

### **Justification of pedagogy and learning theories:**

The pedagogical approaches and learning theories that have been utilised in this learning sequence are Sustained Shared Thinking, open ended questioning, Play-Based learning, situated learning, scaffolding learning, inquiry-based learning and journaling (Booker, 2020; MacDonald, 2018).

Sustained Shared thinking has been utilised as it allows for children and adults to work together in a way that promotes dialog, extend vocabulary and previous learning experiences to create deep connections (Brodie, 2019). It allows for educators and children to learn together, rather than create a direct approach of relaying information, to ensure information resonates with children and to develop creative thinking to promote children's ability to problem solve (Brodie, 2019).

Open ended questioning allows for children to develop their higher order thinking skills and growth mindset (Booker, 2020). Both important for developing mathematical minds and being able to problem solve (Booker, 2020). Open ended questioning will be used to extend children's understanding and to gauge what knowledge they obtain (Booker, 2020).

Utilising a play-based approach allows for children to explore ideas, scenarios and concepts in an environment that is safe for them to do so (Booker, 2020; MacDonald, 2018). Children are able to learn a range of concepts through play, and the information will resonate better than just relaying information from teacher to student (Booker, 2020; MacDonald, 2018). It also allows children to build off their prior knowledge to create new connections and understandings (Booker, 2020; MacDonald, 2018).

Scaffolding can be used to assist children in the steps to further their mathematical understandings, scaffolding will be used in learning experience one to be able to introduce mathematical concepts and develop mathematical minds (MacDonald, 2018). Scaffolding will be used to direct intentional teaching methods. Intentional teaching will be used in all three learning experiences to ensure that children are progressing towards the next steps of the numeracy progression framework, and the focus of the lesson is explored (Booker, 2020).

Attending the Zoo, role playing in a dramatic shop and the scavenger hunt all use situated learning by providing the children with real life scenarios, and hands on experiences to further develop their critical thinking skills and problem solving abilities (Pérez-Sanagustín, et al., 2015).

### **Justification of Formative Assessment and Inquiry Journals:**

Formative assessment is vital for teachers to understand what the children in their classrooms know and can do, it is a tool for making learning visible (Page, & Clarke, 2014). Formative assessment is used day to day and can be used for making decisions in regard to the curriculum or what is successful and what is not (Page, & Clarke, 2014). Formative assessment allows for teachers to reflect on their pedagogical choices, what areas require focusing on and to critically reflect on their pedagogy and practice (Page, & Clarke, 2014). Formative assessment could be in the form of an observation or learning story, or could be work samples with feedback provided, formative assessment needs to utilise a range of different methods to be able to gain the full picture, focusing on test results although provides

some information on the child's development, does not provide a full picture of what a child can or cannot do, it must include as aspect of feedback and areas of improvement for the formative assessment to be useful for the child's learning and development (Page, & Clarke, 2014).

For children to develop their critical thinking abilities and mathematical minds, using Inquiry Journals is a great tool for achieving this (Martin, 2015). Children's ability to successfully engage with mathematical concepts is highly influenced by their attitudes, beliefs, and experiences of mathematics, through journaling, children are able to provide an insight into their thoughts towards mathematics to allow teachers to develop positive dispositions towards mathematics (Martin, 2015). Journaling also allows for children to demonstrate their thought process, and what steps were taken to achieve this. Being able to see the steps children have taken will allow you as a teacher to gauge if the children have understood the content, as sometime children can understand the steps but achieve an incorrect answer (Martin, 2015). Journaling is not only important for children to develop gross mind set and critical thinking abilities, but provides a clear understanding of the child's development, to be able to further their knowledge and make curriculum-based decisions (Martin, 2015).

### **Examples of own Inquiry STEM Journals and Reflection**

Throughout the semester I reflected on my own learning using a STEM journal, with four reflective points. Initially it was used to discuss emotions and thoughts towards mathematics which allowed me to recognise any negative associations with mathematics to try to remove these associations, to ensure when I become a teacher I do not carry these negative perceptions into the classroom, as students success in mathematics is also reliant on teachers ability to teach maths, and their associations towards it (See appendix B) . After each lesson, I would first reflect on what we did and my emotional connections towards it, this allowed me to look at the concepts of mathematics we are learning about, and how I feel about teaching it. The second part of the reflection was relating, where I would make connections on the issue and my knowledge. This allowed me to create deeper connections to the knowledge by relating it back to my own experiences or wonderings (See appendix C) The third part of the reflection was reasoning, this section allowed me to look at any issues or underlying factors that may affect this experience/set of knowledge. It allowed me to critically reflect on the content and consider what implications I need to consider whilst teaching (See appendix D) furthermore, the final part of the reflection was reconstructing, this section also allowed me to critically reflect on what adaptations would be made for future teaching opportunities, and what I could improve on. This allowed me to analyse my own professional learning and ways it could be further improved (see appendix E)



<b>Lesson One (Start of term): Sequence of teaching and learning</b> <b>The Year 2 Café!</b>	<b>Points to remember</b>
<p><b>Introduction:</b></p> <ul style="list-style-type: none"> <li>• Set up a dramatic play area in the design of a café (<b>See Appendix F</b>)</li> <li>• Discuss with children some of the rules and expectations while in the dramatic play area</li> <li>• Read a picture book “Bunny Money” with the children and discuss the story (<b>See Appendix G</b>)</li> <li>• What does the bunny want to buy? What does he need to buy it? How does he know how much he needs? What will he need to do to buy the items?</li> </ul>	<p><b>Resources:</b></p> <p>Menu (with prices)  Pretend food  Pretend drinks  Pretend money  Chairs/dining area  Cashier  Costumes: Cashier, chef, customer, waitress</p> <p><b>Key vocabulary:</b></p> <p>Dollars  Cents  Exchange  Amount  Whole number  Change  Notes  Coins</p> <p><b>Key questions:</b></p> <p>How many ways can you make .... \$  How much do you need for?  How did you know you needed that much?  How did you work that out?  Have you thought of another combination of coins that you could use to pay for this item?  What made you decide to do it this way?  What makes you confident you are correct?</p>
<p><b>Experiences:</b></p> <ul style="list-style-type: none"> <li>• Encourage children to explore role play café</li> <li>• Position myself in the play at the beginning to help guide social skills, and ensure there is a mathematical focus</li> <li>• Engage with children and scaffold learning by using intentional teaching methods to focus on assessment outcomes</li> <li>• Use open ended questions to provoke children’s mathematic</li> <li>• Use the pedagogical approach ‘Sustained Shared Thinking’ to engage with the children and explore the role play environment</li> </ul>	
<p><b>Conclusion:</b></p> <ul style="list-style-type: none"> <li>• Once children are confidently role playing in dramatic play area, sit back and observe children from a distance to see how they explore mathematical concepts in a play-based setting</li> <li>• Document children’s mathematical understandings by using observation methods such as anecdotal and running record templates (<b>See Appendix H</b>)</li> <li>•</li> </ul>	

<p><b>Observations/assessment focus:</b></p> <p>Understand that items have value and cost</p> <p>Understand items need to be exchanged or traded for something else</p> <p>Understand that different coins and notes equate to different amounts</p> <p>Count coins and notes in their amounts</p> <p>Use money to exchange for items</p> <p>Explore money understandings by counting, subtracting and addition</p> <p>Understand the dollar sign goes at the start of the amount, and the cents abbreviation follows the amount</p>	<p><b>Differentiation:</b> If children are beginning to loose interest in area, adapt set up to create a shop or florist for children to explore different ways to exchange items for a cost</p>
<p><b>Curriculum Links/Numeracy Progression</b></p>	
<p>UnM 4: Determines the equivalent value of coins to a maximum of 10 coins of one denomination</p> <p>Year level 2 standard for Money and financial mathematics: Count and order small collections of Australian coins and notes according to their value (<a href="#">ACMNA034 - Scootle</a> )</p>	

<p align="center"><b>Lesson Five (Middle of term): Sequence of teaching and learning</b> <b>Can we buy it?</b></p>	<p align="center"><b>Points to remember</b></p>
<p><b>Introduction:</b></p> <ul style="list-style-type: none"> <li>• Prepare the resources required for the experience (E.g. place price tags onto items and hide them around the room)</li> <li>• Introduce the experience to the children. Explain that we will be engaging in a scavenger hunt challenge to find the correct item, and match the amount of money we need for the item we would like to purchase</li> <li>• Set up 8 trays, each tray with the different amount of coins in it (5 cents in one container, 10 cents in another, etc.) discuss the different amounts with the children in the tray. Ask questions to see who knows what coins equates to what amount of money</li> <li>• Provide the children with the scavenger hunt list to find their items hidden in the room (See Appendix I)</li> </ul>	<p><b>Resources:</b> Different coin values (5c, 10c, 20c, 50c, \$1, \$2, \$5 &amp; \$10) Different items with price tags Scavenger hunt check list Pen Paper</p> <p><b>Key vocabulary:</b> Price tag Cents Dollars Addition Subtraction Amount</p> <p><b>Key questions:</b> How could you sort these coins? How many ways can you make \$....</p>
<p><b>Experiences:</b></p> <ul style="list-style-type: none"> <li>• Instruct children to go for their scavenger hunt, finding their items throughout the room/yard</li> <li>• Once children have found their items, encourage them to go to the money table and figure out how much money is required</li> <li>• Ensure children have the option to practice counting with concrete materials or pen and paper to work out their sums</li> <li>• Assist children with their calculations if needed</li> <li>•</li> </ul>	
<p><b>Conclusion:</b></p> <ul style="list-style-type: none"> <li>• Document children’s understandings and achievements through this experience</li> <li>• Use photographic evidence and anecdotal notes to document their learning</li> <li>• Encourage the children to record their learning using STEM journals, explaining the steps taking to solve the problem and their understanding</li> </ul>	

	<p>What would happen if you didn't have any \$2 coins? 50c pieces? Etc  How do you know you are correct?  Why did you decide to do it this way?  Have the other group members got the same answer?  Why do you think there's may be different to yours?</p>
<p><b>Observations/assessment focus:</b>  Recognises and identifies the correct value of Australian Currency and understands that value is not based on size  Estimating and calculating with whole numbers  Uses money and understand that items need to be exchanged for something  Explore money understandings by counting, subtracting and addition  Understand the dollar sign goes at the start of the amount, and cent abbreviation goes behind the cent amount  Counts in multiples of 5's, 10's, 20's and 50's and the ability to round up numbers  Understands and uses numbers in context  Counts collections of coins to create the face value on the price tag</p>	<p><b>Differentiation:</b>  Scavenger hunt items will vary in difficulty of amounts. If children are struggling with using decimals, provide students with whole number price tags such as \$2 or \$5  If children are finding experience to simple, introduce larger amounts such as \$50.  Children have the option to write or draw responses</p>
<p><b>Curriculum Links/Numeracy Progression</b></p>	

UnM 4: Determines the equivalent value of coins to a maximum of 10 coins of one denomination

Year level 2 standard for Money and financial mathematics: Count and order small collections of Australian coins and notes according to their value ([ACMNA034 - Scootle](#))



<p align="center"><b>Lesson 11 (End of Term): Sequence of teaching and learning</b>  <b>Inquiry Project: What could you feed at the Zoo?</b></p>	<p align="center"><b>Points to remember</b></p>
<p><b>Introduction:</b></p> <ul style="list-style-type: none"> <li>• Before we attend the excursion to the Zoo, begin to develop an Inquiry Based project with the children on what could you feed at the zoo? Create STEM Journal's to document our learning (See Appendix J)</li> <li>• Ask the children to pick a Zoo animal to focus on</li> <li>• Research about that animal – What do they eat, how much do they eat, how much they sleep, what kind of habitat they live in</li> <li>• Document recordings and findings in STEM Journal</li> </ul>	<p><b>Resources:</b></p> <p>Inquiry Journal  Pen  Paper  Ipad/Computer  Counting materials (tens blocks)</p>
<p><b>Experiences:</b></p> <ul style="list-style-type: none"> <li>• Plan for before we go to the zoo, discuss with the children's what questions and information that the children will need to find out from the Zoo keepers</li> <li>• Prepare our questionnaires to take to the Zoo</li> <li>• Questions to ask Zoo keepers <ul style="list-style-type: none"> <li>- How many times do you feed (animal) a day?</li> <li>- How much does it cost to feed (animal) per feed?</li> </ul> </li> </ul> <p>Record Keeper's response in STEM Journal</p>	<p><b>Key questions:</b></p> <p>How did you work out that this animal costs this much to feed for one feed? For one day? How do you know your answer is correct? Are there any other ways you could have worked this out?</p>
<p><b>Conclusion:</b></p> <ul style="list-style-type: none"> <li>• Once back at the classroom, encourage children to share their findings with their peers</li> <li>• Calculate with the children how much it costs to feed their animal for one feed, and for one whole day</li> <li>• Ensuring that children are using their STEM journal to document their calculations, and to explain what steps they took to come to this conclusion</li> <li>• Document findings in Inquiry Project book</li> </ul>	<p>Can you show me what steps you took to work this out?</p>

<p><b>Observations/assessment focus:</b></p> <p>Recognises and identifies the correct value of Australian Currency and understands that value is not based on size</p> <p>Estimating and calculating with whole numbers</p> <p>Explore money understandings by counting, subtracting and addition</p> <p>Understand the dollar sign goes at the start of the amount, and cent abbreviation goes behind the cent amount</p> <p>Counts in multiples of 5's, 10's, 20's and 50's and the ability to round up numbers</p> <p>Understands and uses numbers in context</p> <p>Counts collections of coins to create the face value on the price tag</p>	<p><b>Differentiation:</b></p> <p>If children are finding working out how much an animal eats easily, it could be adapted so that the child will need to find out how much for a week, a month, a year</p>
<p><b>Curriculum Links/Numeracy Progressions</b></p>	
<p>UnM 4: Determines the equivalent value of coins to a maximum of 10 coins of one denomination</p> <p>Year level 2 standard for Money and financial mathematics: Count and order small collections of Australian coins and notes according to their value (<a href="#">ACMNA034 - Scootle</a> )</p>	

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Appendix A

Focus Child A work sample

Enterprise Day Money Investigation

Imagine you have \$5 to spend at Enterprise Day. Choose three items that you would like to buy.

How much have you spent in total?

Popcorn bag \$1

Slime \$1

Fruit water 50c

We have spent \$2 50c

(\$1) (\$1) (50c)

all together makes (1) and (1) and (50c)

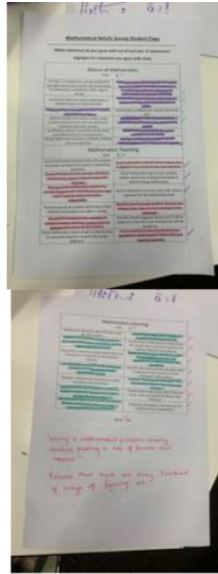
12-4-17

## Appendix B

### Emotional Connections towards mathematics reflection

#### **Reporting and Responding.**

We were provided with a sheet that had negative and positive perceptions of Mathematics. We were asked to highlight our beliefs, we were then provided with a copy that had the positive perceptions, and we were asked to reflect on why we have these negative and positive perceptions of maths. It provided me with an opportunity to reflect on my ideas about mathematics, it encouraged me to analyse why I feel this way, and how I can ensure I promote a positive perception of mathematics while teaching.



#### **Reasoning**

Teachers who are not enthusiastic and positive towards maths, implicate their students ability to learn. Ruscoe's article discussed the notion of teachers perceiving children as innocent and incapable and unable to succeed without an adult, will be detrimental for future development, and motivation towards mathematics. This perception has begun to change and adults view children as capable and confident in their environments, fostering a sense of agency in children and developing towards their success in academic learning.

#### **Reconstructing.**

While engaging in maths learning and teaching, I will ensure that I have positive idiations regarding this form of learning. I will ensure that I see children as confident and capable maths learners in their environment to foster wonder and awe with mathematics.

#### **Relating.**

The issues of having negative perceptions of mathematics becomes an problem as we become teachers as our negative perceptions or dispositions towards maths may impact a child's ability or attitudes towards maths. It has encouraged me to analyse my view of mathematics and attitudes towards it.

**Appendix C**  
**Relating Reflection**

**Relating**

I was able to use my knowledge of mathematical concepts to extend my play and ensure that I engaged with a mathematical mind. I wonder if children who do not completely understand mathematical concepts if they would engage in the same way or differently?

## Appendix D Reasoning Reflection

### Reasoning

It is important to understand that items can have different sizes but the same volume or same sizes with different volume/mass.

### **Reasoning**

The issue for this experience may be the limited knowledge of mathematical language or the realisation that children are actually learning whilst engaged in play. Parents and the wider community may not recognise the importance of play and the maths learning that is happening afterwards.

### **Reasoning.**

Ethogram: The animals didn't do many different things, that could be because we only monitored the animals for 5 minutes at a time. We did not gain a lot of information from these observations. This could be an opportunity to reflect on decision making as a teacher, is this experience beneficial? Does it need to be observed for longer periods of time? Provides an opportunity to reflect on if this experience will provoke deep learning for students.



## Appendix E Reconstruction Reflection

### **Reconstructing**

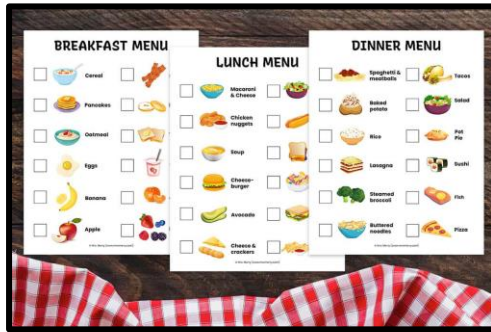
Provide some information of mathematical concepts that may arise. Encourage the children to discuss the learning with others.

Scaffold the children into further concepts and development.


### **Reconstructing**

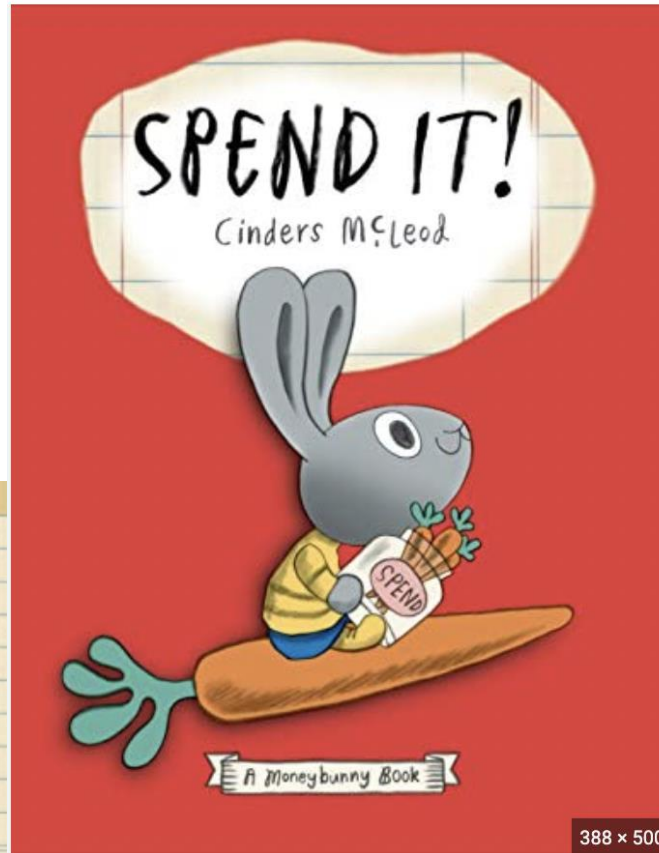
Next time, I would possibly choose an animal to observe for longer than 5 minutes, or obtain information from zoo keepers in regards to what times animals are most active/feeding etc. For the learning experience that was planned, maybe providing children with pen and paper to document the animals as well as take photos will help to strengthen the maths learning that is available.

## Appendix F Resources/Ideas for Role Play Café set up



Appendix G  
Spend it! By Cinders McLeod

	earn	spend	save	
week 1	↑	↓	↑	<p>Saving 1 carrot a week means I can buy my playhouse in 10 weeks!</p> 
week 2	↑	↓	↑	
week 3	↑	↓	↑	
week 4	↑	↓	↑	
week 5	↑	↓	↑	
week 6	↑	↓	↑	
week 7	↑	↓	↑	
week 8	↑	↓	↑	
week 9	↑	↓	↑	
week 10	↑	↓	↑	



**Appendix H**  
**Running Record/Anecdotal Observation Templates**

<b>Running Record</b>	
<b>Child's Name:</b> <b>Observers Name</b> <b>Setting:</b>	<b>Date:</b> <b>Age:</b>
<b>Title:</b>	<b>TIME</b>
<b>Links to the Early Years Framework</b>	
<b>Analysis of Learning</b>	

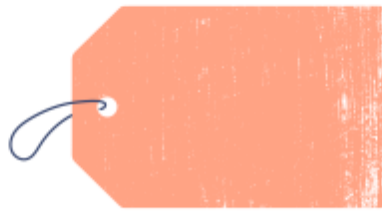
<b>Anecdotal Record</b>	
<b>Child's Name:</b> <b>Observers Name:</b> <b>Group Activity</b> <b>Setting:</b>	<b>Date:</b> <b>Age:</b>
<b>Title:</b>	<b>Photograph</b>
<b>Links to the Framework</b>	
<b>Analysis of learning</b>	

Appendix G  
Scavenger Hunt List

# MONEY SCAVENGER HUNT

You work at the bank! You need to find these items and their correct price! Can you do it?

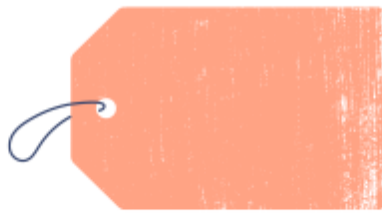
Item 1



Cost \$\$

What coins/notes do we need?

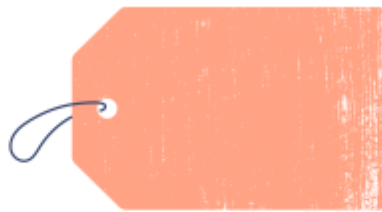
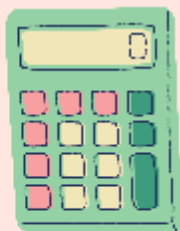
Item 2



Cost \$\$

What coins/notes do we need?

Item 3



Cost \$\$

What coins/notes do we need?



Appendix J

Example of STEM Inquiry Journal

