## CHAPTER NINE

# CONCLUSIONS AND RECOMMENDATIONS

## 9.1 INTRODUCTION

The National Survey revealed a wealth of information on a broad range of issues concerning science, ICT and mathematics education, with a particular emphasis on the different circumstances and needs in various parts of Australia. The findings point to significant inequities in the abilities of schools in different locations to provide quality education in science, ICT and mathematics to their students. Analysis of the National Survey data revealed that schools in rural areas (pop. < 25 000) have considerably greater staffing problems and higher unmet needs for professional development, material resources, support personnel and student learning opportunities, than do their counterparts in metropolitan centres. While parents/caregivers in rural areas are appreciative and supportive of local teachers, there is recognition that their children are disadvantaged in some respects by comparison with those in metropolitan areas.

This chapter summarises and discusses the main findings of the National Survey, and provides recommendations to education authorities about how the issues or inequities identified might be addressed. In making these recommendations, however, it is recognised that they follow from aggregated national findings. State and territory education authorities are best placed to judge the degree to which the findings and recommendations apply to their own situations.

## 9.2 STAFFING ISSUES IN SCIENCE, ICT AND MATHEMATICS

Respondents provided ground-level perspectives on a range of issues concerned with staffing, including their perceptions of staffing profiles in their schools, their motivations for teaching in rural or regional schools, their reflections on pre-service teacher education and preparation and finally, their teaching qualifications.

### 9.2.1 Demand and supply of teachers in rural and regional schools

1. Overall, about 13% of respondents reported a high annual teacher turnover (>20% p.a.) in their schools.
2. Reported rates varied significantly with location. Almost twice as many respondents from Provincial Area schools, and about six times as many from Remote Area schools, reported a high staff turnover rate (>20% p.a.) compared with their colleagues in Metropolitan and Provincial City schools.
3. The evidence indicates that it is significantly more difficult to fill vacant secondary science, ICT and mathematics positions than to fill vacant primary positions. Furthermore, the findings show that vacant primary and secondary positions are substantially more difficult to fill in Provincial and Remote Areas of Australia. Again, this problem appears more acute for secondary teachers.
4. The findings suggest that primary teachers in Provincial Areas are more than twice as likely, and those in Remote Areas up to six times more likely, than those in Metropolitan Areas to be working at a school in which it is very difficult to fill vacant teaching positions.
5. Results indicate that secondary science, ICT and mathematics teachers in Provincial Areas are about twice as likely, and those in Remote Areas about four times as likely, as

those in Metropolitan Areas to be working at a school in which it is very difficult to fill vacant teaching positions in those subjects. Teachers in Provincial City schools are also more likely than those in Metropolitan Area schools to consider it very difficult to fill teacher vacancies in these subjects.

6. Among secondary teachers, the evidence suggests that it is more difficult to fill vacant mathematics positions in Provincial and Remote Areas, than to fill science and ICT vacancies in these locations.
7. The difficulty in filling vacant ICT positions appears to vary less with geographical location. However, ICT teachers seem to be in shorter supply in Metropolitan Areas than are science or mathematics teachers.

*Discussion*

The findings provide a 'teacher perspective' on the rural school staffing problems revealed elsewhere in the literature (e.g., Harris et al., 2005; MCEETYA, 2003; Skilbeck & Connell, 2003). This is an important perspective, confirming inequities in the supply of qualified primary and secondary science, ICT and mathematics teachers to schools in different locations. These inequities have an obvious effect on the quality of education available to students in these locations. It is unlikely that students in a school that has a high turnover of staff, great difficulty in replacing these staff with qualified teachers, and where staff are required to teach outside their areas of expertise, are receiving the same quality of education, and are as supported in their learning, as are those in schools adequately staffed with established, well qualified and experienced teachers. In view of this situation, it is difficult to avoid the conclusion of Alloway et al. (2004) and others that students in these schools are educationally disadvantaged by comparison with their city peers. The findings indicate that this disadvantage is most acute for secondary students, due to the higher turnover rates in combined and secondary schools and greater difficulty filling science and mathematics vacancies.

### 9.2.2 Destination schools of city and country educated teachers

Analysis of the teacher surveys revealed a number of associations between the destinations of teachers and their locations while undertaking pre-service teacher education.

1. The findings revealed a tendency for teachers who attended high school in a rural or regional centre to move to a larger centre when undertaking their teacher training. This is not surprising, as nearly all universities and teachers' colleges are, or were, located in large centres, with most in the capital cities. In some states there are no such institutions outside Metropolitan Areas.
2. The findings exposed a tendency for teachers to gain employment in locations similar to those in which they lived while undertaking pre-service education. The study found that 73% of respondents who lived in rural centres while completing their teacher education are currently working in Provincial Area or Remote Area schools. Only 5% of respondents who lived in rural centres during their teacher education were currently working in Metropolitan schools.
3. On the other hand, the findings did not provide any evidence that teachers who lived in Rural Centres while attending high school or completing teacher education gain employment in Remote Areas. Rather, there appears to be a pattern of drift to larger centres.
4. The findings revealed that a greater-than-expected proportion (over 70%) of science, ICT and mathematics teachers lived in metropolitan centres during their teacher education. In view of finding 2, above, it is likely therefore that beginning teachers in these subject areas will tend to seek employment in Metropolitan rather than Provincial or Remote Area schools.

*Discussion*

The two most important findings in this section are the strong relationship between where teachers lived while undertaking their pre-service teacher education and where they subsequently teach, and the finding that over 70% of secondary science, ICT and mathematics teachers lived in Metropolitan Areas while completing their teacher education. These findings point to a greater supply of science, ICT and mathematics teachers in Metropolitan Areas, which is the current situation. In an environment of overall declining teacher numbers in these subjects (MCEETYA, 2003; 2005), it is clear that demand for these teachers in rural areas will increasingly outweigh supply.

### 9.2.3 Motivations for teaching in rural and regional schools

In order to understand the influences on staffing patterns and teacher motivations to work in rural and regional schools, the survey investigated the influences on teachers' decisions to work in, or to leave, these schools. The findings provide a solid basis for understanding these motivations and for suggesting what steps can be taken to address the staffing problems identified above.

*Motivations for moving to rural or regional schools*

1. Overall, teachers initially taking up positions in these schools were primarily motivated by job availability, educational authority placement, and having previously lived in the same or a similar location.
2. The influence of motivational factors seems to vary with the sex of the teacher. Male respondents were generally more motivated by financial and advancement considerations whereas females placed greater priority on family factors, such as spouse employment or location of other family members.
3. There is evidence that the influence of motivational factors has changed over time. Those who started their teaching careers 30 or so years ago were often allocated to rural or regional schools by education authorities, either through placement or scholarship bonds. However, these systems were not so influential (or perhaps extant) among younger teachers who were more motivated by job availability and whether they had previously lived in the same or a similar location. Younger teachers were also more motivated by financial inducements such as rent subsidies, affordable housing and allowances, while older teachers were more influenced by the situation of their partners.
4. Respondents from Government schools were more likely to have taken up a position at a rural or regional school due to education authority placement than were teachers in other systems.
5. The low mean ratings for subsidies and allowances possibly reflect the relatively small number of respondents who qualified for these incentives.

*Motivations for remaining at a rural or regional school*

1. The greatest influences on teachers' decisions to stay in rural and regional schools were their enjoyment of the lifestyle and community spirit. Family links and partner's employment were also very influential.
2. The highest motivating school characteristic was small class size.
3. Female teachers considered their family situation to be more influential than did males, who rated the cost of living and quality of the lifestyle higher than did females.
4. Consistent with the findings on initial motivations, younger teachers were more inclined to remain in a rural or regional school because of financial considerations than were their older colleagues.
5. Promotion or advancement opportunities were also a greater incentive among younger teachers.

*Motivations for leaving a rural or regional school*

1. Respondents had a wide variety of mainly personal reasons for leaving rural and regional schools.
2. For the most part, these reasons were family related, such as changes in a partner's employment situation, or to improve educational opportunities for their own children.
3. Other teachers left due to a sense of social or professional isolation.
4. While problems with the school or community were the least influential factors, younger teacher tended to rate these as more influential than did older teachers.
5. Primary teachers rated these problems as less influential on their decisions than did teachers at secondary or combined schools. Professional isolation was a greater motivation among secondary and combined school respondents.

*Motivations for moving from a metropolitan to a rural or regional school*

1. Metropolitan teachers considered that smaller class sizes and preference for future transfers had the highest motivational value in terms of moving to a rural or regional school.
2. Financial incentives such as cheaper housing, rent and travel subsidies and allowances were also potentially influential.
3. The youngest group of teachers considered financial and advancement incentives to be substantially more influential than did their older colleagues.
4. Opportunities to work with a smaller staff, or with Indigenous students were the least influential items.

*Discussion*

The finding that education authority bonds or placement were the reasons most teachers initially took up positions in rural and regional schools has a number of implications. First, since most teachers, particularly secondary teachers, were educated in metropolitan centres, it is questionable whether these teachers would have taken up rural teaching positions without such a strategy. Second, it is noteworthy that, once placed, many teachers remained because of satisfaction with the lifestyle and community, or through establishing family ties. However, without the initial placement, it is unlikely these factors alone would have attracted many city-bred teachers.

The analysis of destinations of teachers educated in different areas revealed a pattern of drift from smaller to larger centres. Furthermore, it provided evidence that young teachers are influenced principally by their familiarity with an area and whether they have contacts there. Because of these trends, and the aforementioned fact that most teachers are educated in metropolitan areas, it is difficult to see how rural and regional schools can be properly staffed in the future without either a system of obligatory placement or the development of more effective incentive schemes.

The findings indicate that younger teachers are more motivated than older colleagues by financial inducements such as rent subsidies, affordable housing and allowances. Opportunities for future promotion or preferential transfer were also deemed to be influential, even among experienced teachers. Nevertheless, the present high turnover rates and difficulties filling vacancies indicate that current incentive schemes are not effective, although this would probably vary across states/territories.

Finally, it is significant that a relatively high proportion of teachers who left rural schools did so in order to improve the educational opportunities for their own children. While it is understandable that a teacher would want to maximise these opportunities, such decisions may

also suggest to the community that the standard of education in rural schools is inadequate. Thus, the decision has a compounding and self-perpetuating effect, particularly as it removes at least one more professional person from the community.

### 9.2.4 Perceptions of teacher education and preparation

Primary and secondary teachers were asked to reflect on how well their pre-service teacher education had prepared them for various aspects of their careers. The findings in this section refer to the suitability and effectiveness of respondents' pre-service education, not to their current skill levels.

*Primary teacher preparation*

1. The findings suggest that primary teachers in general feel they were well prepared by their teacher education for teaching mathematics, though considerably less so for teaching science. This was the case for teachers of all ages, indicating that there has been little variation over time in the emphasis given to teaching mathematics and science at the primary level.
2. Most primary teachers also seem to feel that they were reasonably well prepared for teaching in rural and regional schools, and for managing student behaviour. While there was little variation with age in the former, the youngest teachers tended to feel they were better prepared for dealing with student behaviour than were their older colleagues. This may be due to changes in the way teacher education institutions approach the issue of student management, or to younger teachers having less experience of a range of student behaviours.
3. The evidence suggests that primary teachers were considerably less well prepared for teaching Indigenous and NESB students, and for using ICT across the curriculum. It is reasonable to argue that the significant variation with age across a range of specific teaching skills is indicative of the changes in emphasis in teacher preparation over time, particularly with regard to using ICT, and catering for student diversity in the classroom. Acknowledgement by older teachers that their initial teacher education did not prepare them well for aspects of their current teaching environments underscores the importance of providing ongoing professional development.
4. In relation to specific skill preparation, the findings indicate that primary teachers who lived in provincial cities or regional centres during their initial teacher education felt better prepared in some respects by this experience than did those who were located in metropolitan centres. This was particularly the case for preparation for teaching in rural and regional schools.

*Secondary teacher preparation*

1. The findings indicate that secondary science and mathematics teachers feel their teacher education prepared them relatively well for teaching their subjects. This was generally the case for teachers of all ages. However, it is also apparent that most ICT teachers feel their initial teacher education did not prepare them well for teaching their subjects. This is understandable given the relative novelty of ICT as a school subject and the dynamic nature of ICT in general.
2. Secondary teachers appear to have been reasonably well prepared for teaching in rural and regional schools, and for managing student behaviour. There is strong evidence that younger teachers feel better prepared by their pre-service education for incorporating ICT and catering for student diversity than do their older colleagues. As with primary teachers, this is probably indicative of changes in the educational landscape over time, and demonstrates the need for ongoing professional development.

3. The findings indicate that secondary science, ICT and mathematics teachers who lived in provincial cities or regional centres during their initial teacher education feel better prepared in some respects by this experience than do those who were located in metropolitan centres. This was particularly the case for preparation for teaching in rural and regional schools.

*Discussion*

The finding that primary teachers generally felt less well prepared by their pre-service education for teaching science than for teaching mathematics is consistent with the conclusions of Goodrum, Hackling and Rennie (2001) and Harris et al. (2005), who found that primary teachers are not as confident in teaching science as they are in other subjects. Secondary science and mathematics teachers felt they were relatively well prepared for teaching in their subject area. Nevertheless, the findings suggest that few ICT teachers feel their pre-service education prepared them adequately for teaching ICT subjects. In view of the relative novelty and dynamic nature of the subject matter, equipment and pedagogical models, this comes as no surprise. ICT teachers, more than any other group, are required to learn on the job, a situation that has implications for their professional development.

All teacher groups felt generally well prepared to teach in rural and regional schools, although those who had lived in rural or regional centres during their teacher education tended to feel considerably better prepared. While this is understandable since no city universities insist on their students having teaching experiences in a rural area (Boylan, 2003; Halsey, 2005), the finding may be a cause for some concern because of the high proportion of teaching students enrolled in metropolitan universities. In Western Australia, Tasmania and South Australia, for example, all universities are located in Metropolitan Areas.

### 9.2.5 Teacher qualifications

Primary and secondary teachers were asked to describe their levels of qualification and experience. They were also asked whether they had been required to teach courses for which they are not formally qualified.

1. Overall, more than 85% of respondents held either a Bachelor's degree (plus an undergraduate or postgraduate diploma) or some type of postgraduate teaching qualification.
2. The qualifications of primary and secondary science, ICT and mathematics respondents did not vary significantly with age, sex or geographic location.
3. There was strong evidence that many science, ICT and mathematics teachers are being required to teach subjects for which they are not qualified. Furthermore, the findings suggest that teachers in Provincial Areas are about twice as likely, and those in Remote Areas more than three times as likely as those in Metropolitan Areas to be required to teach a subject for which they are not qualified.
4. The findings also suggest that ICT teachers are more likely to be required to take classes in another subject area than are science teachers. Mathematics teachers are least likely to be asked to take such classes.

*Discussion*

The study found that the qualifications of teachers do not vary significantly with age, sex or geographic location. While this might be taken as indicating that students in different areas have equal access to qualified teachers, the study also found that secondary teachers in Provincial and Remote Areas are, respectively, two to three times more likely to be required to teach outside their subject areas than are those in Metropolitan Area schools. The implication is

that students in metropolitan schools are more certain of having a specialist teacher for each of their subjects than are students in Provincial and Remote Area schools. This has obvious implications for the understanding and achievement levels of senior students in different locations.

### 9.2.6 Recommendations to address staffing concerns

*Attraction and retention of teachers for rural schools*

1. It is recommended that education authorities review their rural and remote recruitment incentive schemes in the light of motivational factors identified by the National Survey, with a view to:
   a. extending the eligibility of schemes to apply to a broader range of locations
   b. providing a system of progressive incentives that reward retention
   c. including incentives which would appeal to experienced science, ICT and mathematics teachers and school leaders
   d. ensuring greater awareness of such schemes among pre-service and existing teachers

Components of a progressive incentive scheme could include:

- ongoing career development tied to retention (e.g. targeted leadership training)
- professional development (e.g. qualification for sabbatical after a period of service)
- improved leave entitlements (maturing at intervals of service)
- a progressive rather than flat system of financial incentives
- inbuilt relief in staffing formulae for locations where there is difficulty employing relieving and short term contract teachers.

2. It is recommended that government and non-government education authorities develop or extend scholarship schemes targeting pre-service or beginning science, ICT and mathematics teachers willing to take up appointments in rural and regional schools. Federal and state/territory governments and relevant non-government bodies should examine current scholarship schemes to determine how they might be made more economically efficient, and be monitored for effectiveness.

It is recognized that several state/territories already have scholarship schemes in place, and in some cases these have recently been reviewed. Evidence from the National Survey supports the expansion of such schemes to specifically target pre-service secondary science, ICT and mathematics teachers willing to work in rural or remote schools.

Potential obstacles to the uptake of such scholarships among pre-service teachers include the personal economic difficulties (employment obligations, accommodation, etc.) they may experience in undertaking practical experiences in rural schools. Scholarship schemes would need to take account of these difficulties, especially among students in metropolitan universities. An alternative approach might be to expand the number of places for pre-service teaching programs in science, ICT and mathematics at rural and regional universities (where they exist). Education authorities should also explore scholarship schemes whereby they pay some or all of a teacher's Higher Education Contribution Scheme (HECS) debt. Research by Roberts (2005) suggests that beginning teachers would be strongly motivated by a significant reduction in their HECS debt.

Finally, it is important that such schemes be monitored against outcomes to assess their effectiveness in the short and long term.

3. It is recommended that education authorities, in partnership with universities, local councils, industries and businesses develop or improve strategies to promote the advantages of living and teaching in rural communities.

Strategies could include publicity campaigns promoting rural teaching, aimed at both pre-service and experienced teachers. Education authorities could also collaborate with university education faculties to engage experienced rural teachers to address pre-service teachers about the benefits and challenges of rural schools. Another strategy could be the development of programs whereby groups of pre-service students visit rural and remote schools (e.g. *Beyond the Line* in New South Wales) if something similar is not already in place.

*Support for rural teachers*

4. It is recommended that state/territory education systems sponsor the establishment of a professional Association of Rural Educators, with a central office in a regional area of each state/territory and branches in rural areas. The charter of the association would include:
   a. supporting the orientation of new teachers
   b. supplementary peer support
   c. advocating for rural teachers
   d. enhancing the status of rural service
   e. promoting a sense of collegiality between rural teachers
   f. maintaining the institutional memory of the profession in rural areas

5. It is recommended that education authorities, in collaboration with universities and professional organisations, establish a Rural School Leadership Program. This program would have both an incentive and a developmental dimension, be highly selective and competitive, and target experienced teachers with significant leadership potential. Components of the program may include:
   a. further university education, such as accredited action research (towards a masters or doctoral degree)
   b. links to international rural teacher networks, with the possibility of an exchange program
   c. fast-tracked entry into regional and state Succession Planning programs
   d. provision of personal online coaches/mentors to assist with professional learning pathways and skill acquisition.

Details of the support mechanisms and financial arrangements underpinning aspects of the program, such as further education, would need to be negotiated by the program partners.

Nevertheless, such a program would enhance the attractiveness of rural service among experienced teachers, and the status of rural teaching in general.

*Pre-service preparation for rural teaching*

6. It is recommended that Centres of Excellence in rural and regional pre-service teacher education be established at universities in each state and territory. The National Survey findings clearly support the establishment of such centres in regional universities, where these exist. In states/territories without rural universities, the centres could be established in one or more metropolitan universities committed to rural education.

7. It is recommended that the federal government, in partnership with universities, allocate additional student places in primary teaching and secondary science, ICT and mathematics teaching programs in the aforementioned Centres of Excellence in Rural Education.

8. It is recommended that parties involved in the emerging national and state/territory standards frameworks for pre-service education include standards requiring that:
   a. primary teachers are adequately prepared for teaching mathematics, science and ICT
   b. all teachers are able to address the learning needs of students in rural and regional areas, especially Indigenous students.

## 9.3. PROFESSIONAL CONNECTEDNESS AND ISOLATION OF TEACHERS

Teachers were asked a range of questions to determine their professional development needs in science, ICT and mathematics, and whether they felt professionally connected to, or isolated from, their peers.

### 9.3.1 Professional development needs of primary teachers

1. The findings indicate a strong need for professional development opportunities for primary teachers to develop their ICT skills, and to help them cater for special needs and gifted and talented students.
2. The findings provide strong evidence that primary teachers in Remote Areas are significantly disadvantaged in terms of accessing professional development opportunities such as mentoring, release time for PD and collaboration with colleagues. Teachers in Metropolitan schools appear to have a considerably lower unmet need for in-services in mathematics and science than teachers in other areas, particularly those in Remote Areas.
3. There appears to be a need to develop or improve structures to support mentoring of teachers in remote schools.
4. The findings provide evidence that primary teachers in remote schools, and in schools with high proportions of Indigenous students, feel professionally isolated. In particular, there is a need for professional development to help these teachers cater for special needs and gifted and talented students, for more financial support to cover the costs of

professional development, and for strategies to ensure that classes are covered in their absence.

### 9.3.2 Professional development needs of secondary science teachers

1. The findings strongly suggest that science teachers in general see the priority areas for professional development as being release from face-to-face teaching for programming and other collaborative activities, and more effective communication with educational authorities. The high level of need may be related to developments in secondary science curriculum that have been, and still are, in progress in a number of Australian states and territories.
2. There was a clear indication that science teachers need professional development opportunities to help them cater for the diversity of students in their classes
3. The unmet need for professional development opportunities increased substantially with distance from Metropolitan and Provincial Cities. Indeed, teachers in metropolitan schools reported a lower mean 'need' score on *every* professional development item.
4. The evidence suggests that science teachers in remote schools feel professionally isolated when it comes to opportunities to contribute to syllabus development. It is also apparent that teachers in Metropolitan Areas have far more opportunity to mark/moderate external science examinations. Such opportunities for teachers in remote schools would clearly benefit their students.
5. The findings suggest that science teachers in schools which have a relatively large proportion of Indigenous students have a substantially greater need for a range of professional development opportunities, particularly those which would help them cater for student diversity. However, the findings imply that science teachers in schools where Indigenous students make up 21 to 40% of the student population have a greater need for general in-service opportunities and support than do those in other schools.

### 9.3.3 Professional development needs of secondary ICT teachers

1. The findings strongly suggest that ICT teachers see the need for release from face-to-face teaching for collaborative activities as the highest professional development priority.
2. This finding is indicative of what appears to be a need for intensive on-the-job training. This conclusion is supported by ICT respondents' emphasis on the need for collaboration with ICT teachers in other schools, and for mentoring new staff. These priority areas are also consistent with what many respondents regarded as a relative lack of pre-service training in teaching ICT courses.
3. The tendency for professional development needs to increase with distance from a metropolitan city was not significant for ICT teachers, indicating that distance may be less of an issue for these teachers than is the case with primary and science teachers. Likewise, differences in the proportions of Indigenous students did not significantly affect levels of need. However, given the pattern across variables, the lack of significant associations may also be due to insufficient cell values.

### 9.3.4 Professional development needs of secondary mathematics teachers

1. The findings strongly suggest that secondary mathematics teachers throughout Australia see a high need for professional development to help teach higher-order thinking skills, to improve classroom management and to develop alternative teaching methods.
2. There also appears to be a strong need for release from face-to-face teaching for unit programming, and for more effective communication with education authorities.
3. The evidence suggests that mathematics teachers see a substantial need for professional development opportunities to help them cater for student diversity in their classrooms.

4. While there was a pattern in 'need' ratings across MSGLC categories, the differences were not significant, suggesting that the professional development needs of mathematics teachers do not vary as much with location as do those of science and primary teachers.
5. The findings strongly suggest that mathematics teachers in schools with substantial proportions of Indigenous students require more professional development in student management, alternative teaching methods and strategies to cater for student diversity than do those in schools with fewer Indigenous students.

### 9.3.5 Discussion

Teachers' responses to the questions about their professional development needs were consistent with much of the literature in this area (ICPA, 1999; Roberts, 2005; Vinson, 2002), but provided a greater level of detail on the specific professional development priorities of different types of teachers in different locations. All of the teacher groups indicated a substantial need for release from face-to-face teaching to attend in-services, and better lines of communication between themselves and education authorities. Professional development to help teachers cope with both special needs and gifted and talented students was also a common priority area.

There were a number of important differences in the professional development needs of different types of teachers. The most striking of these include the higher need for primary teachers to develop their ICT skills compared with secondary teachers, and the greater need among ICT teachers for collaboration and ongoing training. Mathematics teachers expressed a high need for professional development to help them teach higher-order thinking skills, and for classroom management strategies.

A general tendency for professional development needs to increase with geographic isolation was noticed among all four respondent groups, although this pattern was significant only among primary and science teachers. Primary teachers in Metropolitan Areas appear to have greater access to in-services to help them with science and mathematics teaching, while the greatest needs of primary teachers in Remote Areas appear to be for the mentoring of new staff, and for relief from face-to-face teaching to access professional development opportunities. The ability of the survey to distinguish between the professional development priorities of these teacher groups highlights its value in providing guidance to education authorities in formulating relevant policies.

There is evidence that the professional development needs of science teachers in metropolitan schools are better catered for than are those of science teachers in all other locations. This is particularly the case for access to in-services and opportunities to mark examinations or contribute to syllabus development. It is clear that such opportunities for teachers would have substantial benefits for their students. Moreover, non-metropolitan science teachers, and those in Remote Areas in particular, appear to be far less satisfied with the availability of professional development opportunities to help them cater for special needs and gifted and talented students. Judging by their comments, many teachers working outside cities find the centralisation of most professional development, with the attendant problems of cost, distance, time and teaching relief, to be the biggest obstacle to making the most of such opportunities.

Finally, the findings provide strong evidence that primary teachers and secondary science and mathematics teachers in schools with higher proportions of Indigenous students have a greater need for a range of professional development opportunities. This is most likely a function of low levels of pre-service preparation in teaching Indigenous students (as reported in Chapter

Four), the greater diversity of student backgrounds, and the aforementioned difficulties involved in accessing professional development in larger centres.

### 9.3.6 Recommendations to address professional isolation

*Induction/orientation of teachers new to a rural area*

9. It is recommended that education authorities, in collaboration with professional organisations (including the Association of Rural Educators), develop and monitor induction and orientation strategies to support the particular needs of teachers new to rural and regional schools including, as appropriate:
    a. teaching Indigenous students, including an awareness of Indigenous cultural issues within local contexts
    b. teaching multi-grade and multi-subject classes
    c. teaching out of curriculum area
    d. working with limited resources including support staff
    e. teaching students with special needs
    f. living in rural communities

The recommendation that rural teachers be better prepared and supported for teaching outside their curriculum areas is a response to the present realities of rural placement revealed by this study and others. In the longer term, however, this is not an acceptable compromise and it is hoped that actions taken to improve the science, ICT and mathematics staffing situations in these schools will have mitigated the necessity for this practice.

*Continuing professional development*

10. It is recommended that education authorities, in partnership with schools and school communities, universities, and professional organisations meet the continuing professional development needs of teachers in rural and regional areas through a range of strategies that ensure equitable access to ongoing quality professional learning. Approaches could include:
    a. the development of flexible staffing and school timetabling arrangements to allow scheduling of professional development
    b. the development of improved systems and strategies for collaborative face-to-face and online modes of professional development for teachers in rural and regional locations
    c. promoting cross-sectoral collaboration in meeting the professional development needs of teachers on a local basis
    d. funding research, development and dissemination of strategies to teach science, ICT and mathematics to the diverse range of students found in rural and regional classrooms
    e. implementing strategies for mentoring rural and regional mathematics, science and ICT teachers at various career stages, e.g., establishment of local networks such as the Association of Rural Educators, and initiatives such as the Rural School Leadership Program, suggested above.

*Professional Engagement*

11. It is recommended that education authorities and curriculum bodies address the professional isolation of rural and regional science, ICT and mathematics teachers by developing and monitoring strategies to ensure equitable access to and involvement in a range of core activities, enabling them to be engaged and contributing members of their professional community. Core professional activities include:
    a. curriculum development
    b. state/territory and system-wide student assessment programs
    c. consultations on pedagogical practice.

## 9.4. MATERIAL RESOURCE AND SUPPORT NEEDS OF TEACHERS

Teachers were asked about the importance and availability of a range of material resources and support personnel to help them teach science, ICT and mathematics. Their responses were analysed to identify the need priorities of different types of teachers, and compare the priorities across different locations.

### 9.4.1 Material resource and support needs of primary teachers

1. Overall, the findings highlight the priority primary teachers give to adequate ICT resourcing and support. In particular, there appears to be a clear need for additional skilled personnel not only to maintain ICT equipment, but also to help primary teachers incorporate ICT into their teaching.
2. Results indicate that the highest non-ICT need among primary teachers is for learning support assistants. In general, the needs of primary teachers appear to be for support personnel rather than material resources such as books, worksheets or AV equipment.
3. There is strong evidence that primary teachers' needs in many areas increase with the proportion of Indigenous students in their schools. For the most part, these needs relate to resources and support to cater for student diversity in their classrooms – not only for Indigeneity, but also for special needs and gifted and talented students. This is an important finding, as teachers' 'need' ratings did not vary significantly with MSGLC category of school.

### 9.4.2 Material resource and support needs of secondary science teachers

1. The findings indicate that science teachers in general see ICT infrastructure and support as the highest priority areas for resourcing.
2. Science teachers in non-metropolitan schools appear to have a higher need for a range of resources and assistance than their metropolitan colleagues. This is particularly the case for ICT support and maintenance, learning support, and resources to cater for student diversity.
3. There is an interesting contrast in the ICT needs of Remote Area science teachers. While their expressed need for computers for students' use was lower than that of teachers in other areas, their need for ICT support staff was considerably higher. The comments of Remote Area science teachers suggest that this may be because remote schools have adequate hardware, but lack access to the technical support to properly maintain and utilise it.
4. Science teachers in schools with relatively high proportions of Indigenous students appear to have a substantially higher level of need for most resources and support.

However, this need is not always highest among teachers in schools with the highest proportions of Indigenous students. For many items, teachers in schools with 21-40% Indigenous students indicated a higher need than did those with >40% Indigenous students. One possible explanation is that schools with the highest populations of such students qualify for extra support and/or funding. Further research is needed to investigate this finding.

### 9.4.3 Material resource and support needs of secondary ICT teachers

1. The findings suggest strongly that ICT teachers in general are most in need of support personnel to help them manage ICT resources and assist teachers and other staff to use these resources effectively. This finding supports the priorities given to greater ICT support by other teacher groups.
2. ICT teachers also expressed a high need for learning support assistants.
3. The results suggest that ICT teachers in non-metropolitan schools have a higher need for a range of resources and support, particularly for addressing student diversity and managing ICT resources. ICT teachers in Remote Area schools have a considerably higher need for basic teaching resources, such as worksheets, texts and library books.
4. The evidence indicates that ICT teachers are spending considerably more time than allocated in managing and maintaining ICT resources, and assisting other staff to use ICT. This increasing demand on their time appears to be the greatest area of concern for many ICT teachers.

### 9.4.4 Material resource and support needs of secondary mathematics teachers

1. The findings indicate that mathematics respondents in general considered ICT equipment and technical support to be their greatest area of resourcing need. Like primary and science teachers, mathematics teachers felt that sufficient computers for student use should be a priority area. Mathematics teachers' comments indicate that their concerns do not necessarily relate to the total number of computers in the school, but the availability of these computers for their classes,
2. Mathematics teachers also see a substantial need for learning support assistants. The findings show a substantial need for resources to cater for the diversity of student abilities in mathematics.
3. In general, schools with moderate to high proportions of Indigenous students appear to be in greater need of most resources. However, the variation in needs across schools with different proportions of Indigenous students illustrates that the greatest needs are not always with schools with the highest Indigenous populations. For many material and personnel resources, teachers in schools with between 21% and 40% Indigenous students expressed a higher need than did those with higher populations.

### 9.4.5 Discussion

Teachers' responses to the questions about material resource and support needs revealed many commonalities and several interesting differences. The most obvious commonality was the high priority teachers placed on ICT resources and assistance. It is significant that the first or second priority of every teacher group was for more ICT support personnel to help integrate ICT into their teaching. The need for additional assistance in maintaining and managing ICT resources also appears to be very high. These findings were consistent with the high demand on ICT teachers to fill these roles additional to their teaching loads.

The results indicate that a third priority of primary, science and mathematics teachers is for sufficient computers for student use. It was noted that all teacher groups indicated a substantially higher need for computers for their students than for themselves. This suggests

that most schools are catering reasonably well for their staff in terms of hardware and software for lesson preparation and administration, but are challenged by the evolution of computers into an increasingly mainstream learning medium.

The high need for learning support personnel was also apparent among all teacher groups. In addition, the relatively high priority teachers gave to resources for special needs, gifted and talented, and in some schools, Indigenous students, indicates that teachers require more support in catering for the diversity of needs among their students.

Conventional resources such as textbooks, worksheets and science equipment (for secondary science teachers) generally rated lower than most other nominated items. However, this should not necessarily be construed as indicating that teachers no longer see these resources as important. Need scores were generated from teachers' ratings of both the importance and availability of resources for their teaching situation. A lower rating may therefore indicate that a resource is relatively important, but readily available.

The findings indicate that there are inequities between metropolitan and non-metropolitan schools in terms of access to resources and support personnel by science and ICT teachers. The geographical trend is most apparent among science teachers, with those in non-metropolitan schools reporting a greater unmet need for a broad range of resources. Considering the importance of equipment and practical work in science, it is reasonable to argue that science students in Metropolitan schools have an advantage over those in Provincial and Remote Area schools.

The geographical trend in resourcing for ICT teachers is less extensive, but indicative of a disadvantage in the area of resources and support to cater for student diversity and general teaching resources. Hardware and connectivity needs in general appear to vary little with geographic location but the necessary support to manage these resources varies considerably, with the needs of Provincial and Remote schools for this support often unmet.

There is strong evidence that teachers in schools with relatively high proportions of Indigenous students feel less well resourced than those in other schools. Primary school teachers in schools where Indigenous students make up more than 40% of the student population appear in greatest need. While relatively well resourced in terms of worksheets, computers and audio visual equipment, teachers in these schools have a greater need for resources to address student diversity, equipment to help them teach science and mathematics, and support personnel to help them get the most out of the ICT equipment they have. Science and mathematics teachers in schools with relatively high Indigenous populations also appear in need of better support and resourcing. The higher needs for resources to cater for special needs and gifted and talented students is perhaps indicative of the range of student abilities in these schools.

### 9.4.6 Recommendations to address access to resources and support personnel

*Provision of compensatory ICT resources*

12. It is recommended that education authorities, in collaboration with school communities, industry and business partners, provide improved access for rural and regional students and teachers to ICT hardware and network capacity. The level of access should allow increased use of online learning modes to compensate for reduced resources in other areas.

*Access to ICT support personnel*

13. It is recommended that education authorities, in collaboration with school communities, industry and business partners, develop and monitor strategies to improve the provision of technical support to rural and regional schools to maximise efficiency of hardware and networks, and reduce the time spent by teachers in maintaining ICT systems. Initiatives could include:
    a. the establishment of strategic partnerships with other ICT users in the local area
    b. the employment of additional human resources for ICT system support

*Access to curriculum resources*

14. It is recommended that education authorities, in collaboration with schools and other government and non-government agencies, develop and disseminate strategies and resources applicable to rural and regional contexts that support primary teachers in catering for students with diverse backgrounds, learning needs and aspirations, including Indigenous students, gifted and talented students, students from non-English speaking backgrounds and students with special learning needs.

15. It is recommended that education authorities, in collaboration with schools and other government and non-government agencies, develop and disseminate strategies and resources applicable to rural and regional contexts that support secondary science, ICT and mathematics teachers in:
    a. integrating ICT into their teaching
    b. catering for students with diverse backgrounds, learning needs and aspirations, including Indigenous students, gifted and talented students, students from non-English speaking backgrounds and students with special learning needs
    c. teaching subjects out of their curriculum areas, including consideration of alternative flexible staffing strategies and online learning to maximise the quality of teaching and learning where the availability of teachers in specialised areas is constrained.

*Access to Learning Support personnel*

16. It is recommended that education authorities increase the numbers of teacher assistants, Aboriginal and Islander Education Workers (AIEW) and other para-professionals in rural and remote schools to support teachers in catering for the diverse learning needs of students.

The National Survey findings show that the unmet need for support personnel is higher in rural and remote areas, indicating that present funding formulae do not seem to be addressing needs equitably. Calculations should recognise that the need for para-professional support does not relate simply to student numbers, but to the diversity of students, community characteristics and accessibility to services.

*Resource funding formulae*

17. It is recommended that education authorities review strategies and funding formulae to recognize that there is a greater unmet need for some resources in schools with 21-40% Indigenous students than in schools with higher Indigenous populations. The variation in resource needs among schools with different proportions of Indigenous students suggests a need for education authorities to allow schools greater flexibility in determining their own resourcing priorities.

## 9.5 STUDENT LEARNING OPPORTUNITIES AND EXPERIENCES

Teachers were asked about the importance and availability of a range of learning experiences for their students. Their responses were analysed to identify the need priorities of different types of teacher, and compare the priorities across different locations.

### 9.5.1 Primary teachers' views on student learning needs

1. The findings indicate that primary teachers in non-metropolitan schools see a significant need for their students to have more opportunities to visit science or mathematics-related educational sites. Primary teachers in Remote Areas see a substantially greater need than those in other locations for their students to have access to such learning opportunities.
2. There also appears to be some concern that teachers do not have enough time to fulfil the requirement of primary science syllabuses. Teachers in all MSGLC areas shared this concern.
3. The findings suggest that primary teachers generally consider students to have sufficient opportunities to participate in externally organised competitions and activities. However, it seems that primary teachers in Remote Areas see a greater unmet need for more such opportunities than do those in other locations.
4. The findings indicate that teachers in schools with relatively high proportions of Indigenous students see a substantially greater need for a range of learning experiences for their students than do those in schools with fewer Indigenous students. These experiences include alternative and extension activities to cater for the diversity of students and ability levels in their classes, and for opportunities to visit science and mathematics-related educational sites.

### 9.5.2 Secondary science teachers' views on student learning needs

1. The findings indicate that science teachers in non-metropolitan schools see a significant need for their students to have more opportunities to visit science-related educational sites. Science teachers in Remote Areas see a substantially greater need for their students to have access to such learning opportunities.
2. The findings suggest that science teachers in general, and those in Metropolitan Areas in particular, consider students to have sufficient opportunities to participate in externally organised competitions and activities.
3. There appears to be a considerable disparity across locations in teachers' perceptions of the need for alternative or extension science activities to cater for student diversity. The evidence indicates that teachers in Remote Areas see a greater need for such activities than do teachers elsewhere, though in terms of experiences of benefit to NESB and Indigenous students, science teachers in Provincial Cities also see a greater need than do those in Provincial or Metropolitan Areas.
4. The findings show that science teachers in schools with relatively high proportions of Indigenous students see a substantially greater need for a range of learning experiences

for their students than do those in schools with fewer Indigenous students. These experiences include alternative and extension activities to cater for the diversity of students and ability levels in their classes, and for opportunities to visit science and mathematics-related educational sites.

5. There is evidence that the greatest need for these experiences is found in schools where Indigenous students make up between 21 and 40% of the student population. Science teachers at these schools seem to feel there is a greater need for qualified teachers, a broader range of science courses and learning experiences for gifted and talented and special needs students, than do those in schools with higher or lower proportions of Indigenous students.

### 9.5.3 Secondary ICT teachers' views on student learning needs

1. The findings indicate that ICT teachers see a substantial need for their students to have the more opportunities to visit ICT-related sites. This need appears to be very high in remote schools, though ICT teachers in Provincial City schools all perceive a relatively high need for these experiences compared to those in metropolitan schools.
2. The evidence indicates that ICT teachers see a substantially higher need than science and mathematics teachers for qualified teachers in their subject area. The level of this need varies little with MSGLC category of school. This is consistent with findings that ICT teachers are less formally qualified in their areas than are other subject teachers, and feel a greater need for ongoing professional development and collaboration.
3. ICT teachers also appear to require more alternative or extension activities for gifted and talented students. Teachers felt there was a moderate to low need for their students to participate in more external competitions and activities.
4. While the geographic differences in general were suggestive rather than significant, the findings clearly show that metropolitan ICT teachers perceive a markedly lower need for a range of student experiences than do teachers in other locations.

### 9.5.4 Secondary mathematics teachers' views on student learning needs

1. The findings indicate that mathematics teachers see a need for their students to have more opportunities to visit mathematics-related educational sites, though the overall need rating was not as high as for science respondents. Mathematics teachers also see a need for alternative/extension activities for gifted and talented and special needs students. The geographic trend found among other teacher groups was not significant for mathematics teachers thus suggesting that the need for these experiences is more general.
2. Teachers felt there was a moderate-to-low need for their students to participate in more external mathematics competitions and activities.
3. The greatest level of 'need' in the Teaching Context in the School component was expressed by respondents from schools having a percentage of Indigenous students between 21% and 40% and the lowest level of 'need' in each case was expressed by respondents from schools with no Indigenous students.
4. The findings indicate that mathematics teachers in schools with high proportions of Indigenous students perceive a higher need for activities which cater for students with special needs, and for opportunities to visit educational sites. Mathematics teachers in schools where more than 20% of students are Indigenous tend to feel there is a need for more qualified teachers.

### 9.5.5 Students learning in composite classes

1. Overall, more than 27% of secondary respondents indicated that at least some senior science, ICT or mathematics courses were taught in composite classes in their schools.

ICT respondents were most often required to combine their senior classes – about 40% compared with science respondents (23%) and mathematics respondents (25%).

2. The practice of combining classes was significantly more common in rural schools. Only 11% of Metropolitan Area respondents, and 17% of Provincial City respondents, reported that composite science, ICT or mathematics classes were held in their schools. By contrast, 36% of those in Provincial Areas and 58% of those in Remote Areas reported this arrangement.

### 9.5.6 Discussion

Overall, the findings clearly indicate that primary and secondary teachers see a substantial need for their students to visit educational sites related to science, ICT and mathematics. Nevertheless, there appears to be considerable geographical variation in the level of need, with primary, science and mathematics teachers in Metropolitan Areas feeling that their students' needs for such excursions are reasonably well served. The level of need increases with distance from a metropolitan centre, with teachers in Remote Areas expressing the highest level of need. It is reasonable to expect that the range of educational experiences available to students in different areas would differ. For example, while students in Metropolitan Areas might have greater access to museums, businesses and factories, those in Provincial or Remote Areas may have easier access to agricultural and mining sites or national parks. However, the trend in the findings suggests that students in Metropolitan Areas have access to richer educational experiences in science, ICT and mathematics than do those in less populated areas. Distance to sites, cost, and the lack of public transport are factors that inhibit student access to a variety of relevant sites, and sites outside their normal experience.

The finding that primary teachers across Australia appear to have insufficient time to complete the requirements of science syllabuses is concerning, but consistent with literature showing that science often has a lower priority in primary schools than assumed by the syllabuses. Goodrum et al. (2001) suggest that this is partly due to some teachers' reluctance to teach science, due to their lack of confidence in the subject. Another possibility is that the focus on numeracy and literacy as priority areas leaves less time for other subjects. Either way, the finding implies that many classes are not completing the science syllabus requirements for one stage/grade before progressing to the next.

There is convincing evidence that primary and secondary schools with relatively high proportions of Indigenous students are in need of a greater variety of learning opportunities to cater for the diversity of students. While this obviously includes suitable learning opportunities for Indigenous students, teachers indicated that learning experiences suitable for special needs and gifted and talented students are also a priority However, it does not appear to be a matter of simply distributing extra resources in proportion to the numbers of Indigenous students, as the findings showed that in many cases it was the schools with between 21 and 40% Indigenous populations that have the greatest need. One explanation could be that such schools have a greater diversity than those in which Indigenous students make up the majority. Another might be that schools with relatively fewer Indigenous students attract less targeted funding, and therefore have fewer resources. Further investigation of this finding is warranted.

Results from the ICT teachers survey indicated that there is a substantial need for qualified teachers in this subject area. The level of this need varied little with MSGLC category of school. This finding is consistent with findings that ICT teachers are less formally qualified in their areas than are other subject teachers, and feel a greater need for ongoing professional development and collaboration.

Finally, the study shows that about 27% of science, ICT and mathematics teachers are required to teach courses in composite classes in order for those courses to run. Many composite classes are made up of Year 11 and 12 students, or of Year 12 students taking different courses. This appears to be a more common situation for ICT courses.

The findings clearly show that students in Provincial and Remote Areas, and senior students in particular, are required far more often to take science, ICT and mathematics courses in composite classes than their peers in Metropolitan and Provincial Cities. This finding highlights another educational inequity detrimental to students in rural schools.

### 9.5.7 Recommendations to improve student learning opportunities

18. It is recommended that education authorities, in partnership with schools, rural communities and other agencies develop strategies, allocate funding, and provide resources to enable rural and regional students to access locally and online a broader range of educational experiences in science, ICT and mathematics comparable to those available to metropolitan locations, such as:
    a. on-site visits
    b. summer schools
    c. opportunities to interact with students from other schools nationally and internationally
    d. mentoring by experts and practitioners in the field
    e. high quality learning materials, including interactive simulations and problem-solving activities
    f. activities that address the learning needs of the range of students in composite classes.

To be effective, the strategies would need to include:

- proportionate funding formulae that reflect difficulty of travelling to major centres
- improved broadband access to facilitate use of web-based simulations, communication with mentors and interaction with other schools.

19. It is recommended that government and non-government schools in rural areas form clusters within which staff are shared to maximise the subjects available to students, particularly in the senior years. These clusters could also coordinate (in collaboration with the Association of Rural Educators) visits by educational outreach programs to minimise costs.

## 9.6 PARENTS/CAREGIVERS' PERSPECTIVES ON THEIR CHILDREN'S SCIENCE, ICT AND MATHEMATICS EDUCATION

Parents/caregivers were asked for their perceptions on a range of issues concerned with their eldest school-age child's education in science, ICT and mathematics. The most significant findings related to perceptions of the capacity of their children's schools to attract and retain qualified teachers, and the qualities of their children's teachers.

### 9.6.1 Perceptions of capacities of schools to attract and retain teachers of science, ICT and mathematics

1. The findings indicate that parents/caregivers' confidence in the capacity of their children's primary schools to attract and retain qualified teachers decreases with the size and remoteness of school location. The findings also show that parents/caregivers in rural and Remote Areas are aware of staffing difficulties in those locations. Overall, parent/caregiver perceptions are generally in agreement with those of teachers, who considered vacant positions in metropolitan schools easiest to fill.
2. Analysis of the responses of parents/caregivers reporting about secondary schools did not reveal the same significant geographical pattern in staffing difficulties reported by science and mathematics teacher respondents in Chapter Four. However, it may be that many parents/caregivers are unfamiliar with the subject-specific qualifications of secondary teachers, generally assuming that those teaching mathematics or science to their children are qualified to teach those subjects.
3. While parents/caregivers in Remote Areas are generally appreciative of their children's teachers, there appears to be concern about the inexperience and capabilities of the teachers commonly recruited to these schools, and the long-term effects on the education of children.

### 9.6.2 Perceptions of achievement and teacher attitudes in science, ICT and mathematics education

1. The findings indicate firstly that parents/caregivers consider the commitment and enthusiasm of teachers to be one of the greatest strengths of schools. Perceptions of the levels of enthusiasm teachers bring to class do not appear to vary significantly with geographical location or type of school.
2. With regard to parents/caregivers' views on whether teachers care that students work to their potential, there was little evidence of substantial variation with type or location of school. Nevertheless, the weak but consistent (and in the case of mathematics, significant) pattern suggesting that parents/caregivers with children attending Provincial Area schools were less inclined than others to consider that teachers care whether students work to their potential is perhaps cause for further investigation.
3. The evidence suggests that the perceptions of parents/caregivers across Australia about achievement levels in science, ICT and mathematics vary substantially with geographic location. Parents/caregivers with children attending metropolitan primary and secondary schools are more inclined to agree that children in these schools achieve to a high standard in science, ICT and mathematics, than are parents/ caregivers with children in non-metropolitan schools. Those with children attending schools in Remote Areas are least inclined to agree. The geographical pattern in perceptions is consistent with patterns of achievement levels in science and mathematics revealed in international studies (Thomson et al., 2004).
4. There also seems to be a perception that teachers in primary and secondary schools in larger population centres provide greater encouragement for students to achieve to their potential in these subjects.

### 9.6.3 Perceptions of strengths and obstacles in science, ICT and mathematics education

1. The findings suggest that, overall, parent/caregivers are appreciative of the commitment, efforts and enthusiasm of teachers involved in science, ICT and mathematics education.
2. Understandably, their greatest concern appears to be that their children have access to an adequate range of learning experiences and opportunities. These include excursions, visits by experts, and a good variety of senior courses from which to choose.

Parents/caregivers seem to be aware that student access to these experiences and opportunities is considerably greater in larger population centres. There is also evidence that those outside these centres are concerned that their children are at an educational disadvantage.

3. Parents/caregivers with children having special needs or talent are appreciative where schools are able to provide relevant support. However, there appears to be concern from parents/caregivers in Provincial and Remote Areas that their schools are unable to provide this support adequately, and a tendency to send bright students to metropolitan schools where possible.
4. Finally, ICT education emerged as a key area of interest among parent/caregivers. There seems to be a general concern that children are not incorporating ICT into their learning as effectively as parents/caregivers would like, and a specific concern among those with children in rural schools that there is insufficient expertise and technical support for ICT.

### 9.6.4 Discussion

The responses of parents/caregivers provided an illuminating insight into their educational values and attitudes, as well as their perceptions of the schools attended by their children. In some cases these perceptions reflected the views and concerns of teachers.

Parents/caregivers' perceptions of the difficulty of attracting and retaining qualified primary teachers displayed a geographical pattern similar to that of primary teachers themselves, indicating their awareness that it is considerably more difficult to staff rural primary schools with qualified teachers than is the case in larger population centres. It was not clear whether parents/caregivers with children at the secondary level were aware of the staffing difficulties reported by science, ICT and mathematics teachers. However, it is doubtful that parents/caregivers would be aware of the subject-specific qualifications of secondary teachers, and therefore of whether their children's teachers were suitably qualified to teach those courses.

With regard to reflections on the qualities of their children's teachers, it was heartening to find that parents/caregivers are in general appreciative of the commitment, efforts and enthusiasm of teachers involved in these subject areas. There was no evidence that the enthusiasm teachers bring to the classroom varied with type or geographic location of school. Nevertheless, comments from parents/caregivers with children in remote schools suggest that there is greater concern about the inexperience of teachers in these schools, and the long term effects of this on children's learning, than is the case in other locations.

One area in which geographical differences were clear was in perceptions of the achievement levels of students in science, ICT and mathematics. The findings indicate that parents/caregivers with children attending schools in Metropolitan Areas are more inclined to think that students in these schools exhibit high achievement, and are encouraged to do so by their teachers, than are parents/with children in non-metropolitan schools. This geographic pattern in perceptions reflects the achievement patterns in national science and mathematics results from PISA, indicating awareness on the part of parents/caregivers of the achievement levels of their schools relative to those in other locations. In a few cases, the belief that students in metropolitan schools achieved higher results, and are more achievement-oriented, influenced parents/caregivers to consider sending their child to a metropolitan school.

The influence of this belief is important in the context of educational orientations, in that parents/caregivers who value university admission results highly may be influenced to move their children from rural schools to metropolitan schools in order to maximise academic success.

### 9.6.4 Recommendation to address parent/caregiver concerns

20. It is recommended that the federal government publicly acknowledge the concerns of parents/caregivers in rural and regional areas outlined in this report. Furthermore, in addressing recommendations 1-19 education authorities should ensure that parent organizations are kept informed, and consulted about initiatives and strategies employed in response to the findings. It is clear from the findings that parents/caregivers in rural and regional areas are concerned about student outcomes in science, ICT and mathematics in rural schools, and it is critical that governments be seen to be addressing these concerns in a systematic and effective way.

## 9.7 CONCLUSION

In view of the scope of the recommendations and the substantial resources, both human and financial, being called for, it is critical that systems of monitoring and accountability be developed parallel to the recommended strategies in order to assess their effectiveness. The complexity involved in negotiating outcomes, setting timelines, deciding on funding strategies, monitoring achievement of outcomes involving teacher attraction and retention, changes in levels of unmet need, and most importantly, improvements in student achievement in science, ICT and mathematics clearly calls for a coordinated national approach. It is also apparent from the National Survey and earlier studies that the concerns identified are national concerns, related to issues extending beyond education. While this chapter has addressed recommendations to a range of education authorities, systems, associations and partners, the actions of these groups need to be coordinated in order to be effective on a national scale. The final chapter outlines a framework for this coordination.