

Supply of specialist subject teachers in secondary schools

Report to Parliament 2 : 2013–14



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October 2013

The Honourable F Simpson MP
Speaker of the Legislative Assembly
Parliament House
BRISBANE QLD 4000

Dear Madam Speaker

Report to Parliament

This report is prepared under Part 3 Division 3 of the *Auditor-General Act 2009*, and is titled Supply of specialist subject teachers in secondary schools.

In accordance with s.67 of the Act, would you please arrange for the report to be tabled in the Legislative Assembly.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Andrew Greaves', with a long, sweeping flourish at the end.

Andrew Greaves
Auditor-General

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Summary

Employment in Science, Technology, Engineering and Mathematics (STEM) related industries has grown more than twice as fast as the general labour market in the last decade. However, industry groups report that the relative decline of STEM skills is causing frustration for employers. The Department of Education, Training and Employment (DETE) also has identified shortages of specialist subject teachers, including teachers of STEM subjects, in specific geographic locations. Concurrently, Queensland students' achievement on international tests has not improved and enrolments in senior mathematics and science subjects have declined.

All teachers train at university in general teaching skills, but secondary school teachers also specialise in specific subjects. Generally, Queensland secondary teachers train in two complementary subjects so they are able to teach more than one area; for example, English and history, or mathematics and chemistry.

This approach to tertiary education means teachers acquire the ability to impart knowledge and manage classrooms effectively as well as the specialist content knowledge and techniques needed for their chosen subjects.

The objective of this audit was to examine how effectively DETE attracts and places specialist subject teachers in secondary schools to maximise the academic outcomes of students. The audit looked at the issue of supply and demand across specialist subject areas in secondary schools generally, but focused on science and mathematics.

Conclusions

Overall, the supply of secondary school teachers matches demand. However, when considered by specialisation, there is a shortage of secondary mathematics, science and industrial design and technology teachers and an oversupply of primary school teachers and of secondary physical education and music, drama and dance teachers.

In practical terms, this means that not all schools are able to offer the full range of subjects they and their students would like and teachers are teaching subjects outside their areas of expertise. While this is more common in regional and remote schools, it also affects metropolitan schools.

The impact of the imbalance in the supply of specialist subject teachers is compounded by the way that teachers are allocated to schools, which is in turn producing unsustainable outcomes. It leads to too much reliance on a core of experienced and qualified teachers to provide informal mentoring and retraining of teachers who have to teach subjects outside their field of expertise.

Reliable data on teachers' qualifications and competencies are also missing, exacerbating the problem by hindering the department's ability to place the right teachers in the right schools and to plan for future demand. This is also an issue of equity, as it ultimately means that the department is unable to fully realise its strategic goal of providing universal access to high quality state education in all secondary schools.

If Queensland is to remain competitive and provide students with opportunities to participate in a broad based, strong economy, a new strategy for the delivery of STEM subjects in secondary schools is needed.

Key findings

Achievement and participation

The Trends in Mathematics and Science Study (TIMSS) is a project of the International Association for the Evaluation of Educational Achievement. It is directed by the TIMSS International Study Center at Boston College, and is administered in Australia by the Australian Council for Educational Research (ACER). The study investigated a nationally representative sample of Year 4 and Year 8 students in relation to their mathematics and science achievement.

In 2012, ACER reported the achievement of Australian Year 4 and Year 8 students in mathematics and science for 2011 compared to other countries. With an average mathematics score of 505, Australian students performed at a significantly lower level than students in six countries: Korea, Singapore, Chinese Taipei, Hong Kong, Japan and the Russian Federation. This is relatively better than in 2007, when the United States, England and Hungary also outperformed Australia—in 2011, their scores were not significantly different to that of Australia.

In Queensland, 41 per cent of all Year 8 students, at both state and independent schools, failed to achieve the intermediate standard of the international benchmark. At the intermediate standard, students can apply basic mathematical knowledge in a variety of situations. This ranks Queensland behind New South Wales and the Australian Capital Territory where, respectively, 34 per cent and 26 per cent of Year 8 students failed to reach the intermediate standard. The average performance of Australian Year 8 students has not changed since 1995.

Participation in senior mathematics and science subjects in Queensland has declined in the last ten years. This is also a trend nationally and internationally. In 2002, 6 214 Queensland secondary state school students completed mathematics B; in 2012, completions have declined by 11.3 per cent to 5 513 despite the overall number of Year 12 students in Queensland state secondary school increasing by 15 per cent over this period.

Data integrity and integration

The data on teacher capability and competence are fragmented across four systems and, as a result, cannot be integrated. The data held across these disparate systems are used to assess teachers' capabilities when they:

- apply for employment with DETE (TSS payroll system)
- apply for transfers (MyHR Recruit)
- nominate subjects for timetabling (OneSchool)
- register for casual or contract work (TRACER).

The lack of integrated data on teacher capabilities and competencies creates inefficiencies for regional human resource staff when helping principals to get the teachers with the qualifications and experience they need to offer the subjects students want to take. It also increases the risk of teachers being placed in schools without the capabilities and competencies requested.

The data on teacher qualifications in these systems are also unreliable and incomplete. The key data integrity issues we found were:

- there were no records of their qualifications for 233 of the 30 218 secondary teachers in the department's database
- seven per cent of the qualifications of secondary teachers were recorded in TSS without sighting evidence to confirm the qualification
- the qualifications for 19 per cent of secondary teachers, teaching senior biology, senior chemistry, mathematics B, junior mathematics and science in semester one 2013, did not show whether they had specialised in mathematics or science in their degrees
- of the teachers in the seven schools we visited, teacher qualifications were not entered for five per cent and were out of date for 23 per cent.

Unreliable data on teacher capability and competence reduce the value of the information for forecasting future secondary teacher demand as DETE cannot accurately profile its secondary teaching workforce. Without accurate and detailed assessments of teacher capability and competence, where they are placed and when they are likely to retire, DETE cannot develop appropriate and proportionate strategies to ensure the future supply will be able to meet demand.

Teaching out of field

Teaching out of field occurs when a qualified and / or experienced teacher is not available, requiring a teacher who has not formally demonstrated that he or she has the specific content knowledge and teaching techniques to teach the subject.

Teaching out of field is relatively common in Australia compared with Northern European and East Asian countries. In the 2011 cycle of TIMSS, 34 per cent of Year 8 Australian students who participated in the test had an out of field mathematics teacher, while internationally the average was 12 per cent.

While all teachers in Queensland must meet the requirements for teacher registration, each school's principal determines the subjects and year levels teachers at that school will teach. In 2010, 24 per cent of permanent secondary teachers reported they were teaching at least one subject out of field. At the secondary schools visited, 49 per cent of the teachers taking mathematics were teaching out of field.

The data indicate that teaching out of field is more common in junior secondary subjects. In 2010, 12.5 per cent of mathematics B teachers reported they were teaching out of field, while 36.5 per cent of junior mathematics teachers reported they were teaching out of field. The analysis of 2013 data from the department's school database OneSchool found that:

- at least 18 per cent of mathematics B teachers were teaching out of field (the data for 12 per cent were incomplete)
- at least 46 per cent of junior mathematics teachers were teaching out of field (the data for 16 per cent were incomplete).

When teachers teach a subject out of field, they need to learn the subject content and specific teaching techniques before they can teach it competently. They reported to us that they do this at night, on weekends and before school. Teachers get help from their colleagues to learn new content and subject specific teaching techniques. In the two metropolitan and provincial city schools we visited, teachers told us they were generally satisfied with the support they get from their colleagues to help them with planning, preparation, assessment and reporting. In the five regional, rural and remote schools visited, the teachers we interviewed were not as satisfied with the level of support received, as there were not as many other qualified or experienced teachers who could help them. This places a training burden on secondary schools to mentor and retrain the teachers in areas of need.

Curriculum offerings

The shortage of specialist teachers is affecting the department's ability to provide a quality education system for all Queensland students. Secondary schools are not always able to offer the full range of subjects to meet the needs and expectations of their students and communities. In our survey of secondary principals, 67 (39 per cent) reported that they could not offer some subjects because they could not get a qualified or experienced teacher; or that they had to restrict the number of students who could take some subjects. This was an issue at schools in metropolitan areas as well as regional and remote areas.

The percentage of schools with no students studying mathematics B has increased from two to five per cent in the last five years. If state secondary schools are not able to offer the full range of subjects, students have the option to study via distance education. The number of students studying mathematics B via distance education has increased in the same time from 20 to 50 students; however, half of the 50 students enrolled in 2012 did not complete the course. DETE is not monitoring the drop in participation in senior mathematics and science and has not developed a strategy to address it.

There is a range of factors that could be contributing to declining interest in senior science and mathematics subjects. Subject selection is primarily a matter of student discretion and enrolment data patterns in regards to this discretion are similar at the national level. Interest in senior mathematics and science subjects may also be affected by the introduction of an increasing range of subject and pathway offerings to senior students that should be considered in the comparison of enrolment rates over time.

Forecasts

In 2012, 3 032 primary and secondary teachers graduated in Queensland. The number of students training to be secondary teachers in Queensland has declined by 42 per cent since 2006.

DETE has identified shortages in the areas of secondary mathematics and science specialisations in broad geographic locations. In 2012, the number of Queensland graduates with specialisations in mathematics and science areas was lower than those in teaching areas where the demand is not as strong. For example:

- junior mathematics—58 graduates
- physics—22 graduates
- health and physical education—93 graduates
- music / dance / drama—200 graduates.

DETE forecasts supply and demand at a state level for all sectors of school education: primary, secondary and special schools. The forecasts consider supply from Queensland universities and demand arising from student enrolment growth, historical teacher separation rates and teacher qualifications from a survey of teachers conducted most recently in 2010. The forecasts anticipate statewide demand for teachers in specialist subject areas where shortages have been reported by regional staffing officers and schools.

Without detailed and current forecasts of teacher demand by subject, the department is unable to develop integrated workforce plans at the state, regional and school levels. Strategies to attract the right teachers to the right schools at the right time could be designed better if forecasts included a greater level of detail. Scholarship programs for new teachers and retraining for teachers wanting to develop their expertise in new subject areas could be targeted better if reliable forecasts identified where they will be needed.

DETE has identified the need to improve teacher supply. It offers scholarships to increase supply in broad locations and subject areas of identified demand and promotes teaching at career days through the *Make a difference. Teach* strategy. The scholarship programs have resulted in 196 successful completions.

DETE established The Teacher Education Centres of Excellence in 2010. The centres across the state focus on quality teaching behaviour management and a mentored induction into teaching. In 2012 and 2013, 174 graduates participated in the program.

On 22 July 2013, *A Fresh Start Strategy* was released. It includes eight initiatives on teacher supply, initial teacher education and effective mentoring and induction. The effect of the new strategy has not been included in the scope of this audit as it is too early to assess its effectiveness on teacher supply.

Recommendations

It is recommended that the Department of Education, Training and Employment:

- 1 improves the quality of the information on teacher subject capability and competence available to staffing officers and principals to improve the placement of teachers at schools and on school timetables by December 2014**
- 2 provides teachers who are teaching subjects out of their field of expertise with the support and professional development needed to develop the content knowledge and pedagogical skills relevant to the subject being taught by June 2014**
- 3 develops and implements a strategy to reduce the imbalance in the supply of specialist subject teachers with a view to improving participation and achievement in Science, Technology, Engineering and Mathematics (STEM) subjects by June 2014**
- 4 develops forecasts for supply and demand of specialist subject teachers that produce more accurate and comprehensive estimates of need at the state and regional levels and by subject, including junior secondary subjects by June 2014**
- 5 integrates and coordinates its approach to workforce plans and initiatives at central, regional and school levels by December 2014.**

Reference to agency comments (Appendix A)

In accordance with section 64 of the *Auditor-General Act 2009*, a copy of this report was provided to the Department of Education, Training and Employment with a request for comments.

Its views have been considered in reaching our audit conclusions and are represented to the extent relevant and warranted in preparing this report.

The full comments received are included in Appendix A of this report.

1 Context

1.1 Background

The *Department of Education, Training and Employment Strategic Plan 2012–16* objective for school education is that every young Queenslander will be prepared with the educational foundations for successful transitions to further education, training and work.

The department intends to achieve this through a range of strategies, including the attraction, retention and development of high quality teachers, supporting high quality teaching practices and fostering a culture of high expectations and enhanced school performance.

The Queensland College of Teachers (QCT) sets minimum qualification requirements for the registration of teachers. QCT does not set or recommend specific qualifications for specialist subject areas. A registered teacher can be employed to teach any subject at any year level in a school. The school / employer ultimately decides the specific subjects, grades or classes assigned to a registered teacher. Queensland state schools recruit from the pool of teacher applicants coordinated by regional human resources teams at DETE and must consider applicants from the transfer pool.

1.2 Pre-service courses for secondary teachers

Universities are autonomous institutions with distinctive missions. They determine the number of available enrolments for primary and secondary pre-service teaching courses. There are many different teacher education programs offered by Queensland and interstate universities. All of these programs incorporate learning how to teach and practical experience in schools. There are a number of possible pathways to become a qualified secondary teacher in Queensland:

- students complete a four year undergraduate pre-service teacher education degree; for example, a Bachelor of Education
- students study two degrees at the same time (dual degree); for example, a Bachelor of Arts with a Bachelor of Education
- students complete an academic degree in a non-education area (for example, a Bachelor of Science) and then complete a postgraduate, pre-service teacher education degree program; for example, a one year Graduate Diploma in Education.

The undergraduate program of study enables students to develop the skills and knowledge for a career in two subjects at secondary level. Students receive off campus professional experience and learning in secondary schools to develop their practical teaching skills and ensure that they become competent and confident in classroom teaching.

Universities have provision for both majors and minors to be taken as part of a study program. A major indicates a series of units in which a student specialises during his or her university degree. Completing a major usually involves successfully completing approximately six to eight units in a particular study area. A minor indicates a subject area of secondary specialisation within a university degree. It requires fewer units of study than a major, but enables an additional study area to be included in a degree. A minor normally consists of between two and four units.

The postgraduate program provides professional preparation for teaching in secondary school settings and is designed for graduates from a non-education background wishing to teach in secondary contexts. The program includes education studies, curriculum studies in two nominated teaching areas and professional experience in secondary school settings.

Teaching secondary specialist subjects such as mathematics and science can be highly technical and challenging. The content knowledge and teaching skills developed during pre-service education and training are very important; for example, the description of the teacher pre-service course at Griffith University identifies that a mathematics teacher requires a strong tertiary foundation in skills, knowledge and teaching methods specific to mathematics. The pre-service course will allow teachers to help their students develop their mathematical skills by exploring, calculating, representing and measuring the world around them.

1.3 Audit objective, scope and approach

The objective of the audit was to examine how effectively the Department of Education, Training and Employment attracts and places specialist subject teachers in secondary schools to maximise student academic outcomes.

The audit included:

- an analysis of the department's human resource databases, workforce plans and scholarship programs
- analysis of pre-service teacher education enrolments
- interviews with the workforce modelling unit
- fieldwork at seven state secondary schools and videoconferences at two state secondary schools
- a paper based survey of 188 Queensland secondary principals which achieved a response rate of 90 per cent.

The cost of the audit was \$497 000.

1.4 Structure of the report

The findings in this report are structured as follows:

- Chapter 2—Student performance
- Chapter 3—Teacher capability and capacity
- Chapter 4—Future workforce supply and demand
- Appendix A contains responses received
- Appendix B details the audit approach.

2 Student performance

In brief

Background

In 2001–02, 8.1 per cent of the Queensland workforce was employed in occupations using Science, Technology, Engineering and Mathematics (STEM) skills. This has grown to 10.5 per cent in 2011–12.

The growth in demand for STEM skills in economically important industries places added significance on student participation rates and academic achievement in this area.

Conclusions

Demand for a workforce with STEM skills is increasing but the supply is reducing. This is restricting Queensland's ability to compete in a global economy. The absence of a whole-of-government plan or strategy to improve participation or achievement in STEM subjects in Queensland is likely to worsen the gap between demand and supply.

Key findings

- In 2011, 41 per cent of Queensland Year 8 students who participated in the Trends in Mathematics and Science Study (TIMSS) failed to achieve the intermediate standard in mathematics and only six per cent achieved the advanced standard on international assessments.
- Participation in senior mathematics and science subjects has declined in terms of participation rates and actual completions.
- Industry groups are reporting shortages of workers with STEM skills.

2.1 Background

Science, Technology, Engineering and Mathematics (STEM) skills are developed in the following fields: science – general; mathematical sciences; physical sciences; chemical sciences; earth sciences; biological sciences; information, computing and communication sciences; engineering and technology; and agricultural, veterinary and environmental sciences. These subjects are considered necessary for the development of knowledge economies, essential in promoting innovation and increasing productivity.

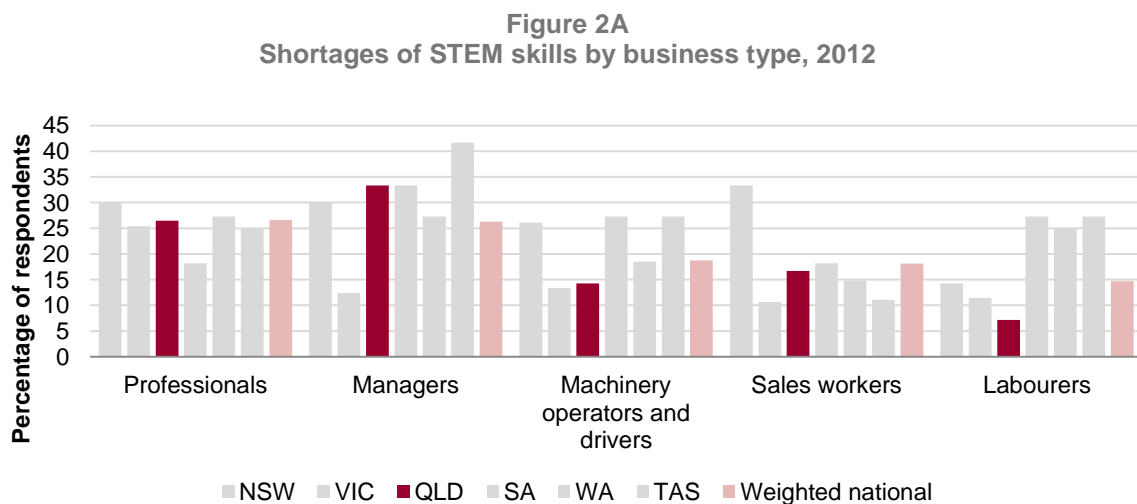
The Queensland Chief Scientist, in his annual report for 2011, made the following comments about the value of STEM skills at the school level:

‘STEM - which 80 per cent of Australians believe to be “very important, or critical to our economy” - we are challenged. Only a mere 3 per cent of Queensland Year 8 maths students positioned themselves over the advanced benchmark on the last TIMSS international test. Compare this, for example, to neighbouring Singapore where 30 per cent of Year 8 maths students make the advanced cut. But this sobering statistic is probably not surprising, considering that only 27 per cent of Queensland maths students are taught by teachers who hold post-secondary qualifications in mathematics, where the international OECD average is 70 per cent.’

2.1.1 STEM skills for the Queensland economy

In its report, *Lifting our Science, Technology, Engineering and Maths (STEM) Skills* released 21 March 2013, the Australian Industry Group estimated that 75 per cent of the fastest growing occupations require STEM skills and knowledge. The report identified that young people in schools and students at universities are not acquiring the STEM skills needed for Australia’s future prosperity.

Figure 2A provides a breakdown of the areas of shortages reported by business type.



Source: Australian Industry Group

The importance of STEM skills for students undertaking tertiary studies is well acknowledged by employer and industry groups. STEM skills are also essential for a range of other occupations. Figure 2B lists occupations where STEM skills are becoming increasingly necessary.

**Figure 2B
Occupations requiring STEM skills**

Occupations	
electrical engineering technicians	mining engineers
agricultural and forestry scientists	chemists and food and wine scientists
environmental scientists	ICT business and systems analysts
software and applications programmers	database and systems administrators
architectural, building and surveying technicians	mechanical engineering draftspersons and technicians
metal casting, forging and finishing trades workers	toolmakers and engineering patternmakers
electricians	telecommunications trades workers

Source: South Australian Department of Further Education, Employment, Skills and Training

2.2 Conclusions

Mathematics and science achievement levels in Queensland have not improved since 1995 and remain below the achievement of the other mainland eastern seaboard states and territories and also below that of comparable countries. Over this period, student participation rates in senior mathematics and science also substantially declined. The correlation between these two metrics indicates they have a common underlying cause; the most likely cause is the shortage of adequately qualified teachers, especially in mathematics and science.

2.3 Achievement and participation

In Queensland, the proportion of students studying mathematics and science subjects in Year 12 is declining. This is a trend nationally and internationally.

There also has been no discernible improvement in overall academic attainment in mathematics and science for the past decade.

2.3.1 Achievement in mathematics and science

The Trends in International Mathematics and Science Study (TIMSS) is an international study directed by the International Association for the Evaluation of Educational Achievement, an independent cooperative of national research institutions and government agencies. The association has been conducting studies of cross national achievement in a wide range of subjects since 1959. TIMSS has been conducted at Year 4 and Year 8 on a four year cycle since 1995.

In 2011, 45 countries including Australia participated in the Year 8 TIMSS assessment. Australia has participated in TIMSS since its inception, providing rich data about trends in mathematics and science achievement over 16 years. To inform educational policy in the participating countries, these worldwide assessment and research projects also routinely collect extensive background information that addresses concerns about the quantity, quality and content of the subjects they teach.

The Australian Council for Educational Research (ACER) report shows that Australia’s scores in mathematics and science have largely remained unchanged over the past 16 years. The report states that:

‘It is clear that in both mathematics and science, Australia has a substantial ‘tail’ of underperformance. For such a highly developed country, this level of underperformance is not acceptable and its minimisation should become a priority.’

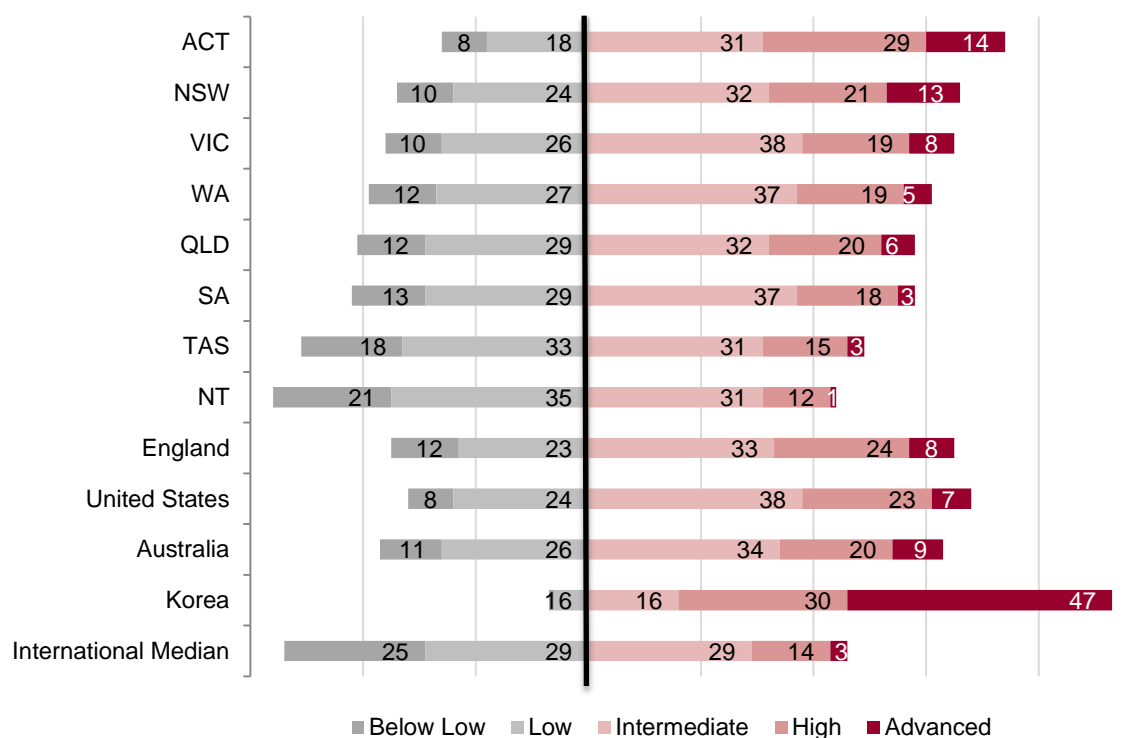
The report states that around one third of Australian Year 8 students are being taught by teachers who have no content or pedagogical training in mathematics. It goes on to conclude that, without strong pedagogical and content knowledge, teachers will be more likely to teach to the middle, failing to provide adequate extension for high achieving students and unable to provide alternative structures for students who are having difficulties.

In the *TIMSS Report 2011*, Australia’s achievement in Year 8 mathematics was ranked 12 of the 42 participating countries, ahead of New Zealand, Sweden and Romania, but significantly behind Korea, Singapore, Chinese Taipei, Hong Kong, Japan and the Russian Federation.

Figure 2C illustrates Year 8 mathematics achievement at each benchmark. In 2011, 41 per cent of Year 8 Queensland students fell below the intermediate standard for this international benchmark. This result has not changed markedly since 1995. The Australian Capital Territory significantly exceeded this benchmark, outperforming all other jurisdictions. Queensland’s results were slightly below New South Wales, Victoria and Western Australia. Students from Tasmania and the Northern Territory were significantly behind the other states and territories.

In New South Wales and the Australian Capital Territory, 34 per cent and 26 per cent of students did not reach the intermediate standard. The only significant changes over time were declines in South Australia and Western Australia from the TIMSS 1995 score to the TIMSS 2011 score.

Figure 2C
Proportion of students meeting international benchmarks for Year 8 mathematics, 2011



Source: ACER 2012

2.3.2 Participation in mathematics and science

Research, internationally and in Australia, has not identified conclusively why science and mathematics disciplines are not attracting graduates.

In 2006, the Queensland Government introduced changes to the *Education Act (General Provisions) 2006*, making it compulsory for students to participate in 'learning or earning'. This means that after students stop being of compulsory school age (16 years or completing year 10), they still must participate in education and training for another two years which could be an educational program provided by a state, non-state school or university, a vocational course, apprenticeship, traineeship or employment skills development program.

This phase ends when students:

- gain a Senior Certificate
- gain a particular vocational qualification (such as a Certificate III or higher level)
- attend for two years after students stopped being of compulsory school age or
- turn 17 years.

Figure 2D shows enrolments in Year 12 have increased by 15.7 per cent in the last decade and the numbers of students completing mathematics B and physics have decreased. The proportion of students completing senior mathematics B in state secondary schools fell by 11.2 per cent; and in physics by five per cent.

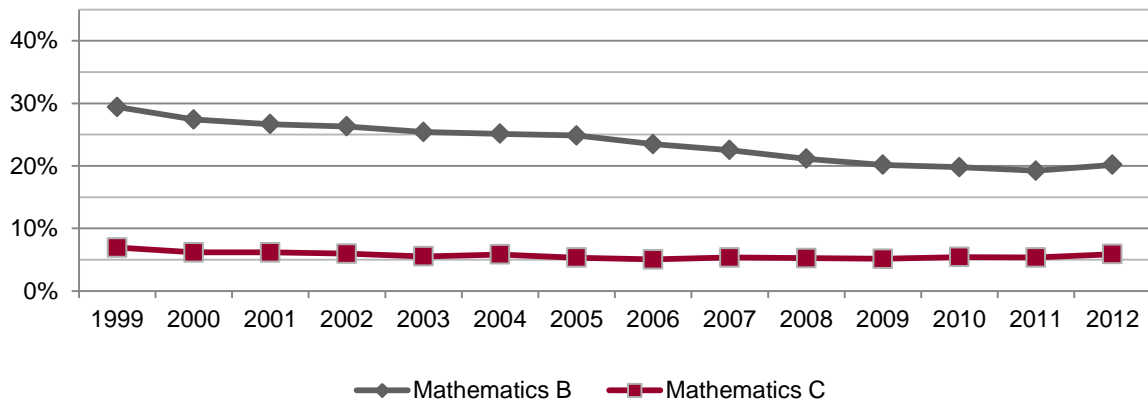
Figure 2D
Completions in senior mathematics and science at state secondary schools, 2002–2012

	Total students	Mathematics B	% of total	Physics	% of total
2012	27 334	5 513	20.1	2 712	9.9
2002	23 612	6 214	26.3	2 855	12.0
Change (Number)	3 722	(701)		(143)	
Change (%)	15.7	(11.2)		(5.0)	

Source: QAO based on Queensland Studies Authority data

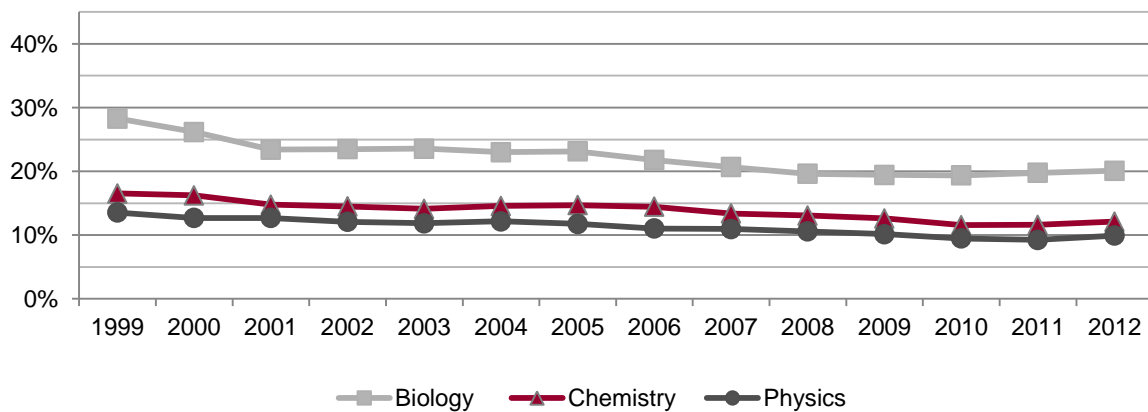
Figure 2E shows that there has been a persistent downward trend in the proportion of students studying mathematics in Year 12 for more than a decade. It is unclear why there was an increase in mathematics B between 2011 and 2012. Figure 2F shows this trend also holds for students studying science subjects. Figure 2G shows that the decline in remote and rural areas has occurred at a faster rate; but these numbers need to be treated with care as the small number of students, particularly in very remote schools, makes the trends volatile and they may also be affected by student enrolments in distance education courses.

Figure 2E
Student participation in Year 12 mathematics, state secondary schools 1999–2012



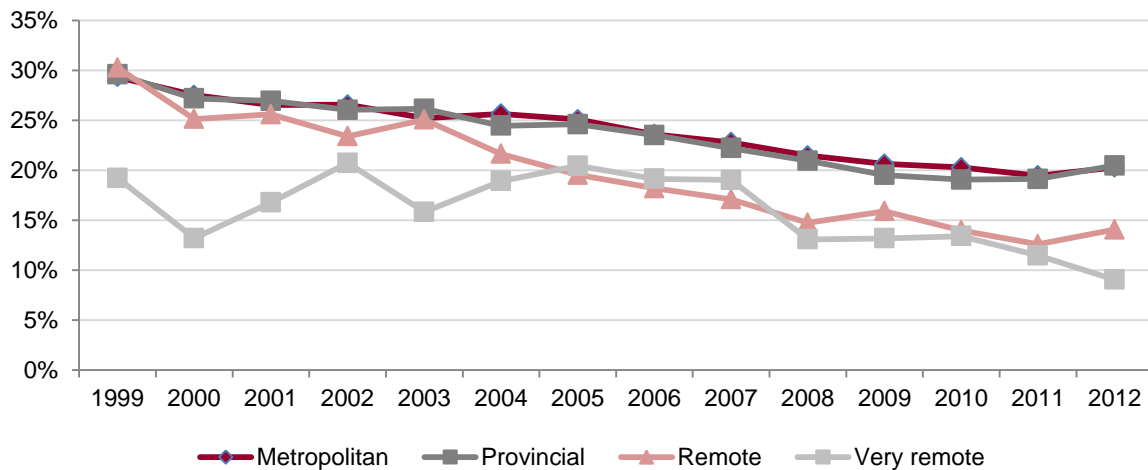
Source: Queensland Studies Authority

Figure 2F
Students participation in Year 12 science subjects, state secondary schools 1999–2012



Source: Queensland Studies Authority

Figure 2G
Student participation in mathematics B, state secondary schools, 1999–2012



Source: Queensland Studies Authority

3 Teacher capability and capacity

In brief

Background

The Department of Education, Training and Employment (DETE) provides education to over 178 000 secondary students at 270 schools across the state. Students study a range of subjects from mathematics and science to arts and drama.

Conclusions

The department needs the right teachers with the right qualifications and experience in the right schools to provide universal access to a quality education. The current model of staffing secondary schools is not ensuring that teachers have the specific subject content knowledge or the teaching techniques for all the subjects they teach.

Students in some schools are disadvantaged by not having access to a qualified and experienced specialist subject teacher or the full range of subjects. This issue of lack of access is more prevalent in rural and remote areas but also affects metropolitan schools. Inequality of access is restricting students' ability to gain the skills and knowledge needed to participate in workplaces that are increasingly demanding scientific and technological competencies. This could reduce public confidence in the quality of education provided by state secondary schools.

Key findings

- There are not enough specialist mathematics and science teachers for all Queensland schools; 12.5 per cent of Queensland mathematics B teachers and 36.5 per cent of junior mathematics teachers in 2010 had no tertiary qualification in mathematics.
- In 2013, 39 per cent of state secondary principals responded that they could not offer some subjects due to a shortage of suitably qualified teachers.
- Schools are responsible for supporting teachers who are teaching out of field. This places a training burden on school budgets and other teachers, particularly in regional and remote areas.
- DETE data to inform the placement of teachers are incomplete and unreliable.

Recommendations

It is recommended that the Department of Education, Training and Employment:

- 1 **improves the quality of the information on teacher subject capability and competence available to staffing officers and principals to improve the placement of teachers at schools and on school timetables by December 2014**
- 2 **provides teachers who are teaching subjects out of their field of expertise with the support and professional development needed to develop the content knowledge and pedagogical skills relevant to the subject being taught by June 2014.**

3.1 Background

Secondary teachers specialise in subject areas as part of their undergraduate and postgraduate degrees, covering the content knowledge of the subject as well as the specific teaching skills required to teach that subject.

Research indicates, as common sense would dictate, that all other things being equal, it is highly desirable for teachers to teach the subjects in which they have gained their degree. The less desirable alternative is that they teach 'out of field' in subjects for which they have not been trained, albeit they are qualified and registered teachers.

This was recently reinforced by The Grattan Institute, in its 2012 report *Catching Up: Learning from the best school systems in East Asia*, which identifies key aspects of teaching that have been shown to improve learning. They include:

- teachers' content knowledge
- teachers' pedagogical knowledge (teaching skills and techniques), both of general principles and those specific to their subject areas
- teaching practices that focus on clear and well structured lessons supported by effective classroom management
- teaching practices that emphasise individualised instruction
- a commitment to higher order problem solving, deep analysis of content, and activities requiring advanced thinking skills and deductive reasoning
- active professional collaboration that has a direct impact on learning and teaching. Key elements include classroom observations, team teaching and constructive feedback.

The Australian Council of Learned Academies in its report *International comparisons of science, technology, engineering and mathematics (STEM) education 2012*, identified some key features in approaches to teaching STEM subjects internationally and compared the approaches with those in Australia.

Countries (with strong STEM skills):

- have an unbreakable commitment to disciplinary contents—they do not equate teaching with class management and credentialing alone (and) they focus on knowledge
- expect STEM subject teachers to be fully qualified in their discipline and to teach in that field and not others; this contrasts sharply with Australia
- focus professional development primarily on the discipline rather than generic programs, which again contrasts with Australia.

These approaches and features depend on an adequate supply of qualified teachers and equitable distribution of qualified teachers across all locations where student demand warrants such courses. It also presupposes that information on teacher skills and qualifications is accurate and up to date.

3.2 Conclusions

Not all students in Queensland have the opportunity to learn from qualified and experienced teachers in specialist subject areas; research indicates this has an adverse impact on academic achievement.

Lack of access to teachers expert in the subject matter and to curriculum offerings raises issues of relative inequity and disadvantage for those locations where there are teacher shortages—issues which are greater in regional and rural areas.

The ability of schools and regions to make the best use of the short supply numbers of specialist subject teachers, and to place them where they are most needed, is hampered by lack of information about the specialist subject areas its teachers are qualified in or capable of teaching.

3.3 Data integrity and systems integration

The Department of Education, Training and Employment (DETE) information on teacher competence and capability is fragmented into four different systems that do not integrate and are inconsistent. There is no single point of truth on secondary teacher capability and competency. This reduces the ability of principals and regional human resource consultants to ensure that teachers are placed in schools and subjects that best fit with their capabilities and competencies.

DETE collects different data on teacher competence and capability when teachers:

- apply for employment with the department (TSS—payroll system)
- apply for transfers from one school to another (MyHR Recruit—human resources system)
- nominate the subjects they want to teach for the timetable (OneSchool—student and school management)
- register for work for casual or contract work (TRACER—casual teacher database).

The qualifications for secondary teachers are recorded in the department's payroll system, TSS. Regional human resource consultants use the information in TSS and MyHR to place teachers for permanent and casual jobs and for transfers. Schools use the information in OneSchool to timetable teachers with the subjects and classes for the year.

Information about teacher competence and capability is not accurate. At the schools we visited, the data on teacher qualifications in TSS were, on average, incomplete for five per cent of teachers and out of date for 23 per cent of teachers. Of all the qualifications in TSS for secondary teachers, seven per cent were not sighted.

DETE established the Teacher Application Centre (TAC) in 2006 to input and assess data centrally from teacher applications. The quality assurance processes in place ensure the information entered in TSS is reliable and accurate; however, the controls around teacher applications do not restrict regional office staff from reactivating applications that had become inactive. This bypasses the quality assurance processes.

The department has not refreshed and corrected the errors, omissions and obsolete information on pre-existing employees because it requires information about whether a teacher is registered or not, rather than information on their current qualifications and competencies. Information on the qualifications of mathematics and science teachers is incomplete for 19 per cent of existing employees, both permanent and temporary. The lack of reliable data on the teaching workforce reduces the department's ability to maximise student learning outcomes through an efficient placement of qualified and capable teachers.

From 2006, the TAC has undertaken the department's process to assess the capability and competence of secondary specialist teacher applicants; previously, it was done by individual regions. The current process is not providing regional staffing officers or principals with reliable and accurate information. Figure 3A shows the data integrity issues identified on a sample of secondary applicants in 2012.

Figure 3A
Testing secondary applicants processed in 2012

Processed by	Number of applications tested	TSS qualifications supported by employee records	TSS subject preferences supported by employee records
TAC	24	16	8
Regions / pre-TAC	5	5	1
Total	29	21	9

Source: QAO

We tested a random sample of 29 secondary teacher applicants who were active in 2012. Of the 29 applicants tested:

- there was no supporting documentation on their employee file to support their qualifications recorded in the payroll system (TSS) for eight (28 per cent) applicants
- subject preferences were not supported by qualifications for 20 (69 per cent) applicants.

The lack of appropriate documentation means that principals cannot be as confident as they need to be that the information about applicants is correct when they are assessing their capability and competency to teach a specific subject.

3.4 Capability

DETE does not have current and reliable information about the extent of teaching out of field. DETE, therefore, cannot develop targeted strategies to reduce the impact of out of field teaching on student learning outcomes.

Out of field teachers are required to teach a subject area where they are not familiar with the subject content knowledge and specific teaching techniques. Teachers' responsibilities may include:

- preparing and marking exams, assessments and tasks
- developing the subject's detailed school program.

In 2010, DETE's survey of permanent teachers found that a third of secondary teachers teaching any mathematics subject reported they had no qualifications in that subject area, as illustrated in Figure 3B. These proportions are consistent with those in the *Trends in Mathematics and Science Study Report 2011*. The survey also showed the extent of underuse of qualified teachers.

The survey data reflects that school principals and leadership teams consider teacher qualifications, background, experience and personal attributes when allocating teachers to subjects. The 2010 qualification survey data identify that:

- 33 per cent of the teachers teaching mathematics in 2010 did not hold a formal mathematics qualification
- 28 per cent of the teachers who had a mathematics qualification in 2010, were not teaching any mathematics
- 41 per cent of the teachers who had a science qualification in 2010 were not teaching any science.

Figure 3B
Out of field teachers teaching mathematics and science subjects in 2010

Subject and level		Teachers with no specialist subject area qualification and teaching %	Teachers with specialist subject area qualification and not teaching (underuse) %
Maths	All maths subjects	33.3	28.6
	Years 8–10	36.5	33.0
	Mathematics A	32.5	46.3
	Mathematics B	12.5	53.7
	Mathematics C	8.8	72.6
Science	All science subjects	14.5	41.5
	Years 8–10	20.3	43.8
	Chemistry	9.80	58.4
	Physics	17.0	51.5
	Biology	7.8	62.7

Source: Department of Education, Training and Employment Workforce Situation Report

DETE is exploring this matter and is working with schools and the peak association for secondary principals to investigate the best ways to deploy teacher capability and capacity across secondary schools to meet student demand and need in both the current and future contexts.

In our 2013 survey, 107 of the 170 principals who responded (63 per cent) stated that there were mathematics classes at their school being taught by out of field teachers and 83 (49 per cent) stated that they had science classes being taught out of field.

It is unclear whether or not teaching out of field has worsened since 2010. For mathematics, Figures 3C and 3D show it is more prevalent in regional, rural and remote schools. This pattern was confirmed in the results of the schools we visited, as shown in figure 3E.

Figure 3C
Proportion of mathematics B teachers by qualification and location, 2013

Zone	Mathematics major	Science major	No major recorded	Others
Metropolitan / provincial city	71%	11%	12%	6%
Regional / rural / remote	67%	13%	12%	8%

Source: QAO

Figure 3D
Proportion of junior mathematics teachers by qualification and location, 2013

Zone	Mathematics major	Science major	No major recorded	Others
Metropolitan / provincial city	40%	23%	16%	21%
Regional / rural / remote	31%	23%	17%	29%

Source: QAO

Figure 3E shows that, at the seven schools we visited, teaching out of field was more prevalent in regional, rural and remote areas. Five of the seven schools we visited were in rural or regional areas and these results therefore, while not representative of the entire state, point to this being more of an issue in these locations.

Figure 3E
Out of field mathematics

Summary of schools visited	Teachers teaching mathematics 'out of field'	Students being taught mathematics by teachers out of field
Metropolitan / provincial city	14%	16%
Regional / rural / remote	35%	26%

Source: QAO

3.4.1 Support for teachers teaching out of field

Each school determines its support for out of field teachers, which can include formal and informal mentoring from other teachers, support from the head of department and attendance at workshops. Providing this support is a drain on school resources and increases teacher workloads.

All of the schools visited provided some level of support for teachers teaching subjects out of field. The types of support for teachers included:

- staff meetings
- faculty meetings
- lesson observations and feedback
- support from regional subject experts
- opportunities to visit other schools.

At the schools visited, the satisfaction with access to this support varied. Access to support depended on the school budget to release teachers, whether or not there were other teachers at the school or nearby schools with subject expertise, and how far the teachers would have to travel. Teachers in rural and remote schools reported higher levels of dissatisfaction with the level of access to support.

Focus groups were held with 67 teachers across the seven schools visited. Common themes emerged from teachers at all the schools visited who were teaching subjects out of their field of expertise. However, there were some differences between the metropolitan / provincial city and the regional / rural schools. The two large metropolitan and provincial city schools visited had significant numbers of qualified and experienced teachers who were able to mentor and support out of field teachers. At the five smaller regional / rural schools, the comments about stress and workload by the teachers were more pronounced as these schools had fewer qualified and experienced teachers to provide the mentoring and support.

In general, the teachers considered that:

- teaching a subject out of field required significant time to prepare the lessons and they had insufficient time to do all the tasks expected of them to provide quality teaching
- teachers had to spend more time on student behaviour when teaching a subject out of their field of expertise
- qualified and experienced teachers volunteered a lot of their time after school and on weekends helping out of field teachers
- teachers teaching out of field were not given lighter teaching loads to allow for more preparation time
- teachers teaching out of field often lacked confidence with the content of the subject and often 'learned it' the night before
- there was not enough time to support out of field teachers to develop content knowledge or the pedagogical skills to stay ahead of the students
- out of field teachers needed a lot of support with planning, assessment and moderation processes; and marking assignments took a lot of their time
- professional development opportunities for certain subject areas were limited and difficult to access, especially in rural and remote areas.

In addition, 28 per cent of the 170 principals who responded to our survey believed that the shortage of specialist subject teachers was having a serious effect on teacher stress (workload) while 43 per cent responded it was having a moderate effect.

The *A Fresh Start* strategy released on 22 July 2013 contains ten initiatives addressing specific issues related to teacher supply, initial teacher education and effective mentoring and induction. The initiatives are:

- finding new pathways into the teaching profession
- professional experience partnership agreements
- explicit graduate expectations
- a professional experience reporting framework
- strengthening the governance of initial teacher education programs
- an annual review of initial teacher education programs
- professional development for mentors
- supervision, mentoring and induction resources
- *Talent Identification Framework*, state schooling only
- teach rural campaign, state schooling only.

The new strategy has not been included in the scope of this audit as it is too early to assess its impact.

At one of the schools visited, teachers who were teaching mathematics out of field were participating in a professional development program to improve their knowledge of mathematical content and teaching techniques. The following case study describes the program.

A model of professional learning

YuMi Deadly Maths Program

This case study features a formal structured approach to professional learning that gave out of field teachers confidence in the content knowledge and the specific teaching techniques that work for the targeted students. It was followed up in the school by site visits that supported the teachers to apply what they had learned in practice.

The YuMi Deadly Mathematics program has been designed to provide support and training to teachers of students from Indigenous and lower socio economic backgrounds. It uses hands on activities and links to real life to help teachers teach mathematics in ways that make sense to children. The program was developed by Queensland University of Technology's YuMi Deadly Centre (YDC).

One of its projects includes the Accelerate Indigenous Mathematics (AIM). It aims to assist teachers of Indigenous Year 8, 9 and 10 students who have Year 2 / 3 mathematics level, to develop Years 8–10 mathematics programs that will accelerate the students' learning to where they can access mathematics subjects in Years 11–12.

In 2012, the participants involved in the AIM project included eight YDC staff, nine schools, 39 teachers, nine teacher aides and their classes. Of these, only three teachers were qualified maths specialists. Each teacher and aide was offered four, two-day professional learning conferences across the year. These sessions covered mathematical content and pedagogy, as well as related issues like research, classroom management and planning.

The professional learning conferences were followed up with a school visit each term that involved working with the teachers on planning, discussions, observations, interviews and model teaching. The research evaluation of the program identified improvements in teacher confidence and competence and improvements in student mathematics skills. The AIM project is researching the benefits of the out of field teachers in Indigenous classrooms and results indicate that Indigenous students are making progress and the Indigenous and non-indigenous achievement gap is being reduced.

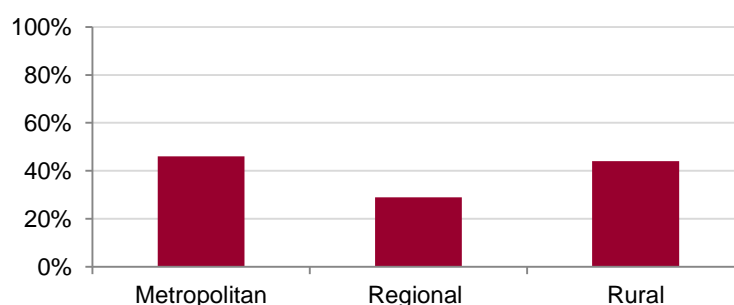
3.5 Capacity

An imbalance between the demand for and supply of specialist subject teachers means also that schools have had to reduce the range of subjects they can offer. Principals report that they are reducing the range of subjects available and relying on teachers to teach subjects out of field.

Persistent shortages of teachers qualified and capable in specific specialist subjects have resulted in schools limiting curriculum offerings. Of the 170 principals who responded to our survey, 67 (39 per cent) reported that there were subjects that they could not offer due to a shortage of specialist subject teaching staff.

The shortage can result in subjects not being offered at all, combining year 11 and 12 classes together or limiting the number of places offered. Figure 3F illustrates this effect in metropolitan, regional and rural contexts.

Figure 3F
Percentage of principals reporting that the teacher shortages are affecting subject offerings



Source: Queensland Audit Office – Schools survey, 2013

Principals make decisions about teacher placements based on their own assessment of each teacher's capabilities and competencies, using data in OneSchool and TSS reports from regional HR consultants.

The Queensland College of Teachers sets the standards for teacher registration based on their qualifications. In Queensland, as in all Australian jurisdictions, teachers are not registered as an early years teacher, primary teacher or specialist secondary teacher. A registered teacher can be employed legally to teach any year level or subject in a school. The specific subjects, grades or classes assigned to a registered teacher are decided ultimately by the school / employer. The Australian Professional Standards for Teachers apply to all primary and secondary teachers, not to the schools. Full registration as a teacher is dependent on meeting the standards:

1. know students and how they learn
2. know the content and how to teach it
3. plan for and implement effective teaching and learning
4. create and maintain supportive and safe learning environments
5. assess, provide feedback and report on student learning
6. engage in professional learning
7. engage professionally with colleagues, parents / carers and the community.

There are no subject specific standards to support standard 2.

The Commonwealth Australian Quality Training Framework sets specific standards for registered training organisations. The standards include specific qualification requirements for teachers employed to teach Vocational Education and Training (VET) subjects. The following case study outlines the requirements and standards for VET teachers.

Quality frameworks for Vocational Education and Training (VET)

Vocational Education and Training quality standards
<p>VET teachers</p> <p>Applicants must meet the standards of the Australian Quality Training Framework (AQTF) to become registered training organisations (RTOs) that can deliver and assess nationally recognised training and issue nationally recognised qualifications. The AQTF applies to providers delivering VET courses.</p> <p>Standard 1: The applicant has strategies in place to provide quality training and assessment across all of its operations.</p> <p>The applicant has a defined strategy, procedures and measures to ensure training and assessment services are conducted by trainers and assessors who:</p> <ol style="list-style-type: none">a) have the necessary training and assessment competencies as determined by the National Quality Council or its successors, andb) have the relevant vocational competencies at least to the level being delivered or assessed, andc) can demonstrate current industry skills directly relevant to the training or assessment being undertaken, andd) continue to develop their VET knowledge and skills as well as their industry currency and trainer or assessor competence. <p>The RTOs report on compliance with the standards and are subject to audits to ensure compliance. Failure to comply puts the provider's re-registration at risk.</p>

The department does not set standards or provide guidance for principals to assess consistently if teachers have the content knowledge, pedagogical skills and qualifications appropriate to the grade level or subject area they teach. This means that decisions about teacher capability or competence for specific subjects are inconsistent and not transparent.

One example is that of a teacher in a small remote high school assessed as competent by the principal to teach junior manual arts (woodwork and metalwork) for a year or two. This creates difficulties when the same teacher is transferred (based on the principal's assessment) to a larger metropolitan school where manual arts includes VET subjects (welding and computer aided design) which the teacher is not qualified to teach as the teacher has no certificate for these subjects. The school ends up with an extra teacher but no one capable and competent to teach the expanded range of manual arts.

3.6 Recommendations

It is recommended that the Department of Education, Training and Employment:

- 1 improves the quality of the information on teacher subject capability and competence available to staffing officers and principals to improve the placement of teachers at schools and on school timetables by December 2014**
- 2 provides teachers who are teaching subjects out of their field of expertise with the support and professional development needed to develop the content knowledge and pedagogical skills relevant to the subject being taught by June 2014.**

4 Future workforce supply and demand

In brief

Background

Forecasting future workforce demand and supply is necessary to identify and address emerging imbalances.

Conclusions

The workforce plans of the Department of Education, Training and Employment broadly identify workforce supply and demand issues and inform the development of its workforce attraction strategies.

The level of detail in the plans on future demand is hindered by unreliable and out of date data on the capabilities and competencies of the secondary school teaching workforce. This reduces the department's ability to ensure the right teachers are available to the right school at the right time.

Key findings

- The department's workforce plans are undertaken centrally and provide information about workforce supply and demand.
- Statewide workforce planning is not integrated with teacher demand at the regional, cluster or school level.
- Forecasts of future needs are made on the assumption that generalist teachers can be expected to provide suitable instruction in junior mathematics and science subjects.
- The data to inform the placement of teachers are incomplete and unreliable.

Recommendations

It is recommended that the Department of Education, Training and Employment:

- 3 develops and implements a strategy to reduce the imbalance in the supply of specialist subject teachers with a view to improving participation and achievement in Science, Technology, Engineering and Mathematics (STEM) subjects by June 2014**
- 4 develops forecasts for supply and demand of specialist subject teachers that produce more accurate and comprehensive estimates of need at the state and regional levels and by subject, including junior secondary subjects by June 2014**
- 5 integrates and coordinates its approach to workforce plans and initiatives at central, regional and school levels by December 2014.**

4.1 Background

Forecasts of future workforce demand and supply allow organisations to develop appropriate strategies so an imbalance between supply and demand does not affect the quality of the services delivered to clients.

Demand forecasts start with an understanding of the current workforce profile and demand for services. This includes information about:

- the age and gender of the workforce to inform forecasts about potential retirements
- the capabilities of the current workforce to inform services about the types of workers that need to be replaced
- forecasts on future growth or reduction in services by geographic area to plan workforce placements and movements.

Schools work within a staffing formula based on the number of students enrolled at the school. The principal has the flexibility to determine the subjects offered in response to local community needs and student interest.

4.2 Conclusions

The workforce plan of the Department of Education, Training and Employment (DETE) complies with the requirements of government guidelines at the overall organisation level. It also has some elements of best practice. There is, however, no operational workforce plan for its teaching workforce to demonstrate, in detail, how the plan's objectives will be achieved.

DETE's workforce planning is subject also to significant limitations:

- current, reliable supply and demand data for specialist subject teachers are not available
- forecasts do not include junior secondary teaching workforce, counter to international research, which credits highly qualified specialist subject teachers for the strong performance in the countries outperforming Queensland and Australia in science, technology, engineering and mathematics.

Established workforce planning initiatives include scholarship and grants programs to supplement the supply of teachers. As no evaluation is undertaken on the long term impacts of scholarship and grants programs, DETE does not know whether its key workforce initiatives have achieved their desired outcomes and whether it has succeeded in addressing identified workforce gaps.

4.3 Workforce planning

DETE conducts workforce planning centrally. DETE's workforce initiatives unit provides workforce information on primary and secondary state school teachers. The 2013 workforce report outlines projected information on teacher demand and supply.

The regional offices and schools are responsible for key human resource decision making such as teacher placement and workforce management. However, the department does not require the regional offices or schools to develop workforce plans. The regional offices and schools visited did not develop workforce plans, although two of the schools visited had forecasts about retirements and upcoming leave. This limits the ability of regional and school staff to plan for the workforce needed to meet the educational needs of the students at individual schools or across the region.

DETE undertakes periodic data collection, through its teacher qualification survey to identify core skills and knowledge, to develop strategies that improve the supply of qualified specialist subject teachers. The department does not have complete, accurate and reliable data on its workforce. Therefore, it collects information from permanent teachers via a survey asking them to nominate:

- any further study they are undertaking
- their current qualifications
- subject specific capabilities and experience
- the subjects they are currently teaching.

The data are self reported and not validated. The last teacher qualification survey was in 2010. This reduces DETE's ability to identify areas of shortage and to support schools by allocating teachers effectively to meet the needs of the schools.

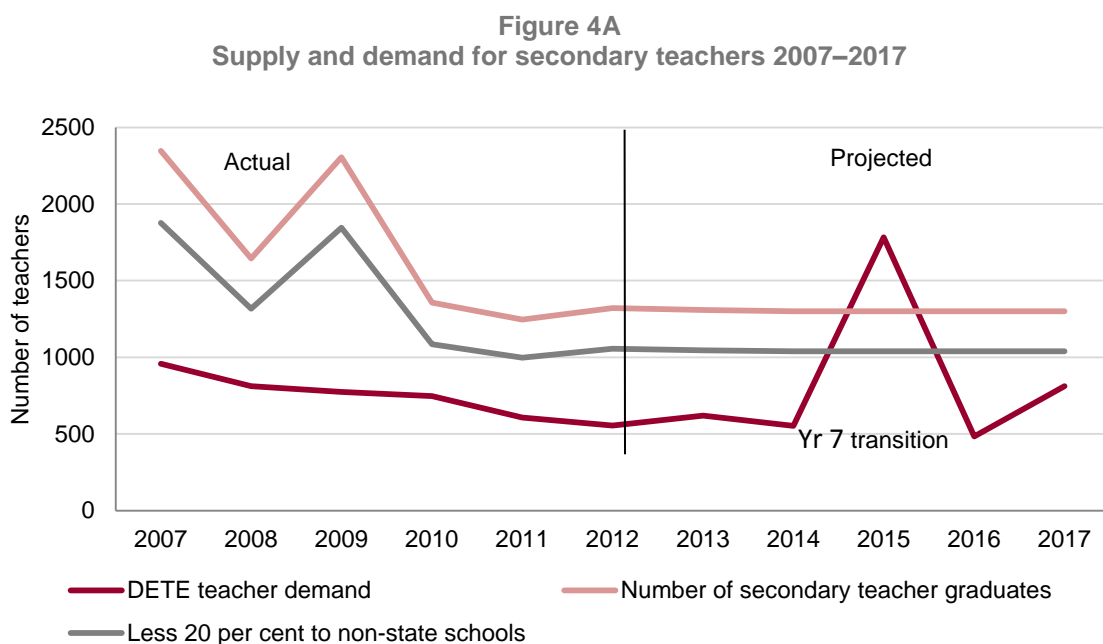
The department's current workforce strategic plan includes a performance measure that workforce supply meets demand. However, there is no evidence of targets, governance mechanisms or information on how DETE will achieve its goals and objectives in a specified time frame. Lack of monitoring and evaluation limits DETE's ability to identify workforce issues effectively and to develop new strategies or modifications to current programs.

4.3.1 Forecasts

DETE's demand forecasts consider teacher retirements and changes in student enrolments. Forecast for supply is based on the data from Queensland universities on expected graduate numbers.

DETE's statewide modelling assumes that 100 per cent of graduates from secondary pre-service courses are available to meet its demand for replacements and growth. However, non-state schools in Queensland employ around 20 per cent of graduates.

Figure 4A shows the supply of graduate teachers and the supply available to DETE. Overall, on current numbers, there are adequate graduates to meet demand. However, shortages are affecting schools in some locations and in some specialist subjects.



Source: DETE

In 2015, the effect of the transition of Year 7 students from primary to secondary school will create a general spike in demand to fill secondary teacher positions. DETE predicts it will need additional secondary school teachers in 2015 and is implementing a suite of initiatives to support current state school teachers who wish to work with students in the junior secondary settings. These include:

- up to 500 junior secondary scholarships for primary schools teachers who are successful in their application to transition to junior secondary settings
- a range of professional development opportunities to build capabilities, knowledge and understanding of adolescent development and pedagogical practices.

The department's *Junior Secondary Attraction and Recruitment Strategy* commits to reporting to program boards about attraction and recruitment activities across the regions worth \$5 410 000. The effects of these activities have not been included in the scope of this audit as it is too early to assess their impact on demand for secondary teachers.

Subject shortages

There is an imbalance in the types of specialist teachers graduating from Queensland universities. DETE has identified shortages in teachers of mathematics, science and industrial design and technology. Figure 4B shows the imbalance between the numbers of specialists in the areas of shortage (mathematics and science teachers) and an oversupply (physical education, music / dance / drama teachers and primary teachers).

Figure 4B
Numbers of graduates from Queensland universities
by selected specialist area and sector, 2010–2012

Specialist area	2010	2011	2012
Physics	70	56	54
Junior mathematics	68	60	78
Mathematics B	135	131	134
Chemistry	114	94	94
Health and physical education	301	378	421
Music / dance / drama	315	292	341
Primary teachers	1 306	1 280	1 287

Source: DETE

Location shortages

A significant proportion of applicants are unwilling to accept placements in non-preferred locations, such as regional and rural schools or those in some low socio economic areas. This creates shortages in these areas. DETE's forecasting does not consider regional demand or supply. This reduces the ability of recruitment strategies and scholarships to target the right teachers for the right schools.

Other sources of teachers, such as those returning to the workforce from leave, may assist DETE to address the shortfall. However, it is difficult for DETE to forecast the number of teachers returning to the workforce and the specific skills and experience they have.

More detailed forecasts of demand at the regional and school levels, along with supply forecasts that consider the competition for graduates from other education providers, will give the department a more accurate forecast of the teacher shortage. This will allow the department to develop appropriate strategies to address any imbalances in supply and demand.

In its research report *Schools Workforce Report 2012*, the Productivity Commission identified that, like other developed countries, Australia is facing nationwide challenges in attracting qualified teachers for a number of specialist subject areas, with persistent shortages reported in some jurisdictions of specialist subject teachers in secondary mathematics and science. DETE's latest forecasts identify growing supply shortages of specialist subject teachers in the following areas:

- secondary mathematics
- secondary science
- industrial design and technology.

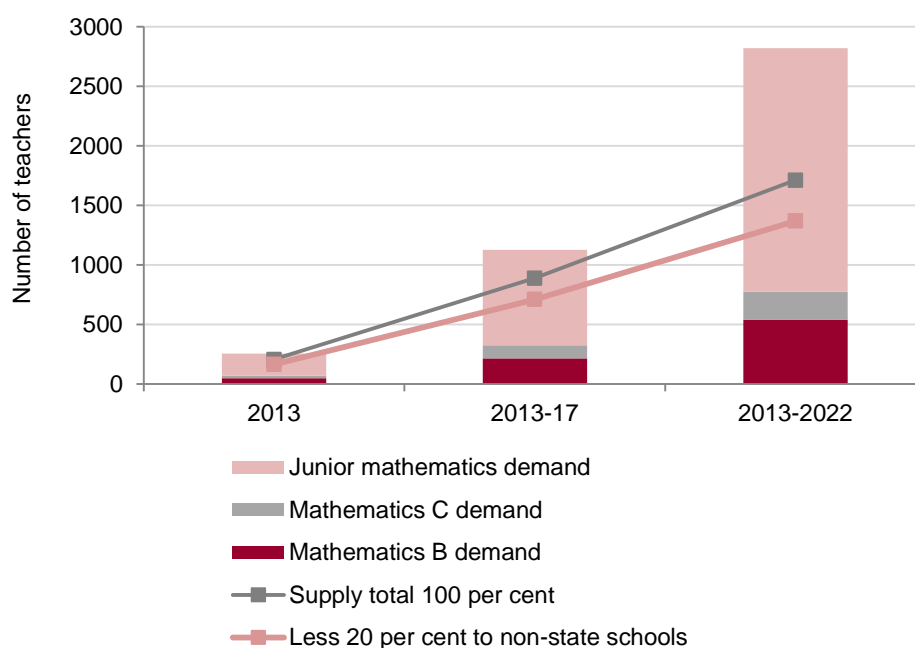
The DETE forecasting model assumes that:

- junior secondary mathematics and science do not need specialist qualifications in mathematics or science
- 100 per cent of graduates from Queensland universities are available for DETE to recruit.

On these assumptions, the numbers of future graduates would more than meet DETE's demand; however, Figure 4C shows how the supply for all mathematics teachers is not adequate to meet demand if mathematics B, C and junior mathematics teachers are included in the model and the 20 per cent of graduates going to non-state schools is considered.

DETE's analysis of the teacher qualification data in its *2010 Draft Workforce Situation Report* is that where the percentage of unqualified teachers is high, it is often in a field where a generalist teacher can be expected to provide suitable instruction. While DETE's assumption is that generalist teachers may be expected to provide suitable instruction in junior mathematics and science, the *Trends in International Mathematics and Science Study (TIMSS)* report shows clearly that Year 8 students whose teacher specialised in mathematics achieve better results.

Figure 4C
Supply and demand mathematics 2013–2022



Source: QAO

4.3.2 Liaison with universities

DETE has formed a working group with the deans of education of Queensland universities. This group provides an opportunity for the Minister for Education, Training and Employment and DETE senior executives to have a direct dialogue with the deans on key issues of common interest, such as workforce supply and demand, the National Assessment Program—Literacy and Numeracy (NAPLAN) and other relevant issues. This group generally meets twice a year.

The Australian Government is responsible for setting university funding and, generally, the universities themselves set course numbers. Universities are autonomous institutions with a distinctive mission, operating within a state or territory and in the national and international higher education environment. Universities are in the business of meeting needs of students, not providing a training service for employers. This limits the ability of the department to influence universities to increase course numbers in areas of greater demand, such as mathematics, science, manual arts and home economics.

The Australian Government provides universities with a payment through the effective full time student load per course. In 2012, 3 032 teachers graduated in Queensland. This includes both primary and secondary teachers. The cost of this graduate load was approximately \$97 million; however, only two thirds of these graduates are likely to be employed within 12 months of graduating. In Queensland, six times more primary school teachers are being trained than are needed. While it is clear that students are being given choices about which courses to study, the continuing imbalance reduces DETE's ability to meet its future workforce needs.

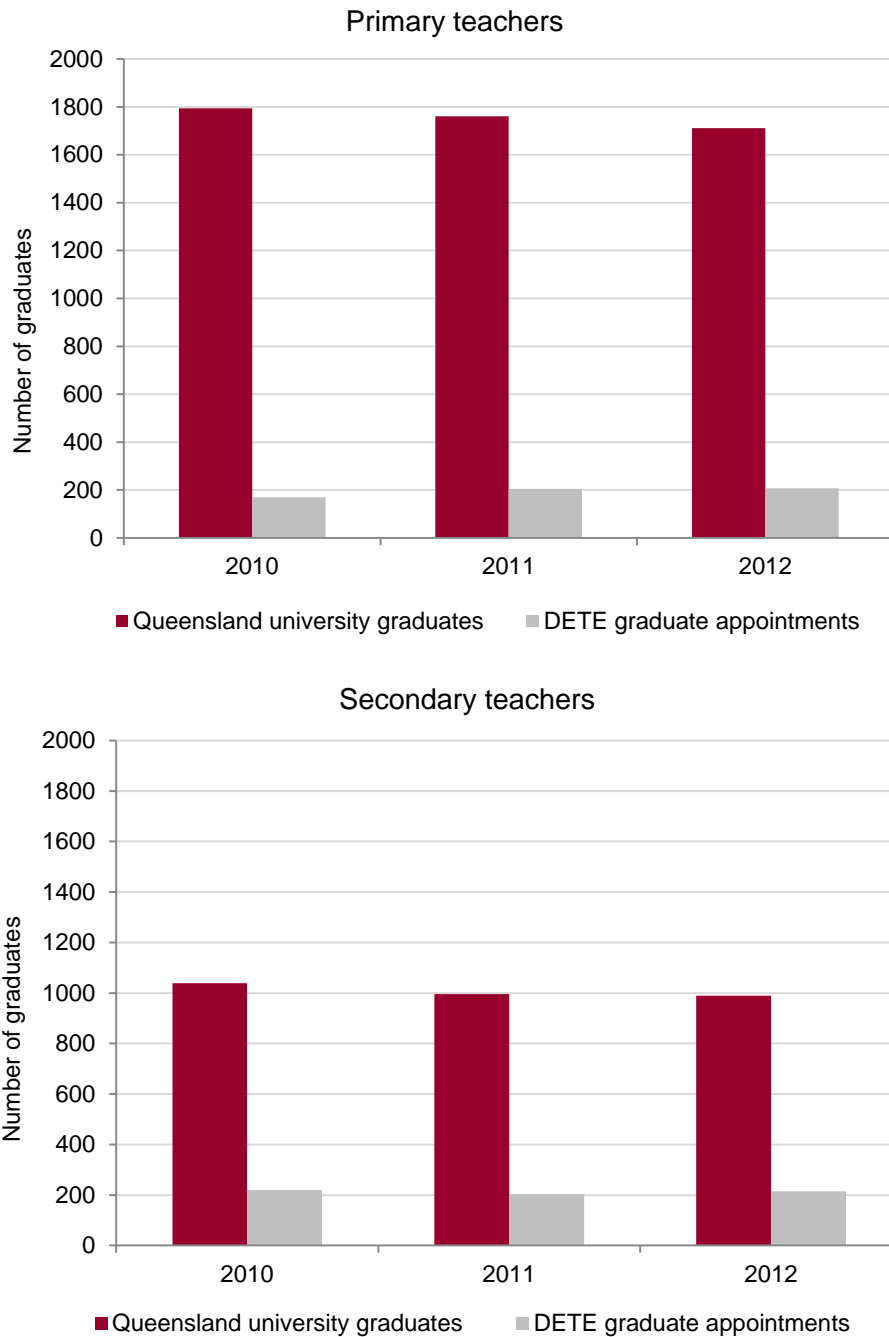
The Productivity Commission, in its *Schools Workforce Report* in April 2012, identified that a key influence of the state education departments on universities is in making available places for students to undertake practicum teaching in schools. Students need to practise their teaching skills to meet the requirements of the course and therefore graduate. Reducing the availability of practicum places in areas of oversupply such as primary school teaching may lead more students to study in areas of greater demand, such as secondary science and mathematics. To date, the department has not used this option to increase the supply of secondary specialist subject teachers in areas where they are most in demand and to reduce the oversupply of primary teachers.

The *Fresh Start* Strategy responds to elements of the 2012 Productivity Commission report on the schools workforce. The strategy includes the introduction of professional experience agreements, for all higher education institutions and all three schooling systems. These agreements are intended to better support alignment of teacher supply and demand through:

- revision of programs to provide opportunities for pre-service teachers to change mid-program in teaching disciplines with high demand or restrictions on access to professional experience placements where the imbalance is profound
- further engagement with industry partners is continuing to determine the best strategy through the recently formed Teacher Quality Working Group.

Figure 4D shows the disparity between the supply and demand for primary and secondary teachers in Queensland. DETE is not the only employer of graduates, as previous employment trends show, as around 20 per cent of graduates gain employment with non-state schools.

Figure 4D
 Graduates gaining employment with DETE, primary and secondary teachers 2010–2012



Source: DETE

4.3.3 Attraction strategies

Since 2007, the department has developed a number of teacher workforce initiatives to attract teachers, including:

- scholarship and grant programs to attract graduate teachers
- five Teacher Education Centres of Excellence as a joint initiative with the Australian Government
- a campaign called *Make a difference. Teach* and a *Teach Team* to promote the vocation of teaching and recruit graduate teachers.

The scholarship and grant programs have variable success rates from 100 per cent to zero completion. DETE has not evaluated the success of these programs. The data indicates that, if the students complete their scholarships successfully, they are likely to stay with DETE even after their scholarship commitments are over.

Recipients did not complete the scholarship program for a variety of reasons including:

- non-completion of their qualification within time frames of the scholarship
- not meeting the employment suitability requirements of the department
- interstate relocation
- changed career choice (funds were repaid to DETE).

The department's *2012 Teacher Supply and Demand Snapshot* report states that the scholarship programs are intended to 'supplement supply, rather than fully meet supply'. The department states that this reflects the difficulties in quantifying demand in schools and budget constraints when determining the number of scholarships and grants to offer annually.

No evaluation is undertaken on the long term impacts of scholarship and grants programs. The lack of evaluation means DETE has missed opportunities to adjust the focus of the initiatives to reflect necessary changes identified in the monitoring and evaluation process. It does not know whether its workforce initiatives have achieved the desired outcomes, nor whether it has succeeded in addressing identified workforce gaps.

4.4 Recommendations

It is recommended that the Department of Education, Training and Employment:

- 3 develops and implements a strategy to reduce the imbalance in the supply of specialist subject teachers with a view to improving participation and achievement in Science, Technology, Engineering and Mathematics (STEM) subjects by June 2014**
- 4 develops forecasts for supply and demand of specialist subject teachers that produce more accurate and comprehensive estimates of need at the state and regional levels and by subject, including junior secondary subjects by June 2014**
- 5 integrates and coordinates its approach to workforce plans and initiatives at central, regional and school levels by December 2014.**

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Appendix A—Comments

Auditor-General Act 2009 (Section 64)—Comments received

Introduction

In accordance with section 64 of the *Auditor-General Act 2009*, a copy of this report was provided to the Department of Education, Training and Employment with a request for comment.

Responsibility for the accuracy, fairness and balance of the comments rests with the head of the agency.

Comments received

Response provided by the Director-General, Department of Education, Training and Employment on 1 October 2013.



Department of
Education, Training and Employment

01 OCT 2013

Mr Andrew Greaves
Auditor-General
Queensland Audit Office
PO Box 15396
CITY EAST QLD 4002

Dear Mr Greaves

Thank you for your letter dated 11 September 2013 regarding the performance audit on the supply of specialist subject area teachers.

Please find enclosed a final statement to accompany the report.

I wish to advise that a number of aspects to the Queensland Government's current reform agenda may impact on the Department of Education, Training and Employment's ability to meet the proposed timeframes, including:

- the transition to increased school autonomy;
- the whole-of-Government review of information systems; and
- the imperative to reduce burden of administrative red tape for frontline service delivery.

The Department's willingness to respond to the recommendations provided by your office is genuine, and I seek your cooperation to ensure the expectations for our policy response is realistic and achievable.

Thank you for your agency's continued support to build a culture of continuous improvement in relation to the Department's workforce planning processes.

Should your officers require further information regarding this matter, I invite them to contact Mr Patrick Bryan, Executive Director, Workforce Initiatives, by email at patrick.bryan@dete.qld.gov.au or on telephone 3405 6358.

Yours sincerely

A handwritten signature in blue ink that reads 'Dr Jim Watterston'.

DR JIM WATTERSTON
Director-General

Ref: 13/335812
Your Ref: 2013-9107P

Enc

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ABN 76 337 613 647

Comments received

Response provided by the Director-General, Department of Education, Training and Employment on 1 October 2013.

A performance audit on the supply of specialist subject area teachers: Department of Education, Training and Employment response

Introduction

During 2013, the Queensland Audit Office (QAO) has conducted a performance audit of matters relating to the delivery of specialist teaching services in Queensland state schools. The objective of this audit was to assess how effectively the Department of Education, Training and Employment (DETE) attracts and places specialist subject teachers in secondary schools to maximise the academic outcomes of students. The audit looked at the issue of supply and demand across specialist subject areas in secondary schools generally but focused on science and mathematics.

The outcomes of this review are found in *The supply of specialist subject teachers in secondary schools: a report prepared for the Queensland Parliament*.

The report found that, whilst the overall supply of secondary teachers is meeting demand, there is a shortage of secondary mathematics, science and industrial design and technology teachers and an oversupply of primary teachers and secondary physical education and music, drama and dance teachers which reduces DETE's ability to provide universal access to high quality state education in secondary schools.

The audit also found issues in relation to:

- the current approach to staffing state secondary schools in Queensland; and
- the availability of reliable data on teachers' qualifications and competencies.

The Department of Education, Training and Employment acknowledges the efforts of the QAO to support DETE's approach to workforce planning for secondary specialist teachers.

The five recommendations contained within the report are supported in principle. Additional comments regarding the recommendations are provided on the separate template.

DETE Response

Summary

- DETE undertakes ongoing strategic workforce planning processes and has identified increasing risk in relation to attracting teachers for some high demand teaching areas and locations.
- Whilst DETE has implemented a range of strategies to ameliorate this risk over time, some issues require further action.
- The issues in relation to mathematics and science teachers are not limited to Queensland. They are both national and international, with all Australian states and territories reporting similar risks.
- Recent announcements by the Queensland Government provide policy direction and resources for further action to mitigate looming risks to teacher staffing.

Background

Over recent years, DETE has strengthened its focus on monitoring the supply, demand and quality of Queensland school teachers.

Comprehensive internal analyses have been developed in 2005, 2007, 2010 and 2012; providing a snapshot over time of available data and related issues. These analyses have indicated that, whilst the supply and demand of teachers remains broadly in balance, there have been increasing challenges in attracting quality teachers for particular teaching areas and school locations. DETE's analyses identify increasing challenges in sourcing secondary mathematics, science and industrial design and technology teachers, and an oversupply of primary teaching graduates.

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For Queensland, the issue has grown largely as a result of the vast spread and geographical diversity of schools, along with a tight labour market in which many occupations have been struggling to attract and retain quality staff.

Actions to address identified issues

DETE has sought to gain strategic leverage to address these issues through:

- close and sustained engagement with Queensland universities to influence the quality and mix of Queensland teaching graduates;
- establishment of working groups with the independent and Catholic schooling sectors and the Queensland College of Teachers to establish an industry voice for engagement with the higher education sector; and
- active participation within the national education governance architecture to influence national policy in relation to initial teacher education.

Operationally, DETE has responded to these analyses through development and implementation of a range of initiatives to attract and retain a quality teaching workforce, especially for high demand teaching areas, including:

- refreshing the *Make a difference – teach* recruitment campaign to provide timely information on the profession and teaching opportunities in state schools, and to highlight DETE's demand for teachers in high demand teaching areas;
- revision of the Remote Area Incentive Scheme, which offers financial incentives for teachers to work in rural and remote school communities;
- establishment of five pilot Teacher Education Centres of Excellence to identify high-performing preservice teachers with high demand specialist teaching skills, and growing their capabilities to work in the state schooling sector;
- provision of scholarship and grant programs to encourage teaching aspirants to consider and accept teaching positions in high demand teaching areas in rural or remote locations, including:
 - *Step into Teaching* Scholarships, which offer financial and non-financial support to non-teaching aspirants to undertake a postgraduate teaching qualification and teach mathematics or science in a rural or remote school;
 - teacher re-training scholarships for high demand teaching areas that build capabilities in existing staff who have indicated a willingness to move into a difficult-to-staff area to address regional shortages;
 - paid rural and remote internships, through which preservice teachers with high demand skills undertake extended internships in non-urban schools through which they may be provided with offers of permanent employment; and
 - *Beyond the Range* professional experience grants, which provide financial incentives for high quality preservice teachers to undertake a practicum in a rural or remote school.
- working with the Queensland College of Teachers and universities to explore options for creating innovative pathways into teaching for aspirants possessing high demand knowledge and skills and who have the requisite personal attributes of a great teacher; and
- expanding the Remote Area Teacher Education Program which supports Aboriginal and Torres Strait Islander Queenslanders to gain an educational qualification whilst largely remaining within their remote community.

These are in addition to targeted recruitment actions to directly fill identified school vacancies by:

- making early offers to final year preservice teachers;
- facilitating intra and inter regional required and requested transfers;
- negotiating with Queensland universities to use their websites to provide information on employment opportunities and link graduates directly to the DETE website;

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- promotion of employment opportunities through advertising in *The Courier Mail* and *The Australian* and *seek.com*; and
- expediting early offers of permanent appointment to teaching graduates for high demand teaching areas.

Importantly in relation to the QAO report, a *Junior Secondary Teacher Attraction Action Plan* has been established that details the initiatives and activities that will be engaged to attract and recruit aspiring, preservice and existing teachers to meet the projected workforce demand from the transition of Year 7 into secondary settings in 2015.

The plan contains a range of actions including:

- defining the capabilities, specific skills, knowledge and attributes essential for people looking to teach in the Junior Secondary learning phase;
- creating specific Junior Secondary Pathways for aspiring and preservice teachers;
- communication and marketing activities;
- a Junior Secondary Teacher Scholarship Model; and
- an Expression of Interest Register for existing state school teachers.

Planned actions

DETE will work to not only address the QAO report recommendations, but also progress further planned actions to improve workforce planning processes, improve the quality of teaching in schools, and improve the supply of teachers for schools in high demand teaching areas, such as:

- working with the state secondary principals' associations to develop a specialist attraction plan, focussed on ensuring an improved supply of teachers for subject areas such as senior science and maths, and industrial technology and design;
- exploring options for establishing university-school partnerships to build on the learning from the pilot Teacher Education Centres of Excellence and create training school clusters to play a new role in preparing specialist teachers for Queensland state schools;
- working directly with schools to develop an approach to providing scholarships and other incentives to attract teaching graduates in high demand specialist teaching areas that meets the demand and expectations of an increasingly autonomous state schooling sector;
- working with schools to develop workforce planning capabilities, processes and systems that can be aggregated to provide local and systemic indicators of current and future demand;
- cleansing data contained with the DETE teacher applicant pool to provide greater certainty for schools and staffing officers seeking to recruit candidates for teaching positions; and
- working to strengthen the integration of effective evaluation strategies into project planning processes.

Constraints

Several key constraints have impacted on DETE's ability to fully address the issues that have been mutually-identified to this point in time. These include:

1. data limitations

DETE is currently acting to refine and improve personal and deployment data on its current workforce through refinements to payroll data systems, the OneSchool information system and other systems that will provide more detailed information regarding both school and system demand and workforce qualifications and competencies. DETE is currently working with all states and territories to develop the first national teaching workforce dataset, which will be available to support strategic workforce planning from 2014.

Whilst these actions are continuing, currently available data to support effective workforce planning is imperfect, and requires supplementation through staff surveys and other ad hoc mechanisms,

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which collectively provide indicative – but not precise – overviews of the workforce and school demand.

Further, DETE currently has no formal mechanism for requiring universities to provide timely data regarding the preservice teacher supply chain. Instead DETE relies on publicly-available national aggregated data and voluntary returns from universities to determine indicative supply.

2. limited influence on supply chain

Universities are funded by the Australian Government, and state governments have limited capacity to influence matters relating to the business functions of individual institutions. This is despite the high interest to employing authorities of matters such as:

- setting aspirant entry standards to programs that meet industry expectations;
- requiring a focus on specified content within programs; and
- ensuring the mix of graduates' teaching areas meets the schooling sectors' needs.

Whilst DETE has over time met frequently with university executives to seek innovations and changes to practice, the influence on programs and graduate outputs has been limited.

3. funding

DETE is actively supporting the Queensland Government's commitment to return our State to a sound fiscal position. In this context, government funding is correctly directed to support frontline service delivery and that funding available to support teacher attraction and retention initiatives is limited. Therefore scholarship and grant programs have not sought to meet overall demand, but have been targeted to boost the supply of quality teachers for specific locations.

Current Queensland Government action

Whilst issues remain in relation to both the supply and quality of teaching graduates for Queensland schools, the actions outlined above have yielded positive outcomes, and are now the focus for specific strategic action through two key Queensland Government initiatives.

Great teachers = Great results

On 8 April 2013, the Premier and the Minister for Education, Training and Employment announced *Great teachers = Great results: A direct action plan for Queensland schools*. The Plan focuses on education reform in two critical areas:

1. Professional excellence in teaching: elevating teaching standards across the board, rewarding high performance and positioning the highest-performing teachers where they are needed most; and
2. Boosting school autonomy: empowering and enabling school leaders and teachers to drive improved outcomes for students, including strengthening discipline in schools.

The Plan represents an investment of \$535 million over four years commencing in 2015; these funds being additional to the almost \$6 billion the Queensland Government already invests in schooling, including \$98 million for the non-state schooling sectors to implement similar reforms.

The Plan will improve the status of teachers, reward our high-performing teachers through accelerated career pathways, and enable struggling schools access to the highest performing teachers.

One of the Plan's commitments is to improve professional excellence in teaching by ensuring that teachers are well-supported from the beginning of their career as they make the transition from graduate to skilled professional.

In helping to support teachers to reach their full potential, the Plan commits to introducing an accredited mentoring program for new teachers to learn from experienced, high-performing teachers.

Additionally, high-performing teachers and principals will have the opportunity to be rewarded under these initiatives.

Whilst collectively these actions will boost the standards of Queensland's teachers and school leaders, of importance to the issues identified by the QAO is the new investment in growing mentoring capability

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across the teaching workforce, and linking these trained mentors with those who will most benefit from a formal mentoring relationship.

The Plan also provides for the expansion of Independent Public Schools, through which principals – working with their local school communities – will obtain great autonomy in decision-making including in relation to recruiting the teachers they require and deploying them according to local need.

A Fresh Start

In July 2013, the Queensland Government released *A Fresh Start: improving the preparation and quality of teachers for Queensland schools*. This new strategy builds on the *Great teachers = Great results* action plan and addresses recommendations from the recent Teacher Education Implementation Taskforce report.

In April 2010, the Government appointed Professor Brian Caldwell and Mr David Sutton to undertake a review of the quality of teacher preparation provided by Queensland teacher education institutions and the support given to beginning teachers. The review made recommendations about:

- the content of preparation programs;
- the practical experience trainee teachers receive;
- the level and duration of preservice programs;
- admission requirements;
- school and teacher education institution partnerships;
- induction to the profession and peer mentoring; and
- evaluating the preparedness of graduates for professional practice.

The Queensland Government supported some recommendations for immediate implementation. These related to good practice and program content in six key areas: Indigenous education, special needs, behaviour management, early childhood education, parental education and professional standards.

A number of broader recommendations were referred to a Teacher Education Implementation Taskforce, which considered these and provided a report to the Queensland Government in January 2012 that contained a series of policy responses with regard to:

- the management of teacher supply and demand;
- improving the quality and delivery of teacher education programs, including the management of professional experiences; and
- enhanced induction for beginning teachers.

A Fresh Start represents the Queensland Government's response to the Taskforce report, and details a suite of interconnected strategic initiatives focused on:

- attracting the highest quality applicants into the teaching profession (teacher supply);
- ensuring they have the essential skills, knowledge and experience required for the diverse real world of contemporary Queensland schools (initial teacher education); and
- supporting their transition from preservice to beginning teacher (effective supervision, mentoring and induction).

The strategy acknowledges that the Government plays a key role in preparing teachers and commits us to actions which will ensure preservice teachers in Queensland meet a consistent standard prior to gaining teacher registration.

The strategy also encourages higher education institutions to work more closely with schools and teachers to support the development of preservice teachers, and — importantly in the context of the QAO recommendations — to ensure the mix of graduates meets the needs of the three Queensland schooling sectors.

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The mechanism provided within *A Fresh Start* that requires Queensland universities to respond more directly to the needs and expectations of the three schooling sectors is the introduction from 2015 of Professional Experience Agreements.

Queensland has agreed to implement the *Accreditation of Initial Teacher Education Programs in Australia: Standards and Procedures* which were developed by the Australia Institute for Teaching and School Leadership (AITSL), as the basis for a nationally-consistent approach to ensuring a consistent quality of programs across Australia. The Standards and Procedures require that the professional experience component of programs must include no fewer than 80 days of well-structured, supervised and assessed teaching practice in schools in undergraduate and double-degree teacher education programs and no fewer than 60 days in graduate entry programs.

Professional experience must be undertaken in a school setting. A graduate from an initial teacher education program who has not met the requirement regarding professional experience will not be eligible for registration as a teacher.

Professional Experience Agreements will provide access to schools across all three schooling sectors to higher education providers who agree to a range of terms, including improving the alignment between teacher supply and demand, and the sharing of more accurate and timely data to build a more clear understanding of the graduate teacher supply chain.

DETE has commenced further development and implementation of *A Fresh Start* with stakeholders including Independent Schools Queensland, the Queensland Catholic Education Commission, the Queensland College of Teachers and higher education institutions.

Broader context

DETE welcomes that the QAO Report acknowledges the national and international context in relation to the issues raised.

There is considerable data and research that indicates that challenges in relation to teacher quality and supply — especially for specialist teaching areas such as mathematics and science — exist internationally in most developed countries. Even where policy innovations are implemented, significant shortfalls in suitable aspirants are reported.

For example, research by Professor John Howson of Oxford Brookes University and Data for Education¹, suggests that up to 30 per cent of maths places on teacher training courses in the United Kingdom were unfilled, with similar issues in physics, modern foreign languages and English.

The Journal of Mathematics and Science² also reports a growing shortage of science and mathematics teachers in the United States. To address this issue nationally, President Obama has proposed an \$80 million investment as part of a public-private partnership to prepare 100,000 new math and science teachers over the next decade (10,000 per year)³.

The Australian context was captured recently in a report developed by the Productivity Commission on the schools workforce⁴ which was requested by the Australian Government on behalf of the Council of Australian Governments (COAG).

The Productivity Commission report found that there are ongoing national imbalances in the supply and demand of different groups of teachers, with persistent surpluses of general primary teachers in metropolitan areas and, at the same time, shortages persisting in certain secondary subject disciplines, and more generally in rural, remote and Indigenous schools. The report found that some low socioeconomic status schools in urban areas are also difficult to staff and that special-needs teachers are in short supply. It concluded that many of these imbalances — some of which, as noted by the QAO, can compromise student outcomes — seem likely to persist for some time, although future magnitudes are difficult to predict and will be affected by a number of factors.

¹ <http://www.bbc.co.uk/news/education-23134979>

² <http://www.math.vcu.edu/g1/journal/Journal7/Part%20/Sterling.html>

³ White House, "President Obama to Host White House Science Fair," news release, February 6, 2012; President Obama's Goals for America, <http://www.barackobama.com/goals/>

⁴ <http://www.pc.gov.au/projects/study/education-workforce/schools/report>

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DETE met with the Commission during the development of the report, and provided a written submission which included concerns regarding the lack of alignment between graduate supply and demand in specific specialist teaching areas, and suggested this imbalance will possibly grow as a result of the *Commonwealth Higher Education Support Amendment (Demand Driven Funding System and Other Measures) Bill 2011*, through which from 2012 the Commonwealth no longer specifies how many undergraduate student places it will fund public universities to provide.

As noted by the Productivity Commission, the issues are common across Australia. This has resulted in several states taking unilateral action to devise local solutions.

In 2012, the Victorian Government released the *New directions for school leadership and the teaching profession* discussion paper. The paper highlighted that the quality of teaching has one of the greatest impacts on student outcomes, and that all education systems in the global top tier of school performance have engaged in ambitious workforce reform. It also describes three key reform areas:

- attract great people into teaching: attract stronger candidates and improve their preparation;
- create a high performance profession: stimulate a culture of excellence and effective professional development; and
- provide strong direction and support: elevate the role of leadership at school and system levels.

The discussion paper aims to stimulate and inform discussion on the future of the teaching profession and school leadership in Victoria. The Victorian Government is currently considering its response to the feedback received on the paper.

The New South Wales (NSW) Government has commenced implementation of its *Great Teaching, Inspired Learning* plan, which provides a set of 16 reforms across the whole career cycle of a teacher; from initial teacher training and induction for beginning teachers, through to how to best recognise and value experienced teachers and support potential school leaders to improve the quality of teaching and learning in the state's schools. The plan includes:

- greater support to beginning teachers with all permanent beginning teachers in NSW government schools from 2014 to have two hours per week relief time, mentoring and support;
- new incentives to attract the best people into teaching degrees; and
- greater empowerment for principals to enforce higher professional standards and recruit and deploy teachers according to local need.

Final comment

DETE does not seek to step away from the issues raised within the QAO report. The importance of schools being able to provide the educational services Queensland families expect cannot be over-stated and the growing risk of teacher shortages in specific subject areas requires action.

As outlined within this document, DETE has been working to ameliorate this risk and the QAO report provides added impetus to boost efforts in this area.

Further momentum has been provided by the release of two new Queensland Government programs in *Great teachers = Great results* and *A Fresh Start*, which will lead to new relationships and partnerships between higher education providers and schooling systems, and a significant cultural change within schools focused on teaching excellence.

DETE will direct effort to achieving the five recommendations provided by the QAO and looks forward to providing the Queensland Parliament with reports as required on progress against these so that both Parliament and the people of Queensland retain confidence that our schools have access to the workforce they need to deliver an education system the equal of those in the highest-performing systems in the world.

Responses to recommendations

Responses to recommendations provided by the Director-General, Department of Education, Training and Employment on 1 October 2013.

Responses to recommendations

Response to recommendations provided by Director-General, Department of Education, Training and Employment

Recommendation	Agree / Disagree	Additional Comments
1. improve the quality of the information on teacher subject capability and competence available to staffing officers and principals to improve the placement of teachers at schools and on school timetables by December 2014	Agree	Any modifications to existing systems or implementation of new systems is subject to wider whole-of-government reviews of information systems and identification of appropriate funding sources. The Department has commenced actions to improve the data provided by higher education providers to quantify teacher supply.
2. provide teachers who are teaching subjects out of their field of expertise with the support and professional development needed to develop the content knowledge and pedagogical skills relevant to the subject being taught by June 2014	Agree	The Department will undertake a needs assessment of the secondary teacher workforce to inform relevant professional development programs specifically aimed at curriculum content and in the context of IPS/School outsourcing and schools in identifying appropriate support mechanisms.
3. develop and implement a strategy to reduce the imbalance in the supply of specialist subject teachers with a view to improving participation and achievement in Science, Technology, Engineering and Mathematics (STEM) subjects by June 2014	Agree	A plan for this purpose is currently being developed in partnership with schools and the peak secondary school principals association. The Department also released A Fresh Start strategy to improve the supply and mix of graduates from Queensland higher education institutions.
4. develop forecasts for supply and demand of specialist subject teachers that produce more accurate and comprehensive estimates of need at the state and regional levels and by subject, including junior secondary subjects by June 2014	Agree	Revised forecasts can be developed in 2014, based on the available information. As information sources and systems improve, concurrent future improvements in supply and demand forecasting can be expected.
5. integrate and coordinate its approach to workforce plans and initiatives at central, regional and school levels by January 2015.	Agree	Integrated approaches to workforce planning can be developed, but implementation may be impacted by broader government education policy, including expectations for school red tape reduction and expansion of the school autonomy agenda.

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Appendix B—Audit details

Audit objective

The objective of the audit was to examine how effectively the Department of Education, Training and Employment (DETE) attracts and places specialist subject teachers in secondary schools to maximise student academic outcomes.

Reasons for the audit

DETE is committed to improving academic outcomes including literacy, numeracy and science for every child in every classroom. It intends to achieve this through the attraction, retention and development of high quality teachers, supporting high quality teaching practices and fostering a culture of high expectations and enhanced school performance.

The Queensland College of Teachers (QCT) sets minimum qualification requirements for the registration of teachers. QCT does not set or recommend specific qualifications for specialist subject areas. A registered teacher can be employed to teach any subject at any year level in a school. The school / employer ultimately decides the specific subjects, grades or classes assigned to a registered teacher. Queensland state schools recruit from the pool of teacher applicants coordinated by regional human resource teams at DETE and must consider applicants from the transfer pool.

DETE has identified shortages of teachers in the following specialist subjects in specific geographic locations: chemistry; home economics; industrial technology and design; junior secondary; language studies, especially Japanese; mathematics B and C; physics; senior English; and special education. DETE predicts that these subject areas will continue to be in demand in the future.

Performance audit approach

The audit was conducted in accordance with the *Auditor-General of Queensland Auditing Standards—September 2012*, which incorporate the requirements of standards issued by the Australian Auditing and Assurance Standards Board.

The audit was conducted between January and September 2013 and examined the supply and demand for secondary specialist subject teachers statewide.

DETE is responsible for engaging Queenslanders in lifelong learning across the entire continuum, from early childhood education and care, through school education, and into training, tertiary education, and employment.

The areas within DETE subject to audit included:

- central office
- regional offices in south east Queensland, north Queensland, far north Queensland, Darling Downs and Brisbane
- state secondary schools (schools that are geographically dispersed) — Gympie State High School, Spinifex College, Tully State High School, Ravenshoe State School, Western Cape College (videoconference), Northern Area Peninsula State College (videoconference), Roma State College, Centenary Heights State High School and Brisbane State High School.

The audit included:

- an analysis of the department's human resource databases, workforce plans and scholarship programs
- analysis of pre-service teacher education enrolments
- interviews with the workforce modelling unit
- fieldwork at seven and videoconferences at two state secondary schools
- a paper based survey of 188 Queensland secondary principals which achieved a response rate of 90 per cent.

Auditor-General Reports to Parliament

Tabled in 2013–14

Report number	Title of report	Date tabled in Legislative Assembly
1	Right of private practice in Queensland public hospitals	July 2013
2	Supply of specialist subject teachers in secondary schools	October 2013

Reports to Parliament are available at www.qao.qld.gov.au