shortest? Why? (AC9MFM01 & UuM1) Where do we start our measurement from? (AC9MFM01 & UuM1) How do you know you’re bigger than this object? (AC9MFM01 & UuM1) (ACARA, 2022; ACARA, 2018b)</p>
<p>Experience:</p> <ul style="list-style-type: none"> • Students go around the classroom or outdoor environment and compare themselves to objects (AC9MFM01 & uuM1) • Students find one object taller than them and one object smaller than them (AC9MFM01 & uuM1) <p style="text-align: right;">(NSW Education Standards Authority [NESAs], 2018b)</p>	<p>Differentiation:</p> <ul style="list-style-type: none"> • Work closely with a partner or teacher throughout activity (E & O) <p>(Van de Walle et al., 2019)</p>

<p style="text-align: right;">(ACARA, 2022; ACARA, 2018b)</p> <p>Conclusion:</p> <ul style="list-style-type: none"> • Students will create a journal entry, drawing themselves and the two objects they found and labelling them accordingly. Write a reflection about the experience. • Students share findings/drawings/annotations with peers (whole class/pairs/small group discussion) (Page & Clarke, 2014) (Martin, 2015) 	<ul style="list-style-type: none"> • Communicate reasoning alternately (verbal, technology, written) (I, E &O) (Bender, 2009) • Communicating instructions to students in alternate manners; written/on devices (I, O) (Van de Walle et al., 2019) • Provide culturally responsive instructions (O) (Van de Walle et al., 2019) • Comparing objects to each other, rather than to students' self (A, I, E & O) (Bender, 2009; Van de Walle et al., 2019) • select 3+ objects, and order them (A) (ACARA, 2022, AC9M1M01; ACARA, 2018b, UuM2)
<p>Observations/assessment focus:</p> <ul style="list-style-type: none"> - <u>Anecdotal records:</u> Completed during or immediately after lesson, focusing on select few students rather than a whole class worth. Focusing on particular concepts (outlined in learning intentions and dispositions of understanding and reasoning (ACARA, 2022, AC9MFM01, AC9M1M01; ACARA, 2018b; UuM1, UuM2; Van de Walle et al., 2019) 	

<p style="text-align: center;">Sequence of teaching and learning Experience 4: The importance of aligning objects</p>	<p style="text-align: center;">Points to Remember</p>
<p>Learning intentions: <i>Students will...</i></p> <ul style="list-style-type: none"> • Align objects; understand how and why we measure from a baseline (AC9M1M02, UuM1) • Compare lengths by direct comparison (AC9M1M02, UuM1) • Use everyday language to describe length (biggest/tallest, smallest/shortest) (AC9MFM01, UuM1) (ACARA, 2022; ACARA, 2018b) 	<p>Resources: 2 x photo provocations Wooden blocks (to stand on) Writing/recording utensils (books and/or technology)</p>
<p>Introduction:</p> <ul style="list-style-type: none"> • Provocation: Students are shown an image of a girl standing next to a tree (See appendix, image 1) • Next, students are shown the same image, but the girl has now climbed the tree (see appendix, image 2). • Teacher will encourage students to discuss concepts of length regarding the picture, how can we describe the trees height? Does the girl’s height change?? Is the girl taller or shorter in the second photo? Why? (AC9MFM01, UuM1) • Questions 1: is the girl taller in the first image or the second? Why? (AC9MFM01 & UuM1) • Question 2: Does climbing the tree mean she is taller? Why/why not? Where do we measure her height from? Her feet, or the bottom of the picture? • This prompts students to begin thinking about the baseline from which we measure objects. To get the same measurement for the girl’s height, we have to make sure she is aligned with the baseline (AC9MFM01 & UuM1) (Van de Walle et al., 2019) (ACARA, 2022; ACARA, 2018b) 	<p>Key vocabulary: Tallest, shortest, biggest, smallest, length, base, accurate/fair</p> <p>Key questions: How do we know that the student is the tallest/shortest? (AC9MFM01 & UuM1) What happens to the shortest student when they stand on the block? Are they now the tallest student? Why/why not? Where do we start our measurement from? Why? (AC9MFM01 & UuM1) (ACARA, 2022; ACARA, 2018b)</p>

<p>Experience:</p> <ul style="list-style-type: none"> • As a class, compare heights with each other until we find the tallest and the shortest student. Students may stand in a line order (with teacher’s assistance) if this is easier (AC9MFM01 & uuM1, UuM2) • Verbally communicate what student is the biggest/tallest and how do we know this? (AC9MFM01, AC9M1M01 & UuM1) • Have the smallest student stand on a block, now making them the largest person. • Verbally communicate; is this student now the biggest? Is it <i>accurate</i> to say this student is the biggest? why/why not? (AC9MFM01 & uuM1) • Remove the block and identify whether this student is still the biggest? Why/Why not? The teacher may bring this back to the provocation, does climbing a tree change your length? (AC9MFM01 & uuM1) <p style="text-align: right;">(NSW Education Standards Authority [NESA], 2018b) (ACARA, 2022; ACARA, 2018b)</p>	<p>Differentiation</p> <ul style="list-style-type: none"> • Small group/pair(s) of students’ complete activity separately, teacher assists this too (E, I, O) (J. Van de Walle et al., 2019) • Students are prompted to reach conclusion without directly seeing it (asking them, is this student taller if they’re on a block?) (A) (J. Van de Walle et al., 2019) • Writing/using technology/verbally communicate reasoning and/or conclusion piece (I, E & O) (Bender, 2009) • Providing printed cut-outs and/or photos on technology (pictures of students) for pairs/individuals to order, completing the same activity (A or I if working independently, E or O if working collaboratively) (ACARA, 2022, AC9MFM01; ACARA, 2018b, UuM1) • Providing other materials for students to order in a similar manner (I, E or O (2 objects), A (3+ objects)) (ACARA, 2022, AC9MFM01, AC9M1M01; ACARA, 2018b, uuM1, uuM2; Van de Walle et al., 2019) • Communicating instructions to students in alternate manners; written/on devices (I, O) (Van de Walle et al., 2019) • Provide culturally responsive instructions (O) (Van de Walle et al., 2019)
<p>Conclusion:</p> <ul style="list-style-type: none"> • Students will complete a journal entry with a drawing (or photograph) detailing the activity. Annotate this (written, electronically, verbally); What is your drawing showing? Who is the tallest student? How did the smallest student become the tallest? was this an <i>accurate/correct</i> measurement? Why/why not? (AC9MFM01 & uuM1) <p style="text-align: right;">(Page & Clarke, 2014) (Martin, 2015)</p> <ul style="list-style-type: none"> • Students should be able to begin communicating reasoning behind why the smallest person is not actually the biggest person just because they’re on a block; identifying the purpose of aligning the ends of objects (to receive an accurate measurement) (AC9MFM01 & uuM1, UuM2) <p style="text-align: right;">(ACARA, 2022; ACARA, 2018b)</p>	
<p>Observations/assessment focus:</p> <ul style="list-style-type: none"> - <u>Checklists</u> utilising questioning to help complete. Observing particular concepts (outlined in learning intentions) and dispositions of Understanding and Reasoning (ACARA, 2022, AC9MFM01, AC9M1M01; ACARA, 2018b, UuM1, UuM2; Van de Walle et al., 2019) 	

<p style="text-align: center;">Sequence of teaching and learning Experience 6: Indirectly Comparing Zoo Animals</p>	<p style="text-align: center;">Points to Remember</p>
<p>Learning intentions: <i>Students will...</i></p> <ul style="list-style-type: none"> • Begin making indirect comparisons of objects (AC9M1M01 & uuM2) • Use everyday language to describe length (AC9MFM01 & uuM1) • Communicate reasoning (AC9MFM01 & uuM1) <p style="text-align: right;">(ACARA, 2022; ACARA, 2018b)</p>	<p>Resources:</p> <ul style="list-style-type: none"> - Zoo & Zoo animals - Writing/recording utensils or technology (to share) <p>Key vocabulary:</p> <ul style="list-style-type: none"> • Bigger/taller • Smaller/shorter • Height • Compare • Order • Size <p>Key questions: What is your biggest/tallest animal? (AC9MFM01 & uuM1) What is your smallest/shortest animal? How do you know this/why? How can we find out what animal is bigger if they aren't right next to each other? (AC9M1M01 & uuM2) (ACARA, 2022; ACARA, 2018b)</p>
<p>Introduction:</p> <ul style="list-style-type: none"> • Looking at a picture of zoo animals and making observations about their size (see appendix) (using key questions to prompt & before leaving for the zoo) (AC9MFM01 & uuM1) <div style="text-align: right;">(Russo & Russo, 2018) (ACARA, 2022; ACARA, 2018b)</div> • At the zoo: Have students walk around and explore the zoo, observe animals, encourage them to measure their own heights against the 'Are you as tall as a baby giraffe?' height chart at Adelaide Zoo (use prompting questions throughout this) (AC9MFM01 & uuM1) <div style="text-align: right;">(Taronga Conservation Society Australia, 2022)</div> 	<p>Differentiation</p> <ul style="list-style-type: none"> • Work in pairs/ small groups(E & O) (Van de Walle et al., 2019) • Select and/or order 3+ animals (A) (ACARA, 2022, AC9M1M01; ACARA, 2018b, UuM2) • Using an object as informal measurement/tool to communicate

<p>Experience:</p> <ul style="list-style-type: none"> • Whilst exploring the zoo, have students select one key (their favourite) animal • Students should then find one animal that is bigger, and one animal that is smaller than their key animal <p>(AC9MFM01, AC9M1M01 & UuM1, UuM2)</p> <p>(Taronga Conservation Society Australia, 2022) (ACARA, 2022)</p>	<p>reasoning (what can you find that is bigger than the giraffe? (A) (ACARA, 2022)</p> <ul style="list-style-type: none"> • Communicate via technology, verbally and/or written (I, O) (Bender, 2009) • Compare other objects at the zoo (may be closer together for a more direct comparison) (against an animal, or against another object. E.g., buildings, trees, students) (E, O, I) (ACARA, 2022, AC9MFM01; ACARA, 2018b UuM1; Van de Walle et al., 2019) • Record/annotate alternatively (written, drawing, electronically, verbally) (I, O) (Bender, 2009) • Provide culturally responsive instructions (O) (Van de Walle et al., 2019)
<p>Conclusion:</p> <ul style="list-style-type: none"> • Students complete a journal entry in which they draw the three animals they identified and label them accordingly (biggest, smallest) • Then they complete the sentence starter: “I know the ___ is the biggest because...” • Complete a reflection about the activity and discuss (whole class/pairs/small groups) their findings, share their drawings/photographs, and tell peers what animal was biggest/smallest and why. <p>(Page & Clarke, 2014) (Martin, 2015)</p>	
<p>Observations/assessment focus:</p> <ul style="list-style-type: none"> - <i>Interviews</i>: after the zoo/on the way home, one-on-one with teacher and student. Using probing questions and key questions to gain insight into students thinking about particular concepts (learning intentions and dispositions of; productive disposition, understanding and reasoning (ACARA, 2022, AC9MFM01, AC9M1M01; ACARA, 2018b, UuM1, UuM2; Van de Walle et al., 2019) 	

Discuss what learning theories and pedagogies will underpin this learning sequence consider play based learning, intentional teaching, inquiry-based learning and / or situated learning which we have discussed in class.

The three experiences are based around building a more in-depth and meaningful foundation of knowledge for length and its concepts, as this will improve their ability to communicate reasoning succinctly (Van de Walle et al., 2017). The experiences utilise intentional teaching which occurs through selecting pedagogies actively and purposefully to, in turn, achieve the specific learning outcomes set (MacDonald, 2018). Doing so includes deciding whether an experience will be most beneficial if child or teacher led. In this case, mathematical concepts do not often come about entirely from a child's own efforts, as other skills may, therefore maintaining a teacher-led, instruction based pedagogy within the intentional teaching was deemed most beneficial for children (MacDonald, 2018).

Experience two was sourced from the NSW education, "Teaching Measurement Early Stage 1- Stage 1" guide (NSW Education Standards Authority [NESA], 2022), and focuses on children using their body to make direct comparisons, and using everyday language to describe these; overall aiding their future reasoning communication abilities (ACARA, 2022, ACM9MFM01; ACARA, 2018b, UuM1; Van de Walle et al., 2017). The intentional teaching begins in the introduction when reading a book as a provocation (Russo & Russo, 2018). The story uses appropriate language to describe height, a concept similar to length and therefore used in conjunction with it at this stage, in addition to making direct comparisons of animals (Van de Walle et al., 2017; Watt, 2017).. Therefore, the book is introducing and essentially modelling the activity children are to undertake next (Russo & Russo, 2018)

Two experiences later, experience four is adapted from the NSW education guide (NESA, 2022), and involves the whole class, again using their bodies to learn. The introduction's provocation uses two images, one of which shows a girl standing in front of the tree, and the other, the same image but she is now climbed up into the tree, placing her up higher in the image. Children will be prompted to discuss her height, making a comparison against the tree, and discussing whether it changes because she has climbed the tree (ACARA, 2022, ACM9MFM01; ACARA, 2018b, UuM1).

The experience puts this provocation into practice. Students make direct comparisons of their height and, with teacher assistance, find the tallest and smallest student (ACARA, 2022, ACM9MFM01; ACARA, 2018b, UuM1; NESAs, 2022). This may involve standing in an ordered line, but this is not necessary. These two students should stand back-to-back, and their height can be discussed; who is taller? Who is shorter? How do we know this? What could we compare their heights to? (ACARA, 2022, ACM9MFM01; ACARA, 2018b, UuM1; DET, 2019, Outcome 5.4).

Following a discussion, the shorter student should stand on a block, and key questions should be re-asked, allowing children to decide who is taller now and why. The concept developed throughout this is aligning objects; how and why we need to do this when we measure length. Children should see that the child's height did not change, but the point from where we measured did. Again, this utilizes intentional teaching as it is introducing a new mathematical concept, whilst also reiterating prior knowledge including everyday language to describe length, and making direct comparisons (ACARA, 2022, AC9MFM01; ACARA, 2018b, UuM1).

Nearing the unit's conclusion, an experience at the zoo further reiterates prior knowledge, whilst introducing the concept of indirect comparison (ACARA, 2022, AC9M1M01; ACARA, 2018b, UuM2). This experience was derived from Taronga Zoo's Stage 1 Mathematical resources guide that asked older students to measure animal travel enclosures (Taronga Conservation Society Australia [TCSA], 2022). Given these students are younger, the experience is simpler and therefore focuses on the animals' size itself and making an indirect comparison rather than calculating a formal measurement. The experience is the same as experience two, although children must now compare animals to each other, rather than themselves to an object (NESAs, 2022; TCSA, 2022). Each child should pick their favourite animal and identify another that is bigger and another that is smaller (ACARA, 2022, AC9M1M01; ACARA, 2018b, UuM1, UuM2). This may be challenging given it is year 1 level knowledge, therefore differentiation strategies are provided but children should be encouraged to try and make some comparisons.

Whilst this final experience utilises intentional teaching, it also incorporates situational learning (SL). SL operates by creating learning experiences from real-life activities (Pérez-Sanagustín et al., 2015). Through teaching via a means of SL, teachers can know that students will be able to sufficiently problem solve in 'real life' scenarios, such as when at the zoo. Therefore, completing

a mathematical experience of identifying length at the zoo shows the teacher that children can pertain and translate prior knowledge from one context to another; from inside the classroom and out, assuring that the learning is more meaningful (DET, 2019, Outcome 4.3). The introduction of a new concept; indirect comparison, may prove difficult to children, but given the SL theory states that active learning increases when participating in a familiar, real-life situation, this should be beneficial (Pérez-Sanagustín et al., 2015). Additionally, working in small groups, which often happens on excursions, further increases effective learning in addition to being more fun for children (Pérez-Sanagustín et al., 2015). Therefore, utilising situational learning in addition to intentional teaching are highly beneficial at this stage of the unit.

Justification of Formative Assessment and Inquiry Journals:

Formative assessments allow insight into a child's progress during experiences or during preassessment phases, and reveal their understandings, or lack of (Booker et al., 2020).

Therefore, they would ideally form a basis for future planning, differentiation, and feedback to children and families (Booker et al., 2020). Each experience utilises a different observation type for formative assessment, depending on the method of the activity. Experience two utilises anecdotal records, allowing insight into children's thinking whilst they complete an experience; noting their actions and language (attending) and deciphering these to see whether they are fully grasping the concept of length and making direct comparisons (interpreting) and, if not, how this can be developed in the following experience (deciding) (Van de Walle et al., 2019). This was chosen as an early observation and assessment as results can then determine future pedagogy and strategies to develop any initial discrepancies in learning length (Van de Walle et al., 2019).

Experience four uses checklists, allowing a teacher to 'mark' whether a child is utilising knowledge and language of length with ease (Van de Walle et al., 2017). This was chosen to be completed during the whole-class activity as it can be set up before the experience and completed quickly whilst the teacher is still running the experience (Van de Walle et al., 2017). Throughout, posing questions to students may reveal answers to then aid marking the checklist, particularly if a child is not overtly verbal during a whole-class experience (Van de Walle et al., 2017).

Finally, the use of interviews comes after the zoo, experience six. This was deemed appropriate as on many excursions, children may be split into groups so the teacher may not be present for

the entire experience. Therefore, this can be completed after the experience, and still allow for in-depth information to be gathered regarding a child's knowledge and concept development and use (Van de Walle et al., 2017). Throughout, the teacher may pose questions to receive more information but cannot correct a child. Rather, they must ask and listen in order to receive a thorough understanding of what the child is, or is not, succeeding in (Van de Walle et al., 2019). Interviews, and the questions asked, may then influence the following experience, but also be repeated near a unit's conclusion to decipher whether any gaps in knowledge pertain (Van de Walle et al., 2019). Additionally, they assess teaching effectiveness and may therefore, again, benefit future pedagogical choices (Van de Walle et al., 2017).

Given the experiences are not the first, nor last, in this unit, the formative assessments were chosen to influence future teaching and learning, improving this and, children's outcomes. A further form of assessment is seen through the conclusion of each experience, as children complete an inquiry journal entry (Booker et al., 2020). In this, they draw a picture of the activity and complete a reflection. In addition to annotating their drawing and writing what they did and how, they may discuss what they did or did not enjoy about the experience, as reflections can be utilised as assessment, future planning and differentiation (Page & Clarke, 2014). These therefore become an informal means by which a teacher may track a student's progress, and plan their future learning (Page & Clarke, 2014). Additionally, teachers can utilise them when providing feedback to both students and families, in turn aiding students ability to communicate reasoning as they develop the necessary knowledge that may have otherwise gone undeveloped without assessment (Page & Clarke, 2014; Van de Walle et al., 2017). Furthermore, journals allow children to communicate their thinking without words, through drawings and pictures. This can be useful if a child does not pertain the language to describe their thinking as of yet, or in the case of these experiences, can allow some children to more meaningfully develop and understand the context of the language they are developing, reinforcing ideas from the experience just undertaken (Beneke, n.d.). Journal writing is therefore repeated for each conclusion as more exposure results in improvement and therefore the aforementioned benefits are more likely to result (Page & Clarke, 2014).

Sharing their writing, or at least discussing it, whether it is with a peer, small group or with the whole class, can allow for further discussion on the learning experience. Therefore, this also

repeats for each experiences' conclusion (Booker et al., 2020). In doing so, children learn from one another, developing their knowledge and self confidence in a welcoming, mathematics-rich environment, in addition to further developing appropriate language to improve their ability to communicate reasoning when measuring length (Booker et al., 2020),

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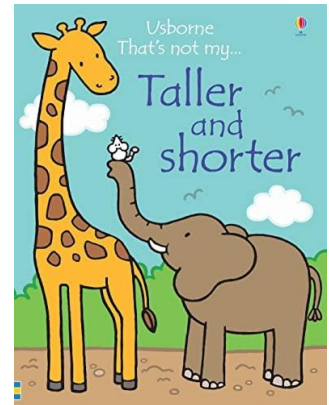
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Appendix

Provocation Resources

Experience 2:

Watt, F. (2017). *Thats Not My... Taller and Shorter*. Usborne Publishing Ltd.



Experience 4:



Image 1: Girl standing at the base of the tree

Source from Word Stock Images



Image 2: Girl climbed up the tree

Experience 6:

(Group Of Zoo Animals Together Isolated Stock Photo - Image of African, Together, n.d.)

