Sequence of Teaching and Learning Points to remember Experience 1: Describing Length Intentional learning Australian Curriculum Links: Learning Aims: Children will be able to identify the attributes of length (UuM1) **Content Descriptor:** Children will be able to use everyday language to describe the Identify and compare attributes of objects and events, including length, attributes that can be measured (UuM1) capacity, mass and duration, using direct comparisons and communicating reasoning (AC9MFM01) Achievement Standard: Students identify the attributes of mass, capacity, length and duration, and (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2019) use direct comparison strategies to compare objects and events General capabilities:

Children will be able to list attributes of length including those outlined in the Australian Curriculum; e.g. tall, short, wide, long, and high (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2022).

- Digital Literacy
- Numeracy
- Critical and creative thinking

(ACARA, 2022)

(Australian Curriculum, Assessment and Reporting Authority [ACARA], 2022)

Introduction:

- Picture book: The long and short of it by Cheryl Nathan & Lisa McCourt
Picture books have been well-established as useful resources in introducing a topic or theme to young children (Russo & Russo, 2018). Picture books are able to encourage mathematical discussion and often introduce mathematics into real life (Jenkins, 2010).

To introduce this topic, the educator will read a children's picture book that explores the attributes of length as well as comparing and order. *The long and short of it* by Cheryl Nathan and Lisa McCourt is the chosen text that will introduce this (Nathan, 1998). This book uses language that describes the attributes of length such as short, long, big, little, and wide. It also makes comparisons throughout the text and includes comparative language such as longer, shorter, and longest. This picture book has been intentionally selected not only for its connections to the measurement curriculum but also for its connections with real-life animals. It helps introduce mathematics into real life and connects with the final zoo experience.

Resources:

- Picture book: The long and short of it (Nathan, 1998)
- Whiteboard and whiteboard marker
- 2x apples of varying sizes
- String
- Paper
- Pencils
- Camera
- iPad and/or computers
- Book creator

After reading the text to the children the educator will then ask the students what themes they thought were present throughout the text. They may give answers such as animals and size. When children identify the theme of measurement the educator will then expand on this by asking a question like "Excellent job guys this book was talking about the size or measurement of certain animal body parts, what are some words that we can think of that might describe the measurement of something? Hint there were some words in the book". This will then lead into the second half of the introductory experience. It also makes the connection to the theme of the learning sequence and connects it to real life.

- Arts supplies
- Classroom objects (for observations and comparisons)

Class brainstorm:

As previously mentioned, the children have been asked to brainstorm words that describe the measurement or size of something. The reason the words measurement and size are being used is intentional as it provides further clarification for the children as measurement is a broad term that combines multiple sub-elements. This whole class brainstorming will give the educator an understanding of what prior knowledge the students already have and identify what areas the educator needs to extend. The words the children identify should be recorded in front of the classroom so all children can view this and refer to these words when required. This brainstorming will introduce children to the attributes of length and provide them will a resource they can use for their future learning experience.

Experiences:

- Comparing apple size:

To visually demonstrate the attributes of length to the children the experience will begin by comparing the size of two apples. To initiate this experience, the students will be asked which apple is bigger and why? After providing their reasoning, the educator will then grab a piece of string and wrap it around the apple and cut the string when it has completely wrapped around the apple one time. This will be completed for each apple. Holding the strings straight and aligned at the ends the previous question will be repeated. The educator should prompt the children with intentional learning questions to engage the children and further understanding. To demonstrate to children the importance of aligning ends in direct comparisons, the educator should move the short string up so its endpoint is higher than the longer strings. Repeat the questions again, asking which string is longer now and does this now change which apple is bigger. If the children answer that it does change the apple size and the shorter string becomes the longer string, further elaboration about direct comparison is required. If not, the children can move on to the next step of this experience.

- Using string to compare object size:

The students will use their knowledge and understanding of length to now work in partners and make comparisons between classroom objects and a piece of string. The children are encouraged to work in partners as children

Key vocabulary:

- Comparative language
 - taller
 - shorter
 - bigger
 - smaller
- Attributes of length
 - tall
 - short
 - long
 - wide
 - hide (ACARA, 2022, AC9MFM01)
- Clear intentional instructions

construct meaning through not only the learning experiences but also through building on and reflecting on the knowledge and ideas of others (Booker, et al., 2020). In this experience, the string will be cut by the educator and one piece provided to each pair. Using this piece of string the children are prompted to move around the classroom align the end of the string with the end of other objects and make comparisons between the string and object. Once the children have identified their favourite comparison, they will record their comparison through a photograph using either the classroom camera or iPad. This photograph will be later used in the conclusion of their learning. Allowing the children to photograph their own learning allows them to make developmental progress in the Australian Curriculum's general capability of digital literacy (ACARA, 2022). At a foundation level, the students may still require help to operate digital tools but should be capable of using simple tools to support their learning (ACARA, 2022).

Conclusion:

- Learning journal:

Using the previously photographed comparisons, with the support of the educator the students will print out a copy of their comparison each. This will then be used to individually write one sentence explaining their comparison. For example, the string is shorter than my water bottle. Individually completing this task helps the educator to assess each student's understanding of length. This learning journal will be used as a formative assessment throughout the learning sequence.

Class discussion:

At the end of the class, the educator should provide a few sentences to the class in a group discussion about the learning achievements of the lesson. This helps to reiterate the learning outcomes to the children and provides an opportunity to clear up any questions or concerns the children have. It also lets the educator to link the learning back to the aims and ensure the learning aims for the session have been met.

Observations/ assessment focus:

Observations

An informal observation of student learning will be made while the children work in partners to make their comparisons. The educator should write brief notes to refer to while assessing the students learning journal later. Informally observing the children will allow the educator to understand what areas of knowledge the students have already developed on where they may require further support. These initial observations are important as they provide a foundational understanding to the educator about where the children are developing. Understanding this means the educator can better plan for differentiation as they will have a greater understanding about what levels the students are performing at.

Assessment

Key questions:

- Are we all making sure to align our ends?
- Does the length change if hold one piece of the string higher than the other?
- What other words could we use to describe the length of something?

Differentiation

- Working with peers or educators knowledgeable about the topic (Van de Walle et al., 2019)
- Differentiated instructions (Van de Walle et al., 2019)

The educator will complete a formative assessment of the students learning by looking at their inquiry journal. This formative assessment will be completed with the child present, and feedback should be provided through a feedback sandwich. With the child present, it also allows the educator and child to discuss mathematical learning. It also allows educators to ask open-ended questions to allow the children to share their ideas and knowledge with the educator (MacDonald, 2018). These conversations benefit both the student and educator as they provide the educator with further insight into the child's mathematical understanding (MacDonald, 2018). This assessment is formative so should provide feedback to the child so they can work on further developing their skills and knowledge in the next experience.

- Culturally responsive instructions (Van de Walle et al., 2019)
- Ordering multiple objects (e.g. one bigger than the string, one smaller than the string)

(ACARA, 2022, AC9M1M01)

Sequence of Teaching and Learning		Points to remember
Experience 2: Comparing and ordering objects		
Play-based learning		
Learning Aims:	Australian Curriculum Links:	
- Children will be able to identify the longer and shorter objects by using	Content Descriptor:	
direct comparison (UuM1)	Identify and compare attributes of objects and events, including length,	
- Children will be able to compare the length of two objects by aligning	capacity, mass and duration, using direct comparisons and	
the ends (UuM1)	communicating reasoning (AC9MFM01)	
	Achievement Standard: Students identify the attributes of mass, capacity, length, and duration, and use direct comparison strategies to compare objects and events	
(ACARA, 2019)	General capabilities:	
	- Digital Literacy	
	- Numeracy	
	 Critical and creative thinking 	
	(ACARA, 2022; Foundation-1 Mathematics	s Curriculum)
	(ACARA, 2022; Digital Literacy)	

Introduction:

Classroom refresher

This experience will begin by assessing if the children have retained the knowledge previously explored in experience 1. This will occur as a whole class discussion through intentional questions. This discussion may be initiated by a general question regarding who remembers what they did in their previous session and then elaborated on the children's answers. This will provide the educator with an understanding of what areas may need to be further explored or if they can move on to the next introductory experience.

- Partner comparisons

In the first experience, children were encouraged to develop their ability to identify the attributes of length. In the second experience, the educator will work to develop children's ability to compare and order objects with similar properties. This activity will be performed in joint construction between the educator and the whole class. Two children will stand back-to-back, and the class will work together to compare the two students and describe their heights using comparative language. An example may be "Child A is taller than Child B". This will then be extended by the educator by having Child B stand on a stool and repeat the experience by asking the students which child is taller now. If the students answer Child B, then the educator will highlight the importance of aligning ends. Child B's height does not change despite the fact he appears taller, the children are not standing on equal levels and therefore the ends are not aligned, and a direct comparison is not being made. This activity will be repeated a few times to help strengthen the children's understanding of direct comparisons and the importance of aligning the ends.

Experiences:

- Play-based exploration with familiar classroom objects

The intention of this activity is to extend the learning from experience 1 and start furthering children's abilities to compare and order objects. This experience will involve the children exploring the attributes of length through a play-based approach. Children will play and manipulate familiar objects within the classroom or school environment to compare the length. Play-based approaches to learning allow children to think and make their own decisions when engaging in measurement-based activities (Booker, et al., 2020). Children already have a natural interest in comparing objects with similar properties, so this experience builds on this theory (Booker, et al., 2020). The children will be encouraged to make multiple comparisons with various objects, however, they are only required to make direct comparisons between two objects as this is the development standard for children at a foundation level. Further comparisons between three or more objects should be considered as a differentiation strategy

Allowing children to make their own decisions about the objects they compare allows them to incorporate their own

Resources:

- Whiteboard and whiteboard marker
- Classroom objects
- Art supplies
- Pencils
- Paper
- Camera
- iPad
- Computer
- Stool/ chair
- Book creator

Key vocabulary:

- Comparative language
 - taller
 - shorter
 - bigger
 - smaller
- Attributes of length
 - tall
 - short
 - long
 - wide
 - hide

interests into the learning. As many of these learning experiences assume children will be interested in animals and comparing, it is important that their interests are considered to maintain engagement (MacDonald, 2018).

Conclusion:

- Learning journal

Like the previous lesson, the children will document their learning in their learning journals. In the previous lesson, the children documented their learning through a photo to help develop their digital capabilities. However, in this session the children will document their learning by using a visual arts method, either drawing, painting, or any other visual arts method the children feel is appropriate. This visual will be paired with a sentence or do from the child that describes the comparison and then uploaded to their online learning journal on book creator. A drawing or visual is a useful way of documenting student learning as it provides a lot of information about their mathematical learning especially when paired with a comment or sentence (MacDonald, 2018). A drawing or other visual will also display whether the children have developed an understanding of the importance of aligning ends. If the children draw the objects direct next to each other they have demonstrated that they are meeting the learning aims of the experience which connects with the national numeracy progression UuM1 (ACARA, 2019).

Observations/ assessment focus:

Observations

Observations of student learning will be made throughout the learning experience in the form of running records. Final observations will also be made, however, these observations will examine the student's visual illustrations. The combination of both observations was intentionally selected as the observations that occur during the teaching and learning experience will provide relevant information to the educator about the student's final illustrations. These observations may highlight something about the student's development that their work doesn't show, and it is important that the educator understands the bigger picture. Understanding the student's thinking is a key part in helping further their development and support their achievement.

Assessment

(ACARA, 2022, AC9MFM01)

- Align the ends
- Play and explore
- Explore different comparisons
- Experiment with different objects

Key questions:

What would happen if I held this up here? Does this change which one is longer? What if Child B stands up here are they taller now? What do you think is the best way to draw these objects? Should we make sure the ends are aligned? What happens if we don't align our ends? What made you pick these objects? What similar properties do they have?

Differentiation

- Working with peers or educators knowledgeable about the topic (Van de Walle et al., 2019)
- Differentiated instructions (Van de Walle et al., 2019)

The students' drawings or visual arts components along with their comments will be used as a formative assessment to identify the student's learning progression. This should be compared with the previous experiences learning journal as this will help to provide information to the educator about the student's mathematical development (MacDonald, 2018). If time permits, the educator should engage in a discussion with the child about their chosen comparison to further understand the student's development. This type of assessment is recognised as an assessment for learning and will allow the educator to make an informed decision about the next learning activities to ensure all children meet the achievement standard for a foundation level (Booker, et al., 2020). It is important that when educators provide their feedback, they use a strategy that doesn't just focus on the answer but also considers the method that the student used to obtain that answer (Booker, et al., 2020).

Sequence of Teaching and Learning

- Culturally responsive instructions (Van de Walle et al., 2019)
- Working collaboratively (Van de Walle et al., 2019)
- Ordering multiple objects (e.g. 3x objects or more)

(ACARA, 2022, AC9M1M01)

- Alternative strategies for displaying learning (Van de Walle et al., 2019)

Points to remember

Sequence of reaching and Learning		1 Onits to remember
Experience 3: Zoo		
Situational Learning		
Learning Aims:	Australian Curriculum Links:	
 identifies the attribute of length (using gestures) (UuM1) 	identify and compare attributes of objects and events, including	
 identifies the longest object using direct comparison (UuM1) 	length, capacity, mass and duration, using direct comparisons and	
 compares the length of two objects by aligning the ends (UuM1) 	communicating reasoning (AC9MFM01)	
 uses everyday language to describe attributes that can be measured 		
(UuM1)	compare directly and indirectly and order objects and events using	
 compares objects and explains how they have been ordered using comparative language (shorter, longer, lighter, heavier) (UuM2) orders three or more objects by comparing the size of each of the objects 	attributes of length, mass, capacity and duration, communicating reasoning (AC9M1M01)	
(UuM2)	Achievement Standard:	

Students identify the attributes of mass, capacity, length, and duration, and use direct comparison strategies to compare objects and events

General capabilities:

Digital Literacy

Numeracy

Critical and creative thinking

(ACARA, 2022; Foundation – 1 Mathematics Curriculum)

(ACARA, 2022; Digital Literacy)

Introduction:

- Children's picture book with an animal focus

In preparation for the zoo, the class will begin with a picture book reading to give the students an idea about the animals and their sizes that they may see at the zoo. Picture book *Life-size Zoo: From Tiny Rodents to Gigantic Elephants, an Actual-size Animal Encyclopedia* written by Kristin Earhart will be read to the entire class (Earhart, 2009). This purpose is to introduce the students to the learning experience and encourage their thinking about what comparison they will make. This book provides illustrations of the exact size of the zoo animals however, it doesn't include size comparisons. Instead, the educators should use intentional questions to encourage the children to think about the comparisons. An example question is 'wow that gorilla's head is so big do you think you're bigger than a gorilla? What about me am I bigger than the gorilla?'

Experiences:

- Indirectly comparing student size with zoo animals to identify an animal shorter and taller than themselves. This experience utilises the situated learning practice to help the children develop their mathematical understandings and problem-solve in real-life situations. There are 4 elements of a situated learning environment; content, context, community, and participation (Perez-Sanagustin et al., 2015). The content refers to the task the learners perform (Perez-Sanagustin et al., 2015). In this experience, the task will be for the children to identify a way to compare their size with the size of the animals. They will need to identify an animal smaller than them and one that is taller than them. They will also need to document their learning similarly to how they previously did, however, they will have the creative freedom to explore any way of documenting. The documentation of learning will be later used in their learning journals; however, they are otherwise free to create a prompt that they feel comfortable with. As a few

Resources:

- Picture book: Life
 Size Zoo (Earhart,
 2009)
- Zoo animals
- Zoo pass
- Transport to the zoo
- Clipboards
- Paper
- Pencils and pens
- Camera
- iPad
- Computer

Key vocabulary:

- Comparative language
- Indirect comparison
- Attributes of length
- Visual prompt
- Creative thinking

examples, this may be a drawing, painting, video, or photo. The context refers to the situation or environment supporting them in this task (Perez-Sanagustin et al., 2015). In this experience, the context refers to the zoo and the surrounding animals that will be used to make comparisons. The community refers to the surrounding students and educators as well as zookeepers that will help the children identify ways to make comparisons and support their learning. The final element of situated learning is participation which refers to participation in the task where the learner is at the centre.

Conclusion:

- Complete their learning journal using their previously documented prompts.

Once back in the classroom, children will be able to document their learning within their learning journals. Using the creative prompts that they documented while at the zoo children will upload their learning to book creator, either on iPad or computers. Along with their prompts, the child should write 1-2 sentences communicating their reasoning. The children are encouraged to be as creative as they would like with their learning journals. Using technology to document their learning aligns with the Australian Curriculum's general capability of digital literacy (ACARA, 2022). More specifically managing and operating as well as creating and exchanging. At a foundation level, students use digital technology to explore tasks and consolidate learning as well as create content (ACARA, 2022). Through creating a learning journal on book creator, the children will show progression in this general capability by demonstrating they can create documentation of their learning using the resources available. It is a way of creating content and consolidating their learning. The creative arts aspect of their prompts also aligns with the arts curriculum further expanding student development.

Observations/ assessment focus:

- Observations at the zoo:

While the students work on their comparisons at the zoo the educator will observe the student interactions and use of vocabulary. While the students record their learning the educator should observe and ask intentional learning questions to expand student thinking. Observing the children while at the zoo will help the educator to identify what animals interest the children. Exploring children's interests further engages the children in learning. Observing the children making comparisons also will help the educator understand the student's developmental levels as well as

Key questions:

What ideas do you have for how you will compare your size with the animals? How do you know that animal is taller than you? What if you stand on that bench next to the enclosure are you taller now? Are there any animals that interest you that you may want to observe? Start thinking about how you might record your comparison. How do you think will best display your learning?

Differentiation

 Working collaboratively with either peer or educator (Van de Walle et al., 2019) allows them to better support the students in their learning. They will be better able to identify the student's struggles and provide them with the support they need to reach the developmental standards for a foundation.

Assessment

The final assessment for this learning sequence will also be of their learning journal similar to the previous experiences. This assessment should be completed outside of the experience by the educator where they can thoroughly go through the learning journal to observe the previously documented learning experiences and identify the student's developmental progression. A feedback comment should then be provided to the student about their achievement as a feedback comment can have a positive influence on their development.

- Differentiated instructions (Van de Walle et al., 2019)
- Culturally responsive instructions (Van de Walle et al., 2019)
- Alternative strategies for displaying learning/ communicating reasoning
- Directly comparing two animals within the same enclosure (ACARA, 2022, AC9MFM01)

Justification of pedagogy and learning theories:

In the first experience, I chose to use an intentional learning approach which includes intentional vocabulary and intentional tasks. Intentional vocabulary helps children to understand the mathematical concepts and the instructions for all children (Van de Walle et al., 2019). Intentional vocabulary also requires intentional learning instructions to support differentiation. As outlined in the differentiation of this learning sequence, providing differentiated instructions helps to support students with varying academic, cultural and linguistic needs (Van de Walle et al., 2019). Intentional vocabulary is also considered through the key vocabulary and the key questions. Reflecting on these helps the educator to identify what language may require explicit attention. The language used in this experience needs to focus on the attributes of length as well as comparative language.

During this experience, the children work with partners to compare the size of classroom objects with a piece of string. Working with a partner was intentionally selected as learning is often enhanced when children engage in learning with others (Van de Walle et al., 2019). Engaging in learning with peers helps the children to reflect and expand on their existing knowledge (Van de Walle et al., 2019). Through working in partnerships in this experience the children will be able to build their knowledge as well as the knowledge of other children. They will be able to support their peer's thoughts and ideas as well as reflect on their strategies.

The second experience was designed to encourage play-based learning. Play and learning have an inextricable relationship where play cannot occur without the children learning (MacDonald, 2018). Play helps children to explore their worlds and investigate meanings while helping them become abstract thinkers (MacDonald, 2018). Play has been well-established as a successful strategy for learning. Throughout this experience, the students will engage in play-based learning as they explore their environment and make comparisons between familiar objects. Children are naturally curious about their environment and will often naturally compare things through play (Booker, et al., 2020). Recognising this theory, this experience will allow children to explore comparisons through play as this is naturally occurring for children. However, some children may require differentiation strategies. These may include differentiating the instructions to be more culturally responsive or extend children's learning further by encouraging them to make multiple comparisons of three or more objects.

In this experience, children will also be introduced to the experience by making comparisons with a partner. As previously mentioned, partnerships help the children build their knowledge by reflecting on their ideas and the ideas of other children (Van de Walle et al., 2019). Partnerships can also be explored in the experience as a strategy for differentiation. Children who may require further support should have the opportunity to work collaboratively with either a knowledgeable peer or educator. This strategy helps to provide additional support as well as allows them to reflect on their ideas by considering the knowledge of their peers.

The final experience that will occur at the zoo uses a situated learning strategy. There are 4 critical elements of a situated learning approach; content, context, community, and participation. As previously described in the learning sequence, the content refers to the learning that will occur during the experience (Perez-Sanagustin et al., 2015). Within this experience, the content is the process of observing and indirectly comparing animal sizes with our own to identify one animal bigger and one animal smaller than us. The context refers to the learning environment or situation that the learning will occur (Perez-Sanagustin et al., 2015). In this experience, the context refers to the zoo. In this experience, the environment is what the students adapt their learning to as a support for understanding mathematics in the real world. Community refers to the surrounding people there to support learning (Perez-Sanagustin et al., 2015). In this experience, the children will be surrounded by their peers as well as knowledgeable educators and zoo staff. The final element is participation which refers to the process of learning and engaging in the task (Perez-Sanagustin et al., 2015).

There are limitations to a situated learning approach, one of these being the lack of collaborative knowledge construction (Perez-Sanagustin et al., 2015). This has been considered during the planning process and has been identified within the learning sequence. It has also been considered as a differentiation strategy for students requiring additional support.

Justification of Formative Assessment and Inquiry Journals:

As an assessment of children's learning, each experience has a formative assessment that will allow the children to have feedback provided to them so they can further improve their learning. This formative assessment is based on the children's learning/ inquiry journals. In the first experience, the learning journal contains one photo of their string comparison and one sentence that describes their comparison. The second experience is very similar however, instead of using a photograph the children are encouraged to draw a picture that illustrates their comparison. Drawings are a useful tool to show what children understand but also how they know it (MacDonald, 2018). Often drawing helps children to surface ideas that they were struggling to describe (MacDonald, 2018). The third experience also documents learning through an inquiry journal. In this experience, children are encouraged to be creative. This was purposely selected to allow the children to make decisions about their learning. It also provides the children with the opportunity to explore various creative art forms.

Documenting their inquiry journals on technology also helps the children to develop their capabilities to use digital devices. This is a key general capability outlined by the Australian Curriculum that helps children become capable of using technologies safely and critically (ACARA, 2022). The development of capabilities in digital technologies also helps children work in schools and in their communities (ACARA, 2022). The inquiry journals also provide further insight into children's understanding and ideas as it helps them to begin to explain their thinking (Van de Walle et al., 2019). As students write in the journals it helps them to reflect on their learning and highlight their dispositions towards mathematics and the experience.

These inquiry journals are also used as a formative assessment strategy for the duration of the learning sequence. Formative assessments are a useful strategy to help pre-assess students' understandings and identify their misconceptions (Van de Walle et al., 2019). Quality assessments can have a dramatic positive influence on student learning by increasing the rate at which the children learn (Van de Walle et al., 2019). Quality formative assessments will provide feedback to the students as well as provide opportunities for the educator to reflect on their teaching practice to identify whether learning experiences were effective (Van de Walle et al., 2019). Throughout this learning sequence, I have highlighted that feedback is required at the end of every experience, either based on the teacher's observations or the learning journal assessments. I also highlighted that this feedback should occur as a comment rather than a score or grade. Providing feedback through a comment rather than a grade or combination produces both increased interest and performance (Butler, 1988). Providing quality feedback in the form of a comment should highlight the children's positive achievements as well as areas for improvement. Throughout the learning sequence, it has also been highlighted that some of the feedback should be provided through a conversation or discussion with the child. Engaging in meaningful discussion is important for the students and the educators as it helps to inform teaching practices while providing effective feedback with opportunities to further communicate their ideas.

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