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Symposium Topic: Teacher Professional Learning in Mathematics
Paper Topic: Workforce Planning for Career Stage Professional Development

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Abstract
The educational, political and economic agendas are inextricably interconnected, a current political focus being the provision of policies, resources and programs to support teacher quality and professional development for the ultimate benefit of students and the knowledge society. Current research indicates that effective professional development involves situated learning in collegial teams, with new ideas being introduced and follow-up support occurring within these groups. Teachers engage in joint enterprise and relevant practical activities over an extended timeframe, with coaching and mentoring to meet individual needs and to support the learning of others in the team also occurring. Career stages and recognition of differentiated learning needs including intensive support for beginning teachers through mentoring and effective induction programs need consideration. Focused professional development linked to career stages requires a comprehensive and strategic approach to workforce data collection and planning.

This paper examines current Australian workforce data and planning within the context of an ageing teacher population and high beginning teacher attrition, with supply shortages already evident in particular locations and secondary subject areas including science and mathematics. The current workforce demographic profile provides evidence of historical recruitment phases and highlights the importance of systems planning involving accommodation of career stages when addressing the professional learning needs of teachers.

Education is increasingly aligned to political and economic agendas, with the education system undergoing massive reform to cater for the continuously changing demands of the knowledge-based society. Teacher workforce planning based on comprehensive data is essential in informing policy development regarding attraction, development, recruitment and retention of teachers (OECD, 2005; MCEETYA, 2004). Effective professional development is essential to ensure teacher quality and a positive impact on student learning.

Traditional models of professional development have been based on attendance of individual teachers at conferences involving standardised pre-packaged input with little consideration for various career stages and school situations. Teachers have indicated little confidence in transferring new knowledge into their classrooms (Bredeson & Scribner, 2000), with on-the-job practice being considered to be an essential aspect in implementing new ideas: 'It is clear from the research that teachers believe that their most effective and useful learning occurs through on-the-job experience and reflection. They do not deny the need for outsiders to provide new knowledge and ideas but they are insistent that such new information is useful to them only when it has been tried in the classroom' (Retallick, 1997: 36). Joyce and Showers (1988) also highlight other professional learning approaches, with presentations resulting in only 10% impact on classroom practice but on-the-job coaching actively supporting educational change in about 85% of situations.

Coaching, mentoring, and teams provide examples of professional development occurring over a sustained period of time, with learning happening within the working day and through professional associations, study groups and other networks. Collegiality and a common focus and relevant practical activities occurring over an extended timeframe are key aspects (Owen, 2005). While collegial teams and links to wider change agendas are important, personal and career needs of individuals also warrant consideration.

A career continuum is recognised as a successful strategy in updating skills, with experienced teachers and leaders having different needs to those who are newly - employed (Bell & Day, 1991; Friedman, 1999). Huberman's (1989) teacher career continuum research indicates that while individual teacher experiences vary, generalised phases can be identified, with various career stages related to differing professional development needs (Huberman, 1992). Beginning teachers in their first, second and third years are often involved in a process of survival and discovery especially in relation to discipline problems. Guidance and support are needed including a systematic induction program, mentoring, classroom observation, basic instructional training and supervision (Danielson & McGreal, 2000). The second stage of stabilization occurs after about four to six years of teaching, and there may be some critical incidents that eventually develop a commitment to staying in the teaching profession. Success and confidence in classroom methodologies are frequently experienced during this period, with collegial professional development teams providing support. The third stage at 7 - 18 years can be a time of energy and experimentation, with opportunities for new responsibilities and promotion and mentoring, coaching and collegial teams supporting professional learning. However for some teachers this may also be a time of reassessment and self-doubts and questioning the career decision. This may be followed by a period of seeking balance between work and family, and eventually disengagement as retirement approaches (Huberman, 1992). While Huberman's research-based description of career stages reflects generalisations and may oversimplify the diverse experiences of individual teachers, the recognition of teaching experiences changing over time and the need for teachers to maintain enthusiasm through restructuring their work and ongoing teacher learning, is emphasised (Smylie, 1999).

While there are contradictory perspectives regarding individual career stage and social context professional development approaches (Hargreaves & Fullan, 1992; Leithwood, Begley & Cousins, 1994), Dall'Alba and Sandberg (2006) highlight concerns about models based on stages of skill development. Instead they emphasise the importance of linking new ideas and skills to overall existing understandings and learning in practice. However, Carney (2002) provides support for the notion of a holistic collaborative context for professional development which includes psychological, career and professional skills of individual teachers and their career stage needs. In addition to the traditional one day conferences, school-based teams, coaching, mentoring and action research professional development models are highlighted and linked to principles of collaboration, joint enterprise, relevant practical activities and using an extended timeframe.

At this current time, there is concern that there is insufficient focus on beginning teacher induction programs (DEST, 2002). Furthermore, there is little evidence of effective professional development which really impacts on classroom practice beyond conservative tinkering and which also challenges beliefs (Thompson & Zeuli, 1999).

Workforce profile data to plan effective professional learning programs which accommodate various career stages is needed, with some significant workforce planning reports being available and warranting consideration.

Workforce Planning Context Overview

Key reports in relation to teacher workforce planning on a global level are the Organisation for Economic Cooperation and Development reports: *Teacher Demand and Supply: Improving Teacher Quality and Addressing Teacher Shortages* (2002) and *Teachers Matter: Attracting, Developing and Retaining Effective Teachers* (2005). The 2005 report outlines key aspects of policies of 25 countries in regards to general and specifically targeted teacher issues. These policies relate to teacher attraction, professional development, recruitment, retention and implementation of policy, with ongoing professional learning being a significant strategy. The 2002 report outlines a conceptual framework for managing teacher demand and supply focused on the workforce including teacher profile data, teacher quality and shortage. Current global concerns regarding teacher shortage highlight the skewed mature age workforce profile, the lack of attraction to the profession and teachers working unlicensed and outside of their area of expertise. The report indicates that the challenge for policy makers is to attract talented and enthusiastic people and retain quality teachers while also reducing attrition in the early years in the profession. Incentives, higher admission standards for teacher education programs, professional development, multiple career paths and competitive pay rates are emphasised. However, there is little concrete information regarding the nature and severity of the shortage. Some data exists in relation to the demographic profile and demand aspects related to student enrolment and instruction time but there are gaps in the data. The gaps relate to issues of attrition and retention, reasons for entry and leaving, the potential supply of graduates and returnees, as well as out-of-field assignments and methods used to cover shortages.

Similar to the OECD report regarding a range of countries, there are various Australian reports (DEST, 2003; Preston, 2000; MCEETYA, 2001; MCEETYA, 2003; MCEETYA, 2004) relating to teacher supply and demand. The MCEETYA reports (2001, 2003, 2004) indicate:

- Australia-wide availability of sufficient teachers to meet demand until 2005;
- Recruitment difficulties for secondary subject specialist areas including mathematics, science, information and communications technology (ICT) and languages other than English (LOTE), with location problems especially in rural and remote areas;
- Age concentration of the current workforce above 50 years and highlighting widespread impending retirement and significant teacher shortages especially for secondary maths and science subjects;
- Few teachers currently aged 35-45 but with significantly increased employment of beginning teachers occurring within the next decade;
- An ageing profile in other professions and similar retirement patterns, with the education sector needing to compete to attract quality newcomers and to improve retention of beginning teachers; and
- Innovative programs to increase the retention of experienced teachers in specialist subject areas such as mathematics needing consideration.

Preston (2001) highlights the 'hidden' coping strategies used by schools to cater for specialist subject teacher shortages including teachers and leaders taking extra classes or additional responsibilities, post-compulsory student lesson cancellations and employment of unqualified teachers, with lower teaching standards resultant. Similarly, the Australian Secondary Principals Association (2003) beginning teacher survey highlights 43% of newcomers teaching outside of their subject expertise area particularly in mathematics, with many new teachers considering alternative occupations due to low pay, poor conditions and support. This is consistent with Australian Education Union (2006) survey results.

Regarding shortages of mathematics teachers, the *Australia's Teachers: Australia's Future and Advancing Innovation, Science, Technology and Mathematics* (DEST, 2003) report also raises issues regarding future supply and the need for targeted policy initiatives, financial incentives to attract and retain teachers and ensuring teacher quality and diversity. The importance of comprehensive statistics being reliably and regularly collected on a national and collaborative basis in relation to teacher workforce trends and teacher education is emphasised. A career-based professional learning continuum is highlighted from initial teacher education (especially within practicum and field-based experiences) and through beginning teacher induction programs. This career support needs to be ongoing as teachers move into different areas of specialisation and as mathematics and science developments occur: 'The message for teacher professional learning is that it be current and vital and that it connect with both teachers' present responsibilities and their evolving career paths' (DEST, 2003: 6).

In planning for career-based professional development, the available information regarding the Australian teacher workforce profile warrants closer examination.

Workforce Data and Australian Teacher Profiles

Examination of Australian Bureau of Statistics teacher workforce data indicates that in 2005, there was 235,794 full-time equivalent teaching staff employed in 9623 schools. About two-thirds were employed in the government sector, with general increases in staffing in government and non-government schools of 16.5% occurring during the decade from 1995 (ABS, 2005: 4).

The Ministerial Council on Education, Education, Training and Youth Affairs (MCEETYA) has surveyed and published biannual reports about teacher supply and demand in recent years. Table A provides a breakdown of employment of Australian teachers by State/Territory, sector and category of school (MCEETYA, 2004: 9):

Table A: Teacher employment by state, sector and school category

Employment of Teachers (FTE) by State/Territory, sector and category of school, 2003

State/Territory	Primary		Secondary		Totals	
	Govt	Non-Govt	Govt	Non-Govt	Govt	Non-Govt
NSW	25,771	10,380	24,334	14,731	50,105	25,111
VIC	19,509	8,427	18,155	12,118	37,664	20,545
QLD	18,412	5,711	12,307	7,082	30,719	12,793
SA	6,936	2,722	4,702	2,734	11,638	5,456
WA	8,940	3,193	6,638	3,927	15,578	7,120
TAS	2,255	601	1,985	884	4,240	1,485
NT	1,452	279	752	339	2,203	617
ACT	1,349	633	1,377	945	2,725	1,577
Australia	***84,623***	***31,945***	***70,249***	***42,759***	***154,872***	***74,704***

Source: Schools Australia, Cat No 4221.0 ABS, 2003

This 2003 data indicates that there were 84, 623 government primary school employees (representing 73% of total primary school teachers) and 31, 945 non-government primary school teachers, with 70, 249 government secondary teachers representing about 62% of all high school teachers. Other data indicates that approximately 84% of teachers are born in Australia, with 92% holding permanent positions and 85% working full-time (Skilbeck & Connell, 2003: 12). A skewed gender and age workforce profile is evident.

Gender and Age Profiles

Teaching has traditionally been perceived as an extension of the traditional role of women as nurturers, with females predominant in the profession. Table B provides data from various states and levels of schooling indicating 67.4% of all full-time equivalent teachers being female in 2003, with females representing 79.1% of all primary teachers and 55.3% of secondary teachers (MCEETYA, 2004: 10).

Table B: Gender of teachers by state/territory

Gender characteristics of the government and non-government teaching workforce, 2003

State/Territory	% Female		
	Primary	Secondary	Total
NSW	79.8	55.2	67.0
VIC	79.9	56.8	67.9
QLD	77.9	56.0	68.2
SA	76.2	49.4	64.6
WA	78.7	52.7	66.6
TAS	79.0	54.4	66.7
NT	82.6	59.6	73.7
ACT	83.5	60.5	71.1
Australia	*79.1*	*55.3*	*67.4*

Source: *Schools Australia, (Cat No 4221.0), ABS, 2003*

Skilbeck and Connell (2003) also note the increasing feminisation of the workforce with 80% of the under 30 workforce profile being female. There has also been a 10% reduction in male enrolments in pre-service teacher education courses in 1983-2000. Explanations for the increased feminisation in terms of lower salaries, cultural factors of perception and child abuse concerns have been cited (MCEETYA, 2001). Therefore females are increasingly being employed across all levels of schooling, with the traditional male dominance of secondary teaching being replaced by more equal numbers of males and females in that level of schooling.

This becomes evident when overlaying the gender profile with the age profile of the Australian teacher workforce as indicated in Table C (Skilbeck & Connell, 2003: 17):

Table C: Teachers employed by age and gender

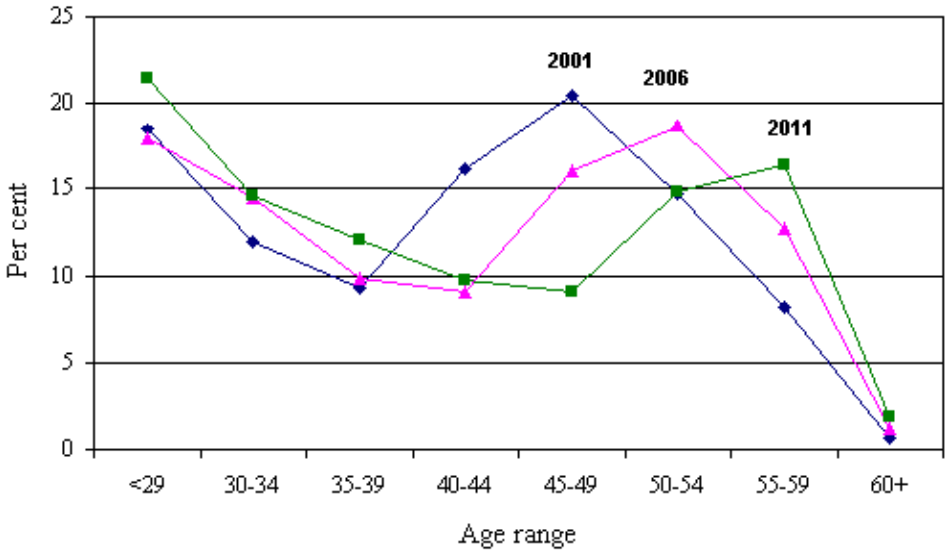
Proportion of teachers employed by age and gender, 2001

	Males %	Female%	Age %
Under 25	4.0%	6.8%	6.0%
25-34	20.3%	23.7%	22.7%
35-44	27.2%	28.9%	28.5%
45-54	36.8%	32.0%	33.3%
55 & Over	11.6%	8.6%	9.4%
	100%	**100%**	**100%**

Source: *MCEETYA, 2004*

Table C indicates relatively similar age profiles for males and females in each age group, with about 71% of the total workforce aged over 35 years and about 43% aged over 45 years. Only about 29% of all Australian teachers are aged below 35 years. This 2001 Australian Bureau of Statistics data indicates nearly half of all male teachers currently clustered in the age bracket above 45 years.

Figure 1 which is based on 1990s data provides additional information and highlights the historical basis for the Australian demographic teacher workforce profile based on Preston's (2001) projections to 2011. This age profile reflects the 1970s baby boomer high employment era for teachers, with the initial youthful age group being aged 45-49 by 2001. In 2006 this group is aged 50-54, with these teachers expected to retire in increasing numbers and become slightly less dominant within the overall age profile by 2011, with the under 29 age group increasingly gaining employment. Figure 1 also reflects low teacher employment in the 1980s and 1990s, with a trough for the 35-39 year olds being evident in 2001 which continues at five year intervals for 2006 (40-44 year olds) and 2011 (45-49 year olds).



Source: *Preston, 2001*

Figure 1: All Australian teachers, projected percentages in each five year age range, 2001, 2006, and 2011

Table D below outlines teacher survey results (cited by MCEETYA, 2003) which provides further data regarding age on a state-by-state basis, with the average age of all Australian teachers being 43.1 and the median age being 45.0.

Table D: Age characteristics by state/territory

Age characteristics of the government and non-government teaching workforce, 2002

State/Territory	Average age of all teachers (years)	Median age of all teachers (years)	Modal age of all teachers (years)
NSW	43.2	45.0	47.0
VIC	43.2	45.0	46.0
QLD	40.6	42.0	45.0
SA	48.2	50.0	49.0
WA	41.8	43.0	44.0
TAS	47.0	47.5	53.0
NT	41.5*	45.0*	37.0*
ACT	46.4	52.5	54.0
Australia	*43.1*	*45.0*	*49.0*

Source: *National survey of teachers, DEST 2002*

* sample for Northern Territory included 13 teachers only

Table D also indicates that some states have even higher average and median ages such as South Australia with 48.2 as the average age and a median age of 50; Australian Capital Territory with 46.4 for the average and 52.5 median age; and Tasmania 47.0 average and 47.5 median.

In particular, Government secondary schools Australia-wide reflect a significant predominance of the over 45 age group, as presented in Figure 2 using 2003 data (MCEETYA, 2004: 14):

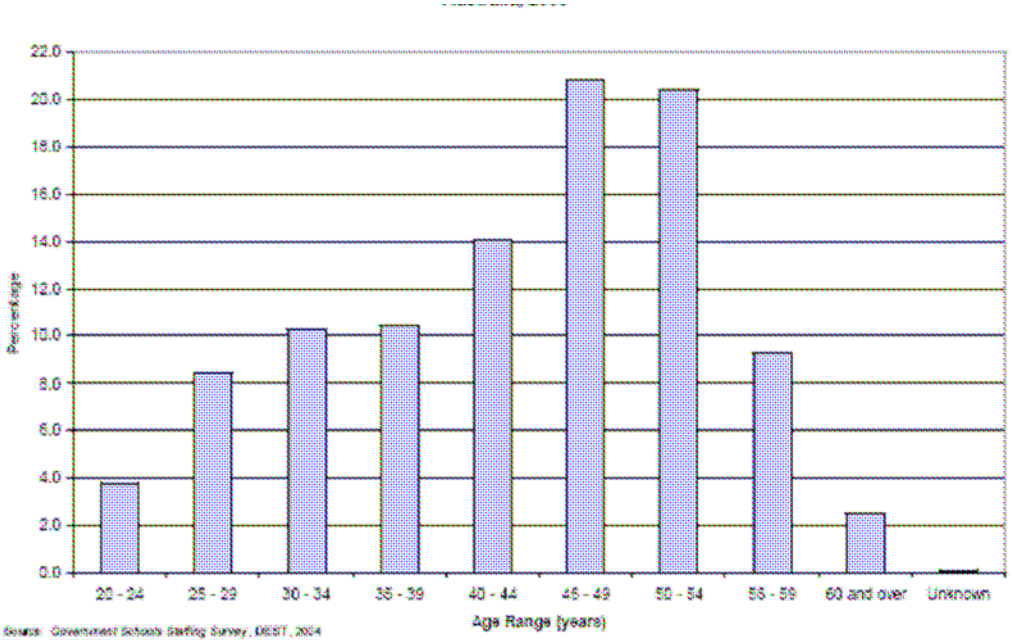


Figure 2: Australian government secondary teacher age profile

Table E below provides further detail about the aged profile of the government secondary teachers in the Australian workforce on a state and territory basis (MCEETYA, 2004: 13), with some states having a particularly mature-aged secondary teacher workforce. Over 53% are aged above 45 (including about 32% aged over 50), with 65% of South Australian secondary teachers above 45 years of age. It should be noted that for the non-government sector, while the over 45 age group is still predominant and represents about 40% of teachers, the secondary teacher age profile is generally more evenly spread across age groups (MCEETYA, 2004: 15).

Table E: Government schools secondary teacher age profile by state/territory

Proportion of Government Secondary School Teachers by Age Group, State/Territory, 2003

Age Range (years)	NSW	VIC	QLD	SA	WA	NT	TAS	ACT	AUST
20 - 24	2.0	4.2	7.5	1.5	3.1	1.7	3.8	4.4	3.8
25 - 29	7.5	8.8	10.5	5.9	8.2	9.7	7.7	8.7	8.4
30 - 34	11.8	7.5	12.4	8.3	11.2	16.5	9.2	8.9	10.2
35 - 39	10.1	9.8	13.2	7.9	11.6	13.1	8.0	9.6	10.5
40 - 44	12.6	15.4	14.4	13.1	14.6	12.3	17.2	12.5	14.0
45 - 49	22.9	21.7	16.8	22.3	19.2	16.1	22.5	18.1	20.8
50 - 54	21.9	21.7	15.7	26.3	16.8	18.6	19.5	23.0	20.4
55 - 59	9.8	8.3	7.0	13.8	11.4	8.5	8.9	10.8	9.3
60 and over	1.5	2.4	2.6	3.2	5.0	4.4	2.8	3.9	2.6
Unknown	0.0	0.4	0.0	0.0	0.0	0.0	0.4	0.0	0.1

Source: *Government Schools Staffing Survey*, DEST, 2004

Given the generally mature-aged workforce profile of Australian teachers and the particular superannuation benefits available to the baby boomer generation who can retire from the age of 55, it is expected that a significant number of teachers in this age group will leave the workforce in the next five to ten years (Skilbeck & Connell, 2003).

The situation is further highlighted because many Australian teachers from across all age groups are considering career change and the workforce separation profile generally is of interest.

Workforce Separation Profile

Survey data indicates the retirement profile by age and gender, with indications of many younger people leaving the profession within the first five to eight years of appointment to schools. From 1996-2001 the degree of loss rose from 2.9% to 3.4% in primary schools and from 4.0% to 4.8% loss in secondary schools, with progressively higher losses expected in the next decade (MCEETYA, 2003).

Based on data from the 1990s, Table F examines projected separation rates for those with primary and secondary teaching qualifications by age group (Preston, 2001: 50):

Table F: Primary and secondary teacher projected separation rates by age

Average annual net separation rates – primary teachers								
< 30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65 +
6.32%	3.55%	-1.25%	0.04%	2.13%	2.63%	17.0%	19.0%	80.0%
Average annual net separation rates – secondary teachers								
< 30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65 +
5.57%	3.07%	-0.02%	-0.39%	1.18%	2.25%	17.0%	19.0%	80.0%

Source: *Preston, 2001*

This table indicates that there are significant separations from the mature-aged retirees (17% for primary and secondary aged 55-59; 19% for primary and secondary teachers aged 60-64), but with other groups also leaving the profession. However, among the secondary teacher workforce, some subject areas have particular issues, with surveys indicating high rates of retirement of English and Mathematics teachers (ASPA, 2006). There are also significant projected separations from the under 30 and 30-34 age groups (6.32% primary and 5.57% secondary for under 30s and 3.55% primary and 3.07% for secondary teachers aged 30-34; Skilbeck & Connell, 2003). Similarly, in a recent survey of beginning teachers, 45.6% did not see themselves teaching in ten year's time (AEU, 2006). Given the high youthful beginning teacher attrition, a key policy direction is to attract people into the profession from a wider range of age groups and backgrounds, including promotional programs currently underway in many states to attract mature-aged recruits (Skilbeck & Connell, 2003).

The anticipated high separation rate is exacerbated by insufficient university graduate numbers from pre-service teacher education courses. This is expected to result in significant shortages in the supply of beginning teachers in particular subjects and locations in the near future. Secondary teachers have been of most concern in terms of supply in relation to demand especially in Victoria, South Australia and Tasmania (Preston, 2001). Insufficient university graduates in high demand subjects are also noted, with various sources predicting approximately 300 Australian mathematics graduates completing Graduate Diplomas annually, with around 60% actual entry of graduates into the teacher workforce (Lawrance & Palmer, 2003: MCEETYA, 2003; Ballantyne, Bain & Preston, 2003).

Given the projected separation figures and graduate shortfalls, government and non-government employers are developing recruitment policies to manage the significant teacher shortage situation in the next five to ten years, including targeted programs for some areas.

Teaching area shortages

Table G shows projected shortages in particular areas of primary school specialisations such as Languages Other than English (LOTE), special education and visual and performing arts, with the degree of shortage varying from state to state (MCEETYA, 2003: 19). Special education and LOTE have some degree of shortage in most states. The non-government primary school sector has even more significant shortages than the government sector (MCEETYA, 2003).

Table G: Government primary school recruitment concerns by state/territory

Overall assessment of the government primary school teacher labour market, 2001

Teaching Area	NSW	VIC	QLD	SA	WA	NT	TAS	ACT
General	None	Minor	None	Minor	Minor	Moderate	Minor	None
LOTE	None	Minor	Minor	Moderate	Moderate	Minor	Minor	Moderate
Special Education	Moderate	Minor	Moderate	Moderate	Minor	Moderate	None	Minor
Visual, Performing Arts	--	Minor	None	Minor	None	Minor	Minor	None
Other	Minor	Minor	--	Moderate	None	Moderate	Minor	Minor

Source: *School Staffing Survey, Government Primary Education, DEST 2002*

However the most significant teacher shortage issues exist for government secondary schools. Table H shows shortage concerns in specific subject areas (MCEETYA, 2004: 30). Mathematics, science, technology, special education, English, health and personal development and LOTE are some of the areas rated as moderate to considerable difficulty in terms of recruitment in three or more States/Territories for each of these subject areas:

Table H: Government secondary subject recruitment concerns by state/territory

Recruitment Issues for 2003 year

Key Learning Area	NSW	VIC	QLD	SA	WA	NT	TAS	ACT	Australia
									Counts of Difficult/Moderate
Health, Physical Education	None	Moderate	Minor	Moderate	None	Moderate	Minor	Minor	3
LOTE[1]	None	Moderate	Difficult	Moderate	Moderate	None	Minor	Moderate	5
Mathematics	Difficult	Minor	Difficult	Difficult	Minor	Difficult	Minor	Minor	4
English	Moderate	None	Moderate	Moderate	None	Minor	Minor	Minor	3
Science	Difficult[4]	None	Difficult	Difficult	None	Difficult	Minor	Minor	4
SOSE[2]	None	None	Minor	Minor	None	None	Minor	None	0
Visual, Performing Arts	None	None	Minor	Moderate	None	None	Minor	None	1
Technology	Moderate	Moderate	Difficult	Difficult	Minor	Moderate	Minor	Minor	5
VET[3]	Minor	None	Minor	Moderate	None	Minor	Minor	Minor	1
Special Education	Moderate	Minor	Moderate	Difficult	None	Moderate	Minor	Minor	4
Other		None						None	0
Counts of Difficult/Moderate	5	3	6	9	1	5	0	1	30

Source: *School Staffing Questionnaire, Government Secondary Education, DEST 2004*

Description of Ratings

Difficult	Broad recruitment deficit (chronic shortfalls)
Moderate	Unable to satisfactorily meet demand in some locations (some shortfalls)
Minor	Just able to satisfy the demand for teachers (significant shortfalls avoided)
None	Abundant teacher supplies (easily able to satisfy demand)

Notes:

1 Languages Other than English
2 Studies of Society and the Environment
3 Vocational Education and Training
4 NSW difficulties relate to specific recruitment of physics teachers.

Some states such as South Australia (for mathematics and science) and New South Wales (for mathematics) are experiencing difficulties in recruiting these specialist teachers across the full range of locations including metropolitan, rural, remote, short--term and extended relief as shown in Table I (MCEETYA, 2004: 31):.

Table I: Mathematics and science secondary teacher shortages by state and situation

Key Learning Area: Mathematics

State	Subject	Level	Nature of Difficulty				
			Metropolitan	Rural /Regional	Remote	Short Term Relief	Extended Relief
NSW		Difficult	•	•	•	•	•
QLD	Senior Subjects (A,B,C)	Difficult		•		•	
SA	All	Difficult	•	•	•	•	•
NT		Difficult			•		

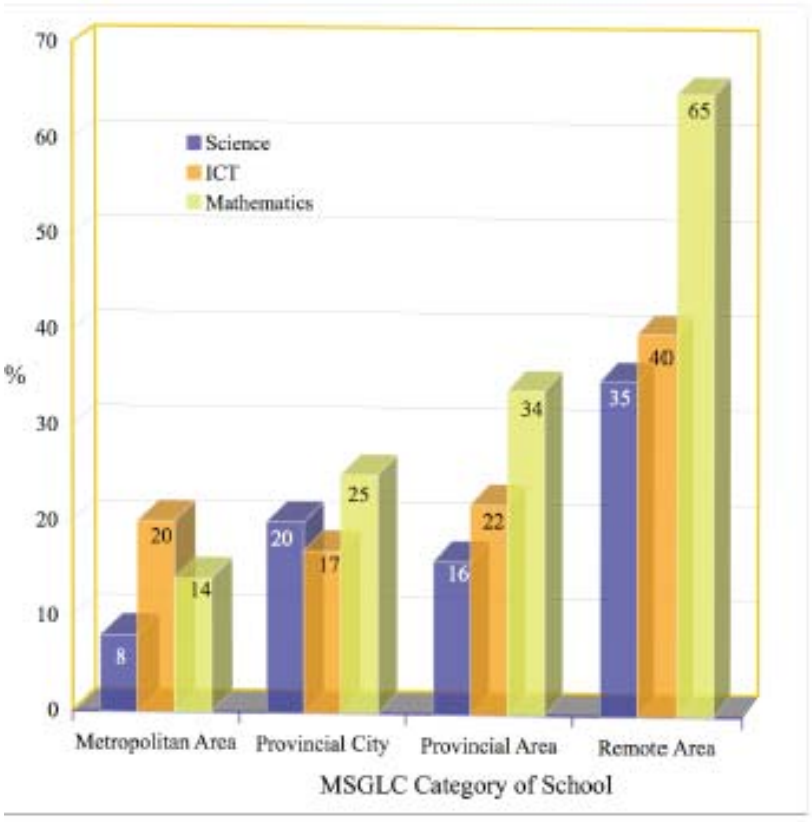
Key Learning Area: Science

State	Subject	Level	Nature of Difficulty				
			Metropolitan	Rural /Regional	Remote	Short Term Relief	Extended Relief
NSW	Physics	Difficult			•	•	•
QLD	Senior Subjects (Physics & Chemistry)	Difficult		•	•		
SA	All	Difficult	•	•	•	•	•
NT		Difficult			•		

Source: *MCEETYA, 2004*

Non-government secondary schools have similar shortage problems to government schools in the areas of LOTE (29.4%), mathematics (38.9%), science (34.7%) and technology (43.6%) (MCEETYA, 2004:30).

Further details of secondary school teacher shortages in government and non-government schools are shown in Figure 3, with reports of difficulties in staffing remote area locations cited by respondents in relation to science (35%), ICT (40%) and mathematics (65%) (SiMERR, 2006: 51):



Source: *SiMERR, 2006*

Figure 3: Hard to fill positions in various subjects and locations

Related to this data regarding specific subject shortages, the Australian Secondary Principals (ASPA) (2003) survey of 540 beginning teachers indicates many teachers working outside of their areas of expertise. Forty-three percent of beginning teacher respondents were teaching in subjects for which they lacked expertise, with mathematics being cited by 29% of respondents (ASPA, 2003a). Principals reported utilising various short term coping strategies including using qualified relief teachers, teachers from other subjects, supporting teachers to gain additional qualifications, shortening courses, amalgamating classes or course cancellations.

Table J outlines some strategies to manage teacher shortage in the non-government secondary school situation on a state-by-state basis (MCEETYA, 2003: 28):

Table J: Non-government secondary school strategies to manage teacher shortage

Non-government secondary schools coping with recruitment shortfall or difficulties

Means of coping	NSW	VIC	QLD	SA	WA	NT	TAS	ACT	National
	%	%	%	%	%	%	%	%	%
Using a qualified relief teacher	36.1	41.2	32.4	38.5	20.8	No data available	33.3	46.2	35.6
Utilising teachers from other subject areas	39.3	39.7	41.2	30.8	41.7		50.0	30.8	39.5
Encouraging teachers to gain qualifications in other subject areas	18.0	16.2	13.2	30.8	20.8		16.7	15.4	17.0
Shortening courses	1.6	1.5	2.9	0.0	4.2		0.0	0.0	2.0
Enlarging classes	1.6	0.0	4.4	0.0	12.5		0.0	0.0	2.8
Cancelling classes	3.3	1.5	5.9	0.0	0.0		0.0	7.7	3.2

Source: *Non-government Schools Staffing Survey, DEST, 2002*

Table J shows that using teachers from other subject areas (39.5%) and using qualified relief teachers (35.6%) are the predominant strategies on a national basis. Another significant strategy used by South Australian non-government secondary schools is to encourage teachers to gain additional qualifications in other subject areas (30.8%), with this strategy dependent on availability of relevant courses from the tertiary sector.

Workforce profile data and career stage PD

Given the Australian workforce profile related to age, gender, workforce separations and areas of projected teacher shortage, considerations related to teacher professional development are essential. Research regarding effective professional development which really changes teacher practices and beliefs, highlights situated learning models involving joint enterprise and shared ideas, collaboration over an extended timeframe, relevant practical activities and a sense of identity and responsibility for the learning of other team members (Barab & Duffy, 2000; Wenger, 1998; Owen, 2005; Putnam & Borko, 2000). Key trends are workplace learning teams with colleagues on an ongoing basis, with coaching and mentoring to support the building of skills. New ideas from other contexts are introduced and considered, with any changes in

educational practice being supported within local situations and communities of practice (Owen, 2005a). Relevant collegial experiences over extended timelines within school-based teams, subject associations, leaders and districts networks are emphasised.

From a workforce planning perspective, within the general principles of effective professional development including communities of practice, individual professional learning and targeted professional development for various groups of teachers at different career stages is involved. Huberman's work (1988, 1992) regarding beginning teachers, experienced teachers and leaders as career stage groups and their professional learning needs has been outlined. Considering the Australian teacher workforce profile, some key issues relevant to career stage professional development throughout all phases of teacher careers are the focus.

For beginning teachers this means induction and mentoring to support the early phases of building an identity as a teacher, building classroom and behaviour management skills and developing confidence in communication with parents and, report writing, as well as skill-building in specific aspects of curriculum and pedagogy. In addition, with the impending retirement of the ageing teacher workforce, considerable numbers of newcomers will be employed in the next five to ten years and professional development to meet their needs is required. As beginning teachers frequently begin their professional lives in rural and remote locations where flexibility to teach in a wide range of areas is required and where significant out-of-field teaching is occurring, induction and specialist skill-building for beginning teachers including through mentoring, is especially important. Given the Australian workforce profile and current and projected secondary subject teacher shortages, mentoring involving a more experienced teacher supporting a less experienced person, provides a particularly relevant professional development strategy. Mentoring develops skills of new recruits through practical situations in extended timeframes, thereby supporting retention of beginning teachers including those teaching in specialist subject areas (Alberta Teachers' Association, 2001).

For experienced teachers, given the aged nature of the current workforce profile, planned and systematic professional development recognising the complexity of issues for the experienced teacher career phase is highlighted:

> *Teachers change schools, they move into different areas of specialisation, they may move in and out of the education profession…Upgrading disciplinary and pedagogical knowledge will be at the core of professional learning, especially in the sciences and technology where there are rapid changes in knowledge and techniques. It is a feature of all subject areas that research, scholarship and practical experience are constantly reshaping both the surface features of the domain and its structure and foundations. The message for teacher professional learning is that it be current and vital and that it connect with both teachers' present responsibilities and their evolving career profiles* (DEST, 2003: 5-6).

The DEST report which is focused on mathematics, science and technology teaching, recommends school-based programs which include catering for the needs of experienced teachers. System-wide strategic steering and targeted professional learning involving the provision of adequate resourcing is also required. This includes the appointment of science and mathematics education coordinators for clusters of secondary schools and feeder primary schools, with coaching and greater cooperation occurring between the levels of schooling to support improvement in these areas of learning within primary schools. A key issue in relation to the mature-aged teacher workforce profile, particularly for specific subjects and secondary schooling, is the importance of teachers remaining up-to-date in their area of content specialization, including coaching each other over time to build skills (Alberta Teachers' Association,

2002). In addition, they need to be sensitive to children's cultural experiences and able to construct meaningful and relevant experiences to enthuse students about learning (DEST, 2003).

As there are currently considerable numbers of teachers aged over 45 years, it is very important to consider that with superannuation changes and employers focused increasingly on retention (MCEETYA, 2004), professional development is an effective way of re-igniting teacher enthusiasm (Smylie, 1999). A career pathway, teaching standards and advanced skills teacher processes are all part of the wider professional learning approaches involving collegiality and reflection which are effective in experienced teacher professional learning.

Conclusion

Ongoing professional learning and development for teachers is recognised on a global level and within Australia as a key strategy in improving teacher quality, with collegial learning focused on relevant activities over an extended timeline being most effective.

Specifically targeted programs for various career phases are also important, with workforce planning data being essential to develop systematic approaches. Beginning teachers, experienced teachers and identified subject and other specialist area programs are needed. Research highlights beginning teacher induction and mentoring and experienced teacher coaching, with new skills and understandings of teachers from various career stages being additionally supported in practical and collegial situations.

Workforce planning data on a local and global level can support the teacher quality agenda, with ongoing teacher professional learning and development on a holistic and targeted level being a key strategy, with linkages to recruitment, attraction and retention policy processes.

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