Numeracy Circles Teacher Information

1. Purpose
Numeracy Circles is a strategy that aims to improve problem solving outcomes for primary and high school students. They are one of the tools that teachers may use to support the teaching of problem solving. They address the four proficiencies of understanding, reasoning, fluency and problem solving.

The purpose of numeracy circles is to make learning visible and audible, solve problems using appropriate strategies, build collaboration, confidence and independence amongst students. They encourage students to reflect on their own learning and enables this to be visible to teachers.

2. Prior Learning
Prior to students engaging in Numeracy Circles, they should have developed the following capabilities:

- Listening skills;
- Co-operative group work;
- Appropriate mathematical understandings;
- Appropriate problem solving strategies;
- Independent reading skills.

3. Role of the Teacher
The role of the teacher when developing student capacities to undertake Numeracy Circles and implementing the strategy within their classroom is to:

- To role model for students how to undertake each role;
- To intervene in the Numeracy Circle process when necessary:
  - To both extend/challenge students thinking as well as supporting those in need;
- To provide students with ongoing feedback about their participation in the Circle process;
- To align problem choice with the Australian Curriculum: Mathematics.

4. Circle Roles: As enacted in Primary and Secondary Schools

<table>
<thead>
<tr>
<th>Primary School Roles</th>
<th>Secondary School Roles</th>
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<tr>
<td>Discussion Director</td>
<td>Predictor</td>
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<td>- Facilitates the discussion and reads the problem to the group.</td>
<td>- Reads the problem to the group.</td>
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<td>- They lead the discussion around what the answer could be.</td>
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5. Circle Process: Enactment in Primary classrooms

1. The Discussion Director reads the question to the group whilst everyone highlights key words on the problem sheet.
2. The Word Master clarifies key words and or symbols included in the problem with the group. They clarify anything they don’t understand.
3. The Discussion Director calls for predictions about the answer to the problem, and leads a discussion about how the relates to prior knowledge / problem solving experiences. Examples of prompt questions include:
The 5-8 Project – Supporting Literacy and Numeracy across Years 5 to 8
Scottsdale Cluster

1. The **Discussion Director** leads the students into a discussion on the problem.
   - What do you think the answer will be?
   - Why do you think this?
   - What information did you use?
   - Have you solved a problem like this before?
   - Have you seen this in the real world?
   - **NOTE**: At this stage group members do not share the answer even if they know what it is!!!

2. The **Image Maker** leads the discussion on what image/model they can create to aide in solving the problem.
   - Subsequently, each student in the group attempts to draw an image/model.
   - As a group they choose the final image/model to support their further solving of the problem.

3. The **Transformer** reviews the key parts of the problem and leads the discussion of the problem, putting the numbers and symbols into words OR putting the words into numbers and symbols.
   - Examples of prompt questions include:
     - What maths/operations can we use?
     - What order do we need to do this in?
     - What do we need to record?

4. Independently or collaboratively (depending upon the teacher’s assessment of the group’s / each individual’s abilities) solve the problem.

5. The **Summariser** calls for individuals to explain their solutions to the problem and leads a discussion of the validity of each answer.

6. The **Summariser** then sums up how the group solved the problem and leads a reflection on the process. Examples of prompt questions include:
   - What did you do?
   - What strategies did you use?
   - Does the answer make sense?
   - Why is the answer correct/not correct?
   - How reasonable was our prediction?

7. Together, individuals in the group choose one way to share how the problem was solved.

8. Finally, a reflection about the Numeracy Circle process and their learning (using exit cards or reflection pro formas) is undertaken:
   - These can be done as individuals, pair share or as a group.
   - Utilising peer assessment to encourage members to ‘step up’.

The Teacher is pivotal to the success of the Numeracy Circle. Initially, the Teacher undertakes the role of **Discussion Director** to ensure the students understand their roles and that the problem solving activity progresses. As the students become more familiar with the process, a student takes over the role. The Teacher decides when the students are ready (at step 6) to solve the problem independently or continue to do so collaboratively with teacher guidance.
6. **Circle Process: Enactment in Secondary classrooms**

1. The **Predictor** reads the question aloud, and facilitates predictions about the answer to the problem, and leads a discussion about how the relates to prior knowledge / problem solving experiences.
2. The **Word Master** clarifies key words and or symbols included in the problem with the group. They clarify anything they don’t understand.
3. The **Transformer** leads the group to restate the question in their own words. They lead a discussion about what needs to be found out to solve the problem and leads a brainstorming of strategies that might be best used to solve the problem.
4. Finally, the **Transformer** asks if anyone has further questions about the problem.
5. Students solve the problem independently.
6. The **Summariser** asks group members to share their answers and the strategies they used to solve it. They lead a discussion within the group about the different answers that were achieved, and a comparison of these answers with their predictions.
7. The **Teacher** facilitates a class discussion, about the group’s / individual’s reflections or utilises Numeracy Circle Exit Passes.

7. **Numeracy Circle Assessment Opportunities**

Through the utilisation of Numeracy Circles, there are opportunities to assess individual, group and whole class understandings in mathematics, as well as individual’s abilities to work in groups and follow process.

Teachers are able to assess an individual’s understanding and ability in group process through:

1. The Numeracy Circle Rubric;
2. Artefacts constructed by the individual during the Numeracy Circle (e.g. Individual worksheet – providing both process and outcome of the problem solving process);
3. Exit Pass (individual reflection).

Teachers are able to assess the diversity of understandings present in the group, through:

1. The Numeracy Circle Group recording sheet.