

# OUT-OF-FIELD MATHEMATICS TEACHERS: AN INTERNATIONAL PROBLEM THAT NEEDS A SOLUTION

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# OUT-OF-FIELD TEACHERS

- Out-of-field teachers are defined as ‘teachers assigned by school administrators to teach subjects which do not match their training or education’ (Ingersoll, 2002; Ní Ríordáin and Hannigan, 2011).

- Teacher capability has a direct impact on student achievement (Darling-Hammond, 2000; Higgins and Boone, 2011).
- Teacher practice in the classroom is affected by the content knowledge and pedagogical skills of the teacher, with the quality and the level of their qualification deemed paramount (Ingvarson et al, 2004).

# PROFESSIONAL DEVELOPMENT

- The focus on teachers' professional development should be on teachers' learning, learning how to learn, and transforming knowledge into practice for student growth (Avalos, 2011).

# THE IRISH SITUATION

The Teaching Council was established to regulate the standards of teaching in Ireland. They stipulate that teachers should meet the following requirements in order to teach mathematics at second-level in Ireland:

- Have studied Mathematics as a major subject in the degree extending over at least three years and of the order of 30% at a minimum of that period.
- Provide details of the degree course content to show that the breadth and depth of the syllabi undertaken are such as to ensure competence to teach Mathematics to the highest level in post-primary education.
- Provide explicit evidence of standards achieved in degree studies in Mathematics with at least an overall Pass result in the examinations in Mathematics (Teaching Council 2009; Ní Ríordáin and Hannigan, 2011).

# THE IRISH SITUATION

- In a PISA study in 2003, it was found that 28% of the 856 Irish mathematics teachers questioned had degrees which did not include mathematics as a major component (Cosgrove et al, 2004).

# THE IRISH SITUATION

Ní Ríordáin and Hannigan (2009) conducted a study with 324 post-primary mathematics teachers and found the following:

- 48% of the teachers did not have a mathematics teaching qualification.
- Of the 156 (48%) of teachers without a mathematics teaching qualification, 35% had a BSc. primary degree (without a significant mathematics component), 34% had a B. Commerce /Business primary degree (without a significant mathematics component) and 27% had a concurrent teacher education degree without mathematics (e.g. science teachers graduating from the University of Limerick).
- Of the 168 teachers with a mathematics teaching qualification, 73% had a BA/BSc. with maths primary degree, 14% had a concurrent teacher education degree with maths and 11% had a BSc. primary degree with a significant amount of mathematics studied throughout the degree.
- Older teachers tended to be more likely to have a teaching qualification in mathematics. Only 40% of the teachers aged 35 or under had a teaching qualification in mathematics compared to 65% of the teachers aged over 35.

# THE SOUTH AUSTRALIAN SITUATION

- At present each Australian state has a department responsible for education. There is no central curriculum but the Australian Curriculum seeks to rectify this.
- DECD (Department for Education and Child Development) regulates education in South Australia.
- To be registered as a mathematics teacher you must have studied 6 semesters of a mathematics subject at university to teach mathematics to year 10 (the equivalent of 3<sup>rd</sup> year) or 8 semesters of mathematics to teach to year 12 (Leaving Cert).
- In reality this is not implemented. No record in Australia of the numbers of out-of-field mathematics teachers.



# THE SOUTH AUSTRALIAN SITUATION

A study carried out by the Australian Council of Deans of Science (2006) raised the following concerns:

- 40% of mathematics teachers did not feel suitably qualified to be teaching mathematics.
- 8% of mathematics teachers had studied no mathematics at university.
- 20% had not studied mathematics beyond first year.
- Teachers under 30 years of age were less likely than their older colleagues to have a major in mathematics or to have studied mathematics teaching methods.

# AN ATTEMPT TO SOLVE THE PROBLEM.....

Teach SA is a South Australian Government initiative to recruit and upskill the DECD maths and science teaching workforce.

It has three strands:

- Recruit: to recruit 40 new senior maths, physics or chemistry teachers to DECD.
- Reskill: to upskill 100 DECD middle years (years 6-9, equivalent to 5<sup>th</sup> class-2<sup>nd</sup> year) maths and/or science teachers.
- Retrain: to upskill 15 DECD senior secondary teachers who are currently teaching senior maths, physics or chemistry without qualification.


The initiative will run from 2011 to 2014.

# TEACH SA - RESKILL

- Participants will undertake a program comprising two courses over a semester to upskill them as middle school maths and science teachers.
- All participants will complete one course covering middle school maths and science pedagogy. They will then choose a second course to specialise in either middle school maths or science education content based on the Australian curriculum and best practice teaching.
- Each course will have between 30 and 40 contact hours and will have significant in-school and out- of-hours follow up, estimated to be about 100 hours.
- The course consists of three intensive university courses of 3 days each over consecutive school holidays (9 days total) plus release time of 1 day a week for two terms and a 'teacher coach' for 8 days support during teaching time.
- Each participant receives \$5,000 towards equipment/resources to improve maths teaching and learning in their school.

# THE PARTICIPANTS

## Cohort 1

- 10 participants: 8 maths, 2 science.
  - Average age was 42 years, 2 of the participants were in their 20s and 2 in their 60s.
  - 8 women, 2 men.
  - Qualifications included the following: 1 overseas engineering qualification, 2 primary school teachers, 2 geography degrees, 1 music degree, 2 English degrees, a joint Agricultural science and sociology degree and a qualification in languages (Chinese and English as a foreign language).
  - The content knowledge was low, general pedagogical skills were high.
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# THE PARTICIPANTS

## Cohort 2

- 27 participants: 25 maths, 2 science.
- Again, a mixture of non-maths/science degrees.
- 24 women, 3 men.
- Very weak content knowledge again.
- Some pedagogical 'experts'.

# THE COURSE

- 3 days of general maths and science lectures/workshops. The focus is on pedagogy and curriculum requirements.
- 6 days of intensive maths lectures/workshops. The focus is on pedagogical content knowledge.

Cohort 1	Cohort 2
October 2011	January 2012
January 2012	April 2012
April 2012	July 2012

# THE FINDINGS

- 5 surveys were generated for participants, coaches and Principals involved with the Teach SA 2011 program. The data was collected in February 2012 when cohort 1 have 2 intensive courses completed, and cohort 2 have 1 course attended.
- 28 out of the 33 cohort 1 and 2 mathematics participants responded to the survey.
- Participants identified confidence in teaching mathematics as being an issue: 23.5% identified as being 'very confident', 35.3% as 'confident', 29.4% as 'average' and 11.4% as 'unconfident'.
- When asked about the impact their training will have in other teachers in their school they responded with the following: 37.9% felt it would have considerable impact, 55.2% expected some impact while 6.9% felt their would be minimal impact.
- 96.4% (27 participants) felt that their content knowledge had increased significantly as a result of attending the course.

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