Improving the quality of maths and science teaching workshop

AUSTRALIAN SCIENCE & MATHEMATICS SCHOOL

Glenys Thompson and Matt Verdon

www.asms.sa.edu.au
ASMS CHARTER to transform science and mathematics education
This afternoon’s workshop...

• Selecting the right teachers

• Undertaking the right upskilling/training to increase student engagement with STEM

• Getting the workplace culture right
Selecting the right teachers – the Teach SA story

• Getting the messaging right
• Getting the competencies right
• Getting the training right
• Getting the metro / rural balance right
TEACH SA
Recruit strand

What is Teach SA?
Teach SA is a South Australian Government initiative to recruit and upskill our mathematics and science teaching workforce. Teach SA will run from 2011 to 2014.

What is the Recruit strand?
The Recruit strand of Teach SA aims to attract 40 new and outstanding mathematics and/or science teachers to DECS by 2014.

This will significantly contribute to replacing the senior maths, physics and chemistry teachers who are expected to retire in the next few years.

As a Teach SA scholar you will receive:
- a significant scholarship to support you in your studies
- extra release time in your first year of teaching
- pre-service training to support you in your first year.

Grants will also be provided to schools that Recruit a Teach SA scholar.

To be a part of Teach SA you must be:
- an existing final year education student who will qualify to teach in 2012 or 2013
- an early career change professional with appropriate qualifications and a passion to teach, and who will qualify to teach by 2014.

Like to find out more?
Contact James Hamilton, Project Officer Teach SA, on 08 8228 8614 or email DECSStrategicRecruitment@sa.gove.au.
www.decs.sa.gov.au/hr/pages/jobsandcareers/teachsa
Getting the competencies right

• Passion for Education
• Maths and Science Knowledge
• Problem Solving / Ability to Learn
• Flexibility
• Organisation and Planning
• Communication
• Works Effectively with Others
• Resilience
• Reflects on Practice
Getting the training right – the value add

• Reflective Practice 1 (first semester subject) was run as an intensive at the beginning of the year so that an additional school placement could be included during Orientation week for the students.

• Workshops with the Ed Dept of SA pedagogical team were organised during mid-semester breaks.

• Students in country placements were visited by University Liaison.

• Mentoring Modules were converted to online resources and made available to teacher mentors.
### Did we get it right?

<table>
<thead>
<tr>
<th>Grade</th>
<th>HD</th>
<th>D</th>
<th>C</th>
<th>P1</th>
<th>P2</th>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>TeachSA</td>
<td>24%</td>
<td>58%</td>
<td>16%</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>All students</td>
<td>6%</td>
<td>25%</td>
<td>42%</td>
<td>20%</td>
<td>3%</td>
<td>1%</td>
<td>3%</td>
</tr>
</tbody>
</table>
How to attract quality teachers to rural areas?

• Money
  – C Change
  – Teach SA

• Conditions
  – Additional funds
  – Additional release
  – Additional support
Doing the right course / training
Our reality......secondary teachers love their subject more than they love teaching

Early career teachers: factors that were important in the decision to become a teacher

<table>
<thead>
<tr>
<th>Factor</th>
<th>Proportion who ticked factors important to them</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Love of teaching</td>
<td>80.6</td>
</tr>
<tr>
<td>Desire to work with young people</td>
<td>77.7</td>
</tr>
<tr>
<td>Desire to contribute to society</td>
<td>52.7</td>
</tr>
<tr>
<td>Holidays, hours of work</td>
<td>27.7</td>
</tr>
<tr>
<td>Family role model(s)</td>
<td>26.4</td>
</tr>
<tr>
<td>Encouragement from teacher(s) while you were at school</td>
<td>21.9</td>
</tr>
<tr>
<td>Security of employment</td>
<td>20.7</td>
</tr>
<tr>
<td>Love of subject</td>
<td>18.2</td>
</tr>
<tr>
<td>Availability of employment</td>
<td>13.2</td>
</tr>
<tr>
<td>Working conditions</td>
<td>12.1</td>
</tr>
<tr>
<td>Status of the teaching profession</td>
<td>4.9</td>
</tr>
<tr>
<td>Attractiveness of the salary</td>
<td>4.3</td>
</tr>
<tr>
<td>Other</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Staff in Australia’s Schools 2013, Table 8.4, page 91
Other realities

• One off professional learning sessions don’t promote long term adoption of new methods and approaches

• Teachers need time to reflect on their practice

• Teach SA experience for Reskill and Retrain
From being a confident junior secondary teacher but even at the 10 and 10A level there were concepts I could teach but missing depth even there. I have taught Year 11 Maths App. but yet again the depth was missing. With the time off and a number of people willing to mentor me from the whole Maths faculty I had time to deal some depth that was missing. Found and learnt to use some new technology that I’m slowly incorporating into lessons. The faculty has shown faith in my personal growth by the opportunity to teach extension Year 10 for the first time in 2013. It has given me a real thirst to continue this improving myself with Maths which I felt I had almost lost before starting this course.
Prior to this course I was studying Maths from textbooks.

At first, the content of the morning sessions was beyond me but this was responded to immediately and has been very useful since. It has been useful in giving me direction, a greater understanding/perspective of the scope and content of senior Maths.

I now have a much better content mind-map.

From here I can learn more from textbooks where required, knowing the perspective on the content.

Also, the morning sessions took the salient points and incorporated expanded knowledge, interesting points, examples and points to note.

The speakers in the evenings were brilliant. It was a privilege to listen to them and I am grateful for this opportunity.

The way we were treated as professionals in terms of accommodation, food and other things that were organised for us was wonderful and provided inspiration.

I did not tend to use my coach much as he was at another school. It was simply easier to talk to people at my own school. With thanks.
Teachers identify ‘engaging students in the subject’ as number 1 for PD...

- Step 1 – make learning collaborative and ask the kids.

- Three questions:
  - How can we get students more interested in studying science and maths at school and at uni?
  - What makes a good maths teacher?
  - What makes a good science teacher?
Some quotes – Getting people interested

• I think that teachers should show students how they will use what we learn in school, outside of school and in real life situations like (our school) does almost in every lesson. It might not make the studying more "fun" but it will show the point of learning it.

(girl, 15 years)
• Do more applications and practical activities with the learning to get students involved in the work and really understanding why it is important from a young age.

• Science in particular would be good to do this as at a younger primary school level there is not much of a focus. The science taught at this level is more phenomena than theory and getting young students involved in fun hands on activities based on this would get them thinking positively about the subject from the get go.

(Boy, 17 years)
What makes a good maths/science teacher?

- Having experience with the difference in maths teachers I think what makes a good maths teacher is
  - Being able to recognise when a student is struggling
  - Putting in the effort to speak one on one with the student
  - Not glamorising specific students
  - Realising when your methods as a teacher are not working
  - Being friendly but not to the point where you're a friend more than a teacher

(Girl, 15 years)
I'm not being particular to a subject here, but I think a main thing that makes a really good teacher is for them to not only love having knowledge about the particular subject, but also loving to teach it to others. Seeing passion inspires people, especially adolescents, and I find if a teacher is passionate about what they're teaching I find it more interesting and tend to stick with the subject even if I don't like it as much or I'm not as good at it.

Another thing that is really essential is being able to relate and empathize with students - which this school has mastered quite well. Not by necessarily having "young" teachers but by having teachers who care enough to take the time to notice each student as an individual and creating a great student/teacher relationship. Because this encourages students to ask for help and aren't afraid to really express themselves in a subject.

(Girl, 17 years)
A good science teacher...

• Someone which is personally truly enthused by what they are teaching to the point where they laugh placing the teacher and the student on equal grounds.

(boy, 16 years)
Your turn – WWW EBI

• WWW – what’s working well
• EBI – even better if

• What is working well in your school/organisation in terms of professional development for your staff?
• What would make it even better?
How and when you ask matters

Activity
Using really cool technology helps

Activity – www.phonelabs.net/a
Platforms of Innovation at the ASMS

Key elements

- Learning Environment
- Learning Programs
- Innovation of Teaching and Learning
- Teachers Learning
- Student Learning
Vertically grouped classes
Team teaching & planning
Virtual classrooms
On-line feedback assessment & reporting

LEARNING ENVIRONMENT
Interdisciplinary Inquiry based Fertile Questions Student Inquiry Project

LEARNING PROGRAMS
Self-directed Metacognitive Capabilities Collaborative Reflective portfolios in maths Problem Based Learning
Redesigning classroom practice

- Team teaching providing options for students
- Virtual classroom – anywhere anytime access to learning materials
- Students choose workshops to suit their learning needs
- Facebook page for sharing ideas and problem – providing solutions
Practitioner Inquiry
Learning Design focus
Pedagogical Content Knowledge
Inquiry Pedagogies
Coaching & Mentoring
Professional Learning Communities – teaching teams

**Planning:**
- Sharing
- Refinement
- Consistency

**Assessment:**
- Clarifying
- Moderating
- Reporting

**Supporting:**
- Sharing
- Coaching
- Mentoring

**Tasks:**
- Development
- Refinement
- Documentation
- Reflection

**Resources:**
- Sharing
- Virtual Classrooms

**Meetings:**
- Cross-disciplinary links
- Sharing
- Dialogue

**Professional Learning Communities**
Enabling school structures

- Timetable meetings in school day and count as load
- Limit teaching across different teams
- Timetable teaching teams together
- Professional learning in school day - early finishing on Tuesday
Platforms of Innovation at the ASMS

Key elements
ASMS Organic Structure, collegiality, learning, innovation, contributive leadership

Australian Science and Mathematics School
transforming science and mathematics education

Contributive Leadership

Distributive Leadership
- TLT Teaching and Learning Teams
- ARG Action Research Groups
- WG Working Groups
- LC Learning Cultures
- LF Learning Futures
- LSH Leadership Steering House
Features of an organisation that support innovation

• Staff from a variety of disciplines working together
• Mechanisms for introducing new ideas
• Involving staff in programs from other agencies
• Internal mechanisms to distribute ideas and proposals (formal and informal)
• “shedding of responsibility” ie they are everyone's responsibility
• Most communication about ideas is advice and information not instructions & decisions

Aitken and Hage (1969)
Serious play

The ASMS innovation space.
Give the technology to the students and stand back. Let them play, experiment, fail and try again.
Support students who come up with ideas.
Suspend teaching as telling, ask questions instead.

www.inovspace.org
Your turn – WWW EBI

• Think about your own situation.

• What is working well to support deep learning in STEM?

• What would make it even better?
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