My name is Kerryn Perry and I started my teaching career at CAPS Kurrawang in September 2010. CAPS Kurrawang is a small 2 teacher community school located just outside of Kalgoorlie.

We have been very fortunate to have the AICS Numeracy Strategy Project to support us in our mathematics teaching. This project included teacher PD’s at least twice a year which gave us an excellent grounding in the best pedagogy for teaching maths to indigenous students. Part of this project was also the availability of a maths consultant to work with us to implement the strategy and guide us in our maths teaching. This was invaluable. Shirley my maths consultant visited us at least once a term and spent time with us in the classroom, mentoring us in our teaching and helping us with diagnostic assessment and planning. As indigenous remote schools often have a high turnover of newly qualified teachers this model is exactly what is needed to support the teachers in becoming great maths teachers.
A key focus of the AICS numeracy strategy is the assess plan teach cycle. We need to use data to find out what students know and what they need to learn. This approach allowed AICS to identify a key need of our students – the need for solid learning at the appropriate level for numeration and calculate. Therefore this was a focus of our teaching.

Assessment is carried out on a regular basis and recorded on the AICS Numeracy Strategy Tracking tool. This tool gives the teacher up to date information on where the gaps are in student learning and this is then used to plan the learning experiences.

A key feature of my planning is to specifically plan for regular practice and to target learning experiences that take the students deeper in their learning. It is important to ensure that all levels of learning are covered. Many learning programs give information and practice using materials or worksheets covering the first two levels (see table below) but do not allow time for the next levels of learning where students develop fluency and the ability to move onto visualisation and then to mental strategies.

The table below shows the levels of learning and activities that correspond to the stages of learning. The last two stages should not be neglected and need to be specifically planned for.

<table>
<thead>
<tr>
<th>Stages of Learning</th>
<th>Explicit Teaching</th>
<th>Action - practice</th>
<th>Feedback</th>
<th>Integrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Info Level</td>
<td>Lesson completed.</td>
<td>Complete practice examples using materials. Explain in own words. Give an example.</td>
<td>Make connections to prior learning. Use what has been learned with visualisation &amp; explain. Complete separate assessment at a later date. Know when to use this in a new situation.</td>
<td>Can flexibly use and apply this. Becomes part of Mental Strategies. Recognise new problems and how to solve them.</td>
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<tr>
<td>Know How Level</td>
<td>Design and deliver learning experiences that help students to know about a new concept.</td>
<td>Provide activities, games or worksheets that enable students to learn this concept. Give students opportunities to talk about and reflect on what they have</td>
<td>Over coming weeks and months give students opportunities to undertake activities that; develop fluency; move students from materials to visualisation; enable them to make connections and apply</td>
<td></td>
</tr>
<tr>
<td>Wisdom Level</td>
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At Kurrawang my lesson sequence mirrors the levels and stages of learning starting with warm-ups and regular practice where students start to think mathematically, have some fun and are given a chance to practice concepts. After the warm up information is provided on new concepts through explicit instruction. This may be at the information level of learning or it may be explicit instruction to help the students to make connections and move into deeper levels of learning. This is followed by time for applying this new learning and exploring the concept with materials. At the end of the lesson students are asked to reflect on and say in their own words what they have learned.

The **warm-up/practice** is a vitally important part of my lessons. It is thoroughly planned to allow students to practice previously learned concepts. The aim is to develop deeper understanding of the concept and then develop fluency and the ability to apply the concepts to other situations.

During the **explicit instruction** phase of the lesson, new concepts are introduced and learning begins. New information is linked to existing knowledge with students using materials to gain understanding.
Once a concept has been learned it must be applied to new learning and the concept explored and reinforced in different situations. This part of the lesson may need to include work on concepts already learned but requiring deeper learning. The teacher designs learning experiences to allow students to make connections and apply previous learning in a different context and thus take them deeper in their learning. It is no good just teaching something and after that two week unit is over moving onto something else. Students need to regularly re-visit this learning to become fluent and be able to apply it in different situations. This will become obvious to the teacher if they are doing regular assessments – and using this data– in planning lessons. Find out what the student needs to know and give them time to learn it through all the levels of learning.

During the reflection students come together and discuss what they have learned. Often another example will be discussed with opportunity for the students to talk about how they worked out the problem.

An Example from Calculate

Let’s look at an example in the calculate section of the mathematics curriculum. What I found was that students might seem to know something such as how to calculate ‘near doubles’ in specific lessons but when faced with a situation where a ‘near double’ is appropriate in a different context they are not able to apply that learning. Conversely, they start to over apply the current learning – always trying to use doubles.

The students need to be scaffolded in ways to help them link ideas and learning and to know how to choose the appropriate strategy. The teacher can use flowcharts to show the students the steps to solving a maths problem. In addition the teacher must explicitly teach the students how to recognise when to apply the learning and give them practice in doing this.

In future lessons the warmup/practice would include opportunities for students to recall their doubles basic facts and play a game that requires near doubles. Although new material on a different topic may be introduced in the explicit instruction section at this time, I would possibly take a couple of lessons to use explicit instruction or other activities to help the students make the connection about when and how to apply the ‘near doubles’ strategy. Then they can take some time in those lessons during the application part of the lesson for practice to develop fluency and deeper learning on this concept.

Connecting oral, written and quantity of the number
AICS Numeracy Strategy emphasised the importance of connecting the oral number with the written number and with the quantity of the number. This is another important connection that has been key to success in teaching numeration to my indigenous students.

An example of this can be seen in the information stage of learning when students are learning about reading and writing numbers in the thousands. The teacher sets up an explicit teaching activity where students read and write on number expanders and then connect to the quantity using materials such as pop sticks or MAB to model the number.

Another important part of my pedagogy is to ensure that I have focused on the language. This means identifying the language that will need explaining and working out how to explicitly teach that language.

When playing games it is important to restate in maths language what is happening and use the language in context.

During reflection students are encouraged to use the maths language when they talk about their learning.
Over the past couple of years I have seen many students make very significant progress through the approach described above. This year, Damian, a year two student at Kurrawang has made progress in the areas of Numeration and Calculations. At the beginning of 2012, he could solve addition and subtraction problems by drawing a picture and counting everything by ones. See the work sample to the right.

By the end of September, he was able to solve addition and subtraction problems mentally using a variety of different strategies, such as, doubles, near doubles, combinations to ten and place value partitioning. In the work samples to the left and below, he has simply written the answers without having to do any drawing or counting.

This is evidence that he is able to solve simple addition and subtraction problems using a range of efficient mental and written strategies, one of the content descriptors at year two level of the Australian Curriculum.
In February Damian knew how to say and write number sequences up to 119, but not beyond. See the work sample to the left.

After focussed work in this area, Damian was able to say and write the number sequences up to *one thousand and twelve*, 1012. The work sample to the right shows that he was able to complete the number sequences across the more difficult tens, hundreds and thousands changeover points, ie, from 119 to 120, from 399 to 400, from 999 to 1000, from 1009 to 1010.

This work sample shows that Damian is achieving an aspect of the Australian Curriculum at year two level, *recognise, model, represent and order numbers to at least 1000*.

In the work samples below, Damian was asked to write numbers as they were called out. The correct numbers are shown in red. When asked to write numbers in March, the sample on the left, Damian showed that he knew how to use the patterns within the numeration system to write the numbers up to 101, but not beyond. He was unable to write decimal numbers.

In September, after focussed work on the patterns within the Numeration system, Damian was able to write all of the whole numbers up to 818 and the decimal numbers $307 and $1.50 (year two level). He was also able to write most of the whole numbers up to 9098, and two digit decimal numbers related to money. He had difficulty with one number, 5106 which he wrote as 5016.

This shows that Damian is achieving an aspect of the Australian Curriculum at year two level and working towards achievement of the year three level.
In March, Damian was asked to read a series of whole numbers up to 999 and simple decimal numbers. The work sample below, which is a copy of my records, shows that he had trouble reading the numbers 118 and $1.50.

In September, Damian was asked to read the same numbers, and some at year three level; up to
9 999 and more complex decimal numbers. The work sample below shows that he was able to correctly read all of these numbers, ($75, he self-corrected.) indicating that he is achieving an aspect of the Australian Curriculum at year three level.

The work sample collection shows that Damian is achieving results which are appropriate for his year level, and in some areas beyond. Damian’s progress was similar to most of the other students within this school which demonstrates that with targeted teaching, students are able to make progress at an age appropriate rate.

Conclusion

Over the past couple of years I have found the AICS numeracy strategy approach of assessing for learning to be a great model for targeting my teaching. Knowing exactly what a student knows and needs to learn and then planning for that learning in a way that includes targeting the deeper learning has enabled these children to be successful. There are many challenges in indigenous education due to high absenteeism and culturally different ways of
learning, however using a structured lesson sequence and targeting the teaching and learning at the point of need has been a successful model here at CAPS Kurrawang.