LEADING LEARNING- GOING BEYOND THE CONTENT

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When any new curriculum is introduced it is almost inevitable that initially it will be used in a naïve way, with a focus on the content. In South Australia we wanted the Australian Curriculum to live up to its potential, as promised by the evidence base used to inform its development. We wanted to enable leaders and teachers to think about the curriculum in a way that supports students to become successful learners as described in the Melbourne Declaration.

This paper will describe a snapshot of some key elements of the SA Department of Education and Child Development (DECD) approach for leading achievable changes in teaching and learning. Central to the strategy was the creation of a suite of resources, the Leading Learning website. This website supports and challenges school leaders and teachers to think about the *Australian Curriculum* in ways that engage all learners to think creatively and critically.
The tools described in this paper can be found, along with many other resources, at http://www.acleadersresource.sa.edu.au.

Background

Almost 20 years ago, Seymour Papert (a renowned Mathematics educator) said that, 'We need to produce people who know how to act when they're faced with situations for which they were not specifically prepared'. Acknowledgement of this need and the implications for education has gathered momentum in systems across the world in recent decades. The 2013 OECD skills report cited *problem solving and the ability to learn,* as skills needed by workers in the 21st century, 'to help them weather the uncertainties of a rapidly changing labour market'.

In South Australia, focus on the need to develop young people who are powerful learners led to the establishment of the 'Learning to Learn' project. This project culminated in the publication of the South Australian Teaching for Effective Learning framework (TfEL, 2010). The mandated framework draws together the research evidence, the voices of educational experts from around the world and South Australian expertise.

The TfEL framework is based on high-challenge, social constructivist pedagogy. It recognises that we are all learners and that the conditions needed for students learning are just as important to adult learners, including the teachers and leaders in our schools. The framework reflects two key concepts:

- *Learning for effective teaching* supports leaders and teachers to see themselves as learners, reflect on their practice and create opportunities to develop their professional expertise.

- *Teaching for effective learning* supports teachers to develop their practice in three domains:
    - Create safe conditions for rigorous learning
    - Develop expert learners
    - Personalise and connect learning.

In South Australia, we believe it is essential to bring together the Australian Curriculum (*What* we teach) with the pedagogy articulated in the TfEL Framework (*How* we teach) in order to develop successful, powerful, life-long learners.

In December 2014, AAMT mirrored this position about the need to bring together the what and the how, when they stated; "It is more important than ever before for teachers to consider *how* they teach as well as what they teach- *what and how* cannot be separated when developing skills in key areas such as critical thinking, communication, and mathematical modeling". (AAMT, 2104)

Implementing the Australian Curriculum- opportunity and challenge

With the introduction of the Australian Curriculum, many school leaders in South Australia reported their teachers felt overwhelmed by the apparent content requirements. Leaders and teachers saw this manifesting itself in an unintentional regression to a didactic coverage of curriculum content, rather than the responsive, high-challenge pedagogical approach that had begun to develop through their implementation of the principles of the TfEL framework.

Leaders' and teachers' concerns presented us with an opportunity to engage them in exploration of how we could work with the Australian Curriculum and the TfEL framework and in doing so develop powerful, expert learners.

The Australian Curriculum was shaped to reflect 21st century global imperatives and Teaching and Learning Services (DECD) responded to the implementation of the curriculum to make the strategic intent visible and doable. In the case of mathematics, the strategic intent is captured in the Australian Curriculum: Mathematics Proficiencies (AC: Proficiencies) and we sought to raise their profile through modelling how they can be woven together with the content.

The Leading Learning website (DECD, 2013) and associated professional development opportunities have been created and continue to evolve to support our teachers, leaders and students to become designers of learning, through which the Strategic intent of the Australian Curriculum and the principles of the Teaching for Effective Learning framework are brought together.

Transforming the way we think about the intended learning

The Teaching for Effective Learning framework is complimented by a number of resources, one of which is a Learning Design framework (Figure 1). This framework has been developed to support teachers to be designers of learning in which they bring together the 'what' (Australian Curriculum) and the 'how' (SA TfEL). There are considerable similarities between this framework and the 'Backwards Design' framework (McTighe & Wiggins, 2006). The notable difference is the way in which Learning Design considers what the student brings to the learning. Considering students strengths, challenges, dispositions, culture and aspirations are all essential aspects of SA Learning Design.

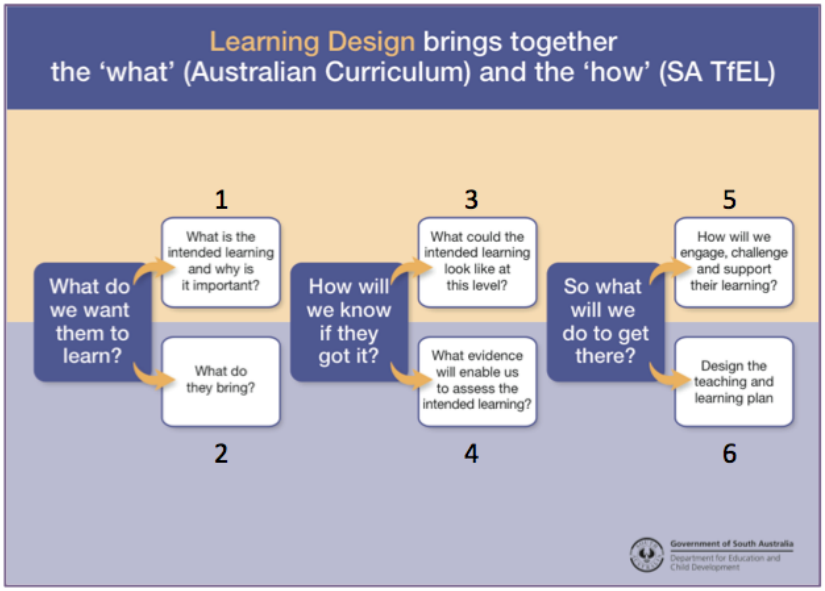

Figure 1. Learning Design framework

The first box of Learning Design asks teachers to consider, '*What* is the intended learning and *why* is this important?' Recent South Australian research suggests that this question is answered in two fundamentally different ways. One response reflects linear, transactional pedagogy that is primarily content driven. The other is a responsive, design-oriented pedagogy, which includes a broader range of learning intentions. The Leading Learning resource is designed to support a fundamental shift from transactional pedagogy to design-oriented, responsive pedagogy.

In a transactional model of mathematics pedagogy, the intended learning would identify only the content to be address with students. For example, the teacher could describe the intended learning as:

What?

Students learn to: Calculate the area of a parallelogram.

Why?

This learning is important because it is in the Year 7 curriculum.

With this learning intention, it would perhaps be appropriate to present students with information such as this:

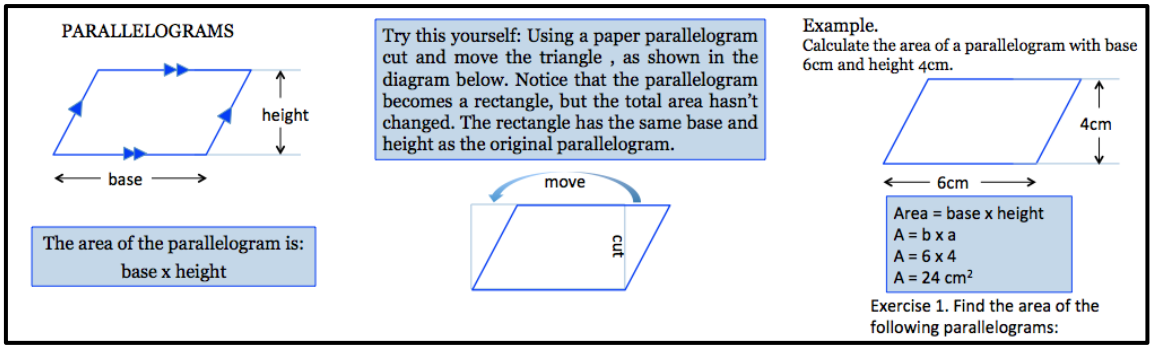

Figure 2. Traditional textbook introduction

This image (Figure 2) is representative of many textbook and worksheet introductions to parallelogram area. Notice that the learner is:

- *told* which measurements they will need to make
- *told* to use the terms base and height
- *told* the area formula in words, then in symbols
- *shown* one explanation of why the formula works
- *shown* how to apply the formula
- *asked to apply the given formula* to questions similar to the example shown.

For many students, this transactional pedagogy, which provides a 'learning diet' of *told, shown and asked to apply given procedures,* has many unintended and quite damaging learning outcomes. Inevitably, many students will begin to believe that to learn maths they must first be shown what to do. They learn that there is only one-way to respond to each problem and that successful mathematics learning is about remembering and applying processes.

In contrast to this transactional pedagogy, in responsive, design-oriented maths pedagogy the intended learning would identify a broad range of skills and capabilities. For example, the teacher could describe the intended learning as:

What?

Students learn to:

- transfer and build on existing understanding
- look for, establish and express general rules
- develop skills in working collaboratively
- calculate the area of a parallelogram.

Why?

This learning is important because:

- it uses the content of the Year 7 curriculum to develop skills in thinking and communicating mathematically and working collaboratively.

The pedagogy shift that is expressed here centres on using content as a vehicle for intentionally developing a broader base of skills and dispositions in students. There is no doubt that we want the students to learn the content, but it is insufficient on its own. To achieve this learning intention, perhaps we could begin by asking students to make a judgment; "For each pair of shapes, which do you think might be bigger- the area of the parallelogram or the area of the rectangle?" (Figure 3)

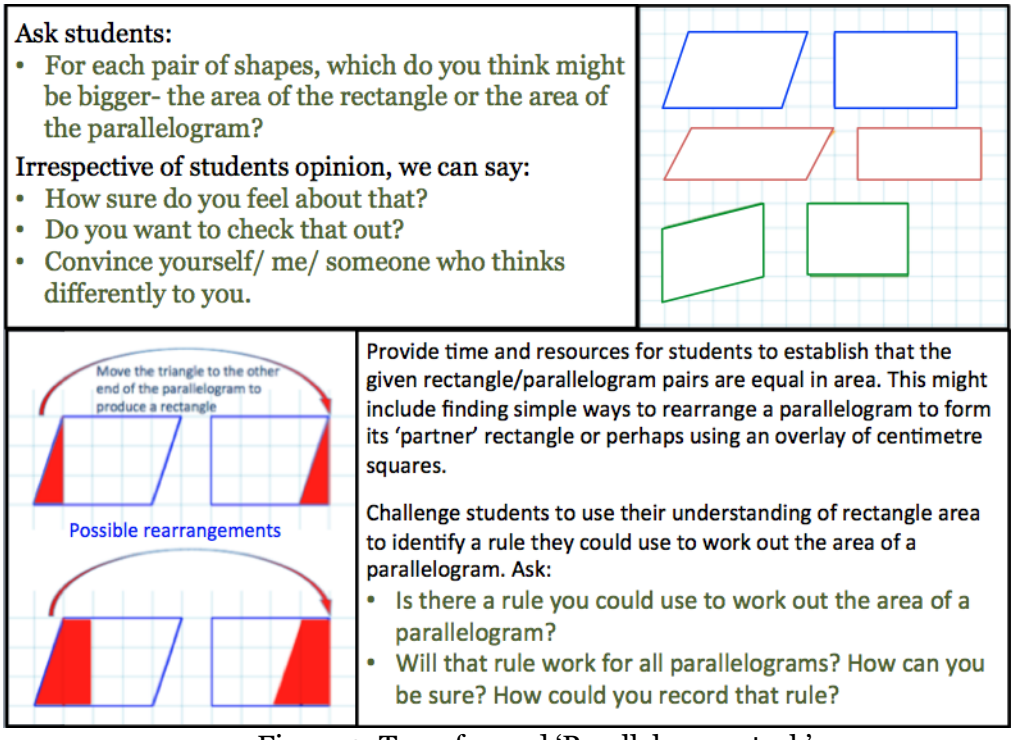

Figure 3. Transformed 'Parallelogram task'

This question requires students to activate their understanding of area, prior to any information being provided by the teacher or text. When using this question, the teacher does not ask students directly what they understand by the term area, but they do gain insight into the students understanding nonetheless. Even if the student has only a sense of the term area, rather than an ability to articulate the definition, the

teacher can observe this 'sense' of area. Equally, it does not preclude students from articulating the definition.

In this pedagogical paradigm, the teacher is responsive to the insight that her students bring, therefore it is difficult to identify a precise pattern that her questioning would follow. However, it may be broadly similar to that in Figure 3. In this example, the learner is challenged to:

- *notice* a relationship
- *convince* someone of their current opinion about the relationship
- *transfer* what they already know about area calculation in rectangles to a new context
- *establish* a rule for area calculation in parallelograms (perhaps verbally, then written words then using symbolic representation)

This learning experience consisting of, *notice, convince, transfer and establish a rule*, has the same outcome as the text book learning experience in relation to 'content learned'. However the additional learning outcomes in this model, often include students' learning that:

- *they* can create new understanding *without* it being modeled to them
- purposeful dialogue with peers can be mutually beneficial for learning.

When we provide students with the opportunity to make connections and construct understanding, they are more likely to develop conceptual understanding. Whilst, initially, this may appear to be a more time consuming learning process, we should consider that; "Conceptual understanding also supports retention. Because facts and methods learned with understanding are connected, they are easier to remember and use, and they can be reconstructed when forgotten". (National Science Research Council, 2001)

Hence, developing students' conceptual understanding, through applying pedagogy such as this, could result in breaking the cycle of 're-teaching' content year after year. We would still need to ensure that students have formal mathematical language and conventions, but when we provide this information after they have established conceptual understanding, we are adding useful information at the point of need. In this model of pedagogy we have instructed only that which we cannot support students to reason for themselves.

In the latter example, the development of the proficiencies is achieved through day-to-day learning of content. In the former, there is almost no alternative other than to teach the content and somehow bolt on the proficiencies after the fact.

Supporting South Australian teachers and leaders to transform tasks

Examples, such as the parallelogram question, can be useful in communicating the nature of the shift in pedagogy that we intend for teachers to enact. However, in the same way as we want our students to view mathematics as a coherent whole, in which they identify principles behind the specific examples, we also want our teachers and leaders to be clear about the pedagogical principles that we are asking them to enact.

Providing teachers with individual examples, such as the parallelogram question, without challenging and supporting them to identify the principles applied to the design of the task, does no more than give them one classroom activity.

Many resources and much professional development does exactly this. Even 'expert' teachers who share their practice can fall in to the trap of sharing their activities and telling teachers what they do, without developing an understanding of the deeper learning intentions that are implicit for the expert. Whilst 'smart borrowing' *with* understanding can be useful in developing teacher practice, the use of activities, without understanding the deeper learning intention and the pedagogy required to

achieve it, can be disempowering and de-professionalising. Leaders empower teachers when they support them to build their own bridges from their current to their next practice.

The 'Transforming Tasks' professional learning module in the leading Learning resource (Figure 4) does exactly this. Teachers are asked to *suggest* possible transformations for a task, *notice the relationship* between the task, 'before' and 'after' the transformation, and work with colleagues to *establish general principles* for transforming tasks for greater engagement with intellectual challenge.

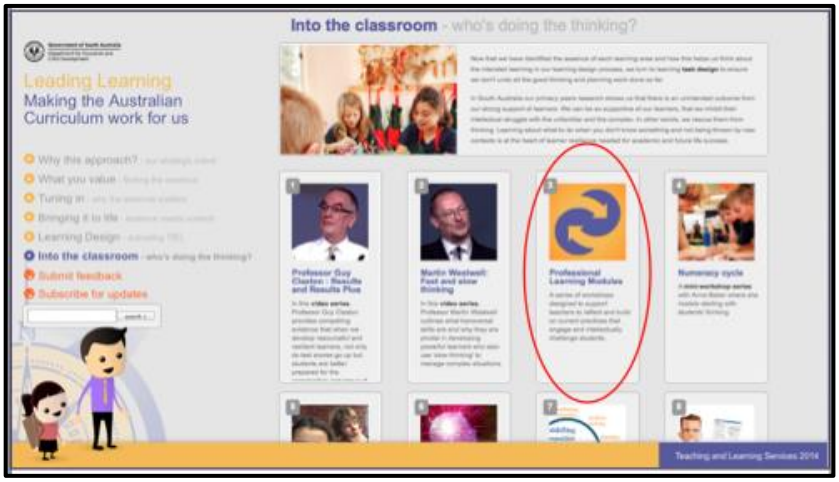

Figure 4. Leading Learning Resource. Into the classroom: Professional-learning module- 'Transforming Tasks

'Transforming Tasks'- Strategies and techniques

The 'Transforming Tasks' module identifies four strategies that, together, articulate the nature of the pedagogical shift we aim to achieve.
These four key *strategies* are:

- From closed to open
- From information to knowledge
- From tell to ask
- From procedural to problem based

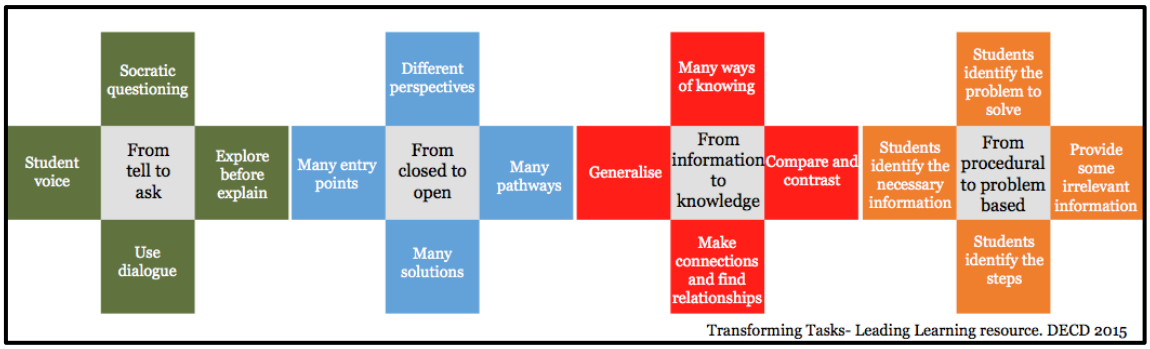

Figure 5. Overview of strategies and techniques from "Transforming Tasks' http://www.acleadersresource.sa.edu.au/index.php?page=into_the_classroom

Each of the four transformation strategies could be achieved through applying many different techniques. Just four techniques were chosen to exemplify each strategy (Figure 5).
For each of the 16 techniques, sets of examples demonstrate how they each can be used to transform a traditional textbook or worksheet style task into a task that develops a

broader skill set and provides greater engagement with intellectual challenge. These examples show each technique being used in isolation, so they allow practice to be changed in manageable steps. Of course, techniques can also be combined. In the parallelograms example (Figure 3) the teacher combined three techniques:

- Compare and contrast - Supporting the shift 'From information to knowledge'
- Explore before explain - Supporting the shift 'From tell to ask'
- Generalise - Supporting the shift 'From information to knowledge'

It is intended that these strategies and techniques be used alongside the TfEL framework to establish a common language for articulating intentional learning design.

During the creation of this resource, subject specialists in Mathematics, Science, English, History, Geography, the Arts and Technology worked together to establish techniques that were deemed appropriate for use in all learning areas. Having one set of strategies that can be applied across all learning areas is valuable when considering the demands on primary school teachers. Observation of the use of this resource suggests that having common strategies could be useful in supporting interdisciplinary collaboration in the high school setting. It also allows non-specialist leaders to share a common language with teachers.

Raising the profile of the Australian Curriculum: Mathematics Proficiencies- Making them visible and doable

The verbs used in the Proficiencies describe the actions in which students can engage when learning and using mathematics content. To embed the Proficiencies in students learning experiences, teachers need to ask questions that activate those actions in their students. But what questions would achieve this? The Proficiencies describe the actions, but not the questions that can drive those actions.

The Bringing it to Life (BitL) tool was developed to bring the proficiencies to life in the classroom. The tool models questions that can be used to drive the actions described in the Proficiencies. It has three layers, which increase in the level of detail provided.

Questions have been develop for all four of the AC: Proficiencies, but for the purpose of this paper we will look at the AC Proficiency: Understanding. The first layer of the tool poses questions that help teachers to enact the emphasis of each Proficiency.

The questions, in the first layer of the BitL tool (Figure 7), identified to reflect the verbs in the 'Understanding' proficiency are:

- What patterns, connections, and relationships can you see?
- Can you answer backwards (inverse) questions?
- Can you represent, calculate or create in different way?

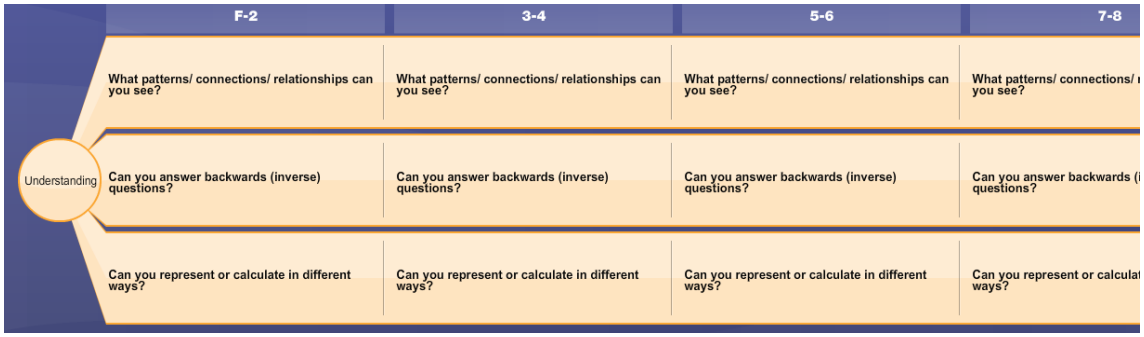

Figure 7. First layer of the mathematics BitL tool- Understanding
http://www.acleadersresource.sa.edu.au/index.php?page=bringing_it_to_life

The following description of Conceptual Understanding, from the 'Adding It Up' report, reflects why, for this proficiency, we identified questions that highlight connectivity and flexibility in the use of mathematics:

> Students with conceptual understanding know more than isolated facts and methods…….They have organized their knowledge into a coherent whole, which enables them to learn new ideas by connecting those ideas to what they already know.
> A significant indicator of conceptual understanding is being able to represent mathematical situations in different ways……..The degree of students' conceptual understanding is related to the richness and extent of the connections they have made.
> (Kilpatrick, Swafford & Findell, 2001)

Layer two of the BitL tool contains suggestions about the type of questions that teachers can use with students in order to activate each element of the proficiency. For example, specific questions under the heading, 'What patterns, connections and relationships can you see?' include:

- Which could be the odd one out?
- What is the connection between….?
- How are these (values/shapes/angles/questions/graphs etc) the same as each other?
- How are these (values/shapes/angles/questions/graphs etc) different to each other?

The questions can be used across all content areas, and in layer three specific examples are provided of how each question could be brought together with a particular piece of content.

Teachers and leaders have used to BitL tool, both to design learning for their students and also to reflect on the nature of the questions in their existing tasks. Often teachers have commented how the tool has supported them to realise the extent to which they focus on questions reflecting the Fluency proficiency- the recall and remember element of the mathematics curriculum.

Supporting teachers to embed the proficiencies in their learning design is vital. Without support from leaders of mathematics curriculum, many teachers can get locked into delivering mathematics content and in turn students get locked into being passive receivers of information. The BitL tool provides leaders and teachers with a resource to make the proficiencies visible and doable in the classroom.

Supporting effective practice.

The 'Transforming Tasks' resources and the BitL tool are just two examples of discrete assets within the Leading Learning resource. While the resource allows leaders and teachers to dip in and out, an overall developmental narrative exists. This allows leaders to determine where their school sits in the developmental story and target tools that might be most effective for them. The developmental narrative, from rationale to practice, is framed in the navigation menu:

- Why this approach?
- What you value
- Tuning in
- Bringing it to life
- Learning Design
- Into the classroom

Assets within this resource, include videos of National and International Educational Leaders, custom designed animations to assist in describing and communicating the shift in pedagogy to stakeholders, including parents and students. Tools to assist with enacting the pedagogy described in the TfEL framework and the

voices of South Australian teachers and leaders, sharing their practice.

The Leading Learning resource continues to be developed in response to research and feedback from teachers and leaders. Exciting new modules are currently planned for 'Engagement', 'Developing executive function through curriculum' and 'SOLO'.

Conclusion

We know that transactional delivery of mathematical facts has limited sustained impact for many students. When we instruct appropriate mathematical processes, rather than supporting students to develop conceptual understanding we can leave a trail of misconceptions active in our students' thinking. The instructed information can sit in disequilibrium with their intuitive understanding and when they have forgotten the instructed information they will return to their intuitive understanding. When students learn, with appropriate support, to construct understanding to establish relationships for themselves, they are better placed to reconstruct that understanding when the rules have been forgotten. When teachers design for learning to occur in this way, they are going beyond the delivery of content. They contribute to the development of successful lifelong learners.

The conditions needed for students' learning are as important for adult learning. Just as with our students, transactional delivery of learning for teachers can have limited effect. The Leading Learning resource supports leaders and teachers to work together to construct their conceptual understanding, from which their next pedagogy can be established.

References

AAMT. (2014). *Quantitative Skills of 21st Century Workers- Summary*. Retrieved 18 May, 2015, from http://www.aamt.edu.au/Media/Files/Quantitative-Skills-Summary/(language)/eng-AU

ACARA. (2012). *The Shape of the Australian Curriculum*. (3rd ed.). Retrieved 17 May, 2015, from http://www.acara.edu.au/verve/_resources/The_Shape_of_the_Australian_Curriculum_V3.pdf

DECD (2013). *Leading Learning*. Retrieved 17 May, 2015, from http://www.acleadersresource.sa.edu.au

DECD. (2010). *Learning to learn: Teaching for Effective Learning*. Retrieved 17 May, 2015, from http://www.learningtolearn.sa.edu.au/tfel/pages/tfeloverview/

Kilpatrick, J, Swafford, J & Findell, B. (2001). *Adding It Up*. Washington DC: National Academy Press.

Mctighe, J & Wiggins, G. (2006). *Understanding by Design*. Victoria, Australia: Hawker Brownlow Education.

Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA), (2008). *Melbourne Declaration on Educational Goals for Young Australians.* Retrieved 17 May, 2015, from http://www.curriculum.edu.au/verve/_resources/national_declaration_on_the_educational_goals_for_young_australians.pdf

Papert, S. (1998). *Child Power: Keys to the New Learning of the Digital Century*. Retrieved 18 May, 2015, from http://www.papert.org/articles/Childpower.ht