CHAPTER SEVEN

STUDENT LEARNING OPPORTUNITIES AND EXPERIENCES

7.1 INTRODUCTION

This chapter reports teachers' responses to questions about the needs of their students for a variety of learning experiences and opportunities. The surveys presented teachers with a set of items relating to educational experiences and opportunities such as extension activities, excursions, alternate activities for targeted groups, and a broad range of academic courses. Teachers were asked to rate each item on two scales: the importance of this experience/opportunity for their students' learning, and the availability of this experience/opportunity at their school. The two ratings for each item were combined to produce a single 'need' rating (see Chapter Three). The chapter presents the results of these need ratings across a range of variables for each of the survey respondent groups.

7.2 PRIMARY TEACHERS' VIEWS ON STUDENT LEARNING NEEDS

Table 7.1 summarises, at the level of the entire primary teacher sample, the average scores on the 'need'-transformed items dealing with student learning experiences and opportunities. The areas of greatest overall 'need' include students having opportunities to visit science or mathematics-related educational sites, and having adequate time allocation for teaching to fulfil the syllabus requirements for science. The area of least 'need' overall concerned students being able to participate in external primary competitions and activities in all three subject areas (ICT, science and mathematics).

Table 7.1 Overall average 'need' scores, standard deviations and valid N for primary respondents' ratings of the Student Learning Experience items (items are listed in descending order of mean 'need' score) [Scores can range from 1 to 20[49]]

PRIMARY STUDENT LEARNING NEEDS ITEMS	Mean	s.d.	Valid N
Opportunities for students to visit science or mathematics related educational sites	**9.84**	3.62	1485
Adequate time allocation for teaching to fulfil the syllabus requirements for science	**9.28**	3.89	1475
Alternative or extension activities in science or mathematics teaching programs for gifted & talented students	**8.93**	3.43	1425
Alternative or extension activities in science or mathematics teaching programs for special needs students	**8.89**	3.53	1413
Adequate time allocation for teaching to fulfil the syllabus requirements for mathematics	**8.76**	3.88	1470
Alternative or extension activities in science or mathematics teaching programs for Indigenous students	**8.48**	3.83	1351
Alternative or extension activities in science or mathematics teaching programs for NESB students	**8.39**	3.87	1316
Student participation in external ICT competitions and activities	**7.07**	3.16	1439
Student participation in external science competitions and activities	**6.67**	2.89	1467
Student participation in external mathematics competitions and activities	**6.60**	2.86	1454

[49] The 'needs' scores constitute ordinal rather than interval measures, since they were transformed from ordinal rating scales. While the possible scores range from 1 to 20, an average 'need' score on an item (that is, an item rated midway on both the importance and availability scales) would be about 7.5 rather than 10.

A principal components analysis of the 'need'-transformed Student Learning Experience items (Appendix 7.1) showed three substantive components: Alternative and Extension Activities for Targeted Groups, External Competitions and Activities for Students, and Time Allocated to Teach Syllabus Requirements. Scores on these three components were analysed using a series of MANCOVAs in order to make specific group comparisons. Two MANCOVAs were conducted comparing mean component 'need' scores by MSGLC category and percentage of students with Indigenous backgrounds. Table 7.2 shows the mean ratings and their associated standard errors on the three components across the categories of the comparison variables.

Table 7.2 Mean ratings by primary respondents on Student Learning Experience item components, broken down by MSGLC categories and percentage of students with Indigenous backgrounds [a]

			Student Learning Experience Components			
			Alternative & Extension Activities for Targeted Groups	External Competitions & Activities for Students	Time Allocated to Teach Syllabus Requirements	Valid N
MSGLC categories	Metropolitan Area	Mean	8.34	6.42	9.15	
		s.e. (Mean)	.22	.20	.27	213
	Provincial City	Mean	8.71	6.57	8.78	
		s.e. (Mean)	.17	.16	.21	324
	Provincial Area	Mean	9.02	6.77	9.04	
		s.e. (Mean)	.11	.11	.14	746
	Remote Area	Mean	9.81	7.58	9.10	
		s.e. (Mean)	.25	.23	.31	153
Percentage of students in your school with Indigenous backgrounds	0%	Mean	8.46	6.72	9.09	
		s.e. (Mean)	.18	.17	.22	50
	1 - 20%	Mean	8.88	6.62	8.90	
		s.e. (Mean)	.10	.09	.12	387
	21 - 40%	Mean	10.09	7.31	8.98	
		s.e. (Mean)	.30	.29	.37	35
	> 40%	Mean	10.99	8.26	10.25	
		s.e. (Mean)	.39	.36	.47	16

[a] Shading denotes components where significant or suggestive mean differences exist between the groups being compared. Gold shading indicates significant differences ($p < .001$) on a component; light blue shading indicates suggestive differences ($p < .01$) on a component.

Variation with geographic region

The multivariate test for MSGLC category differences across the primary Student Learning Experience components was significant[50]. Follow-up tests revealed that the principal reasons for this significant multivariate difference were significant univariate differences in the mean 'need' scores on the Alternative and Extension Activities for Targeted Groups and External Competitions and Activities for Students components. Respondents from Remote Areas perceived substantially greater 'need' for these two components. Figure 7.1 displays the profile plot of the original primary Student Learning Experience 'need' transformed items by MSGLC category. Within the Alternative/Extension Activities for Targeted Groups component the disparity between the high level of 'need' for opportunities to visit science or mathematics related educational sites, expressed by respondents from Remote Areas and, to a lesser extent by respondents from Provincial Cities and Areas, compared to respondents from other MSGLC categories, especially Metropolitan Areas, was quite marked. Also notable were the relatively

[50] Wilks' lambda = .977, $F(9, 3473.094) = 3.64$, $p < .001$, partial $\eta^2 = .01$

greater levels of 'need' expressed by respondents from Remote Areas for student participation in external competitions and activities in all three subject areas.

The comments of primary respondents in Provincial and Remote Areas provided explanations for their ratings:

> We are isolated from major towns and centres, and excursions require at least two hours just for travel. (Primary teacher, Provincial Area, Qld)

> The biggest obstacle is our inability to visit motivational learning experiences out of the school environment, because of the cost of going on excursions to museums, ScienceWorks etc. Often there are no role models in the community to show the student just how far science and maths can take them. (Primary teacher, Provincial Area, Vic.)

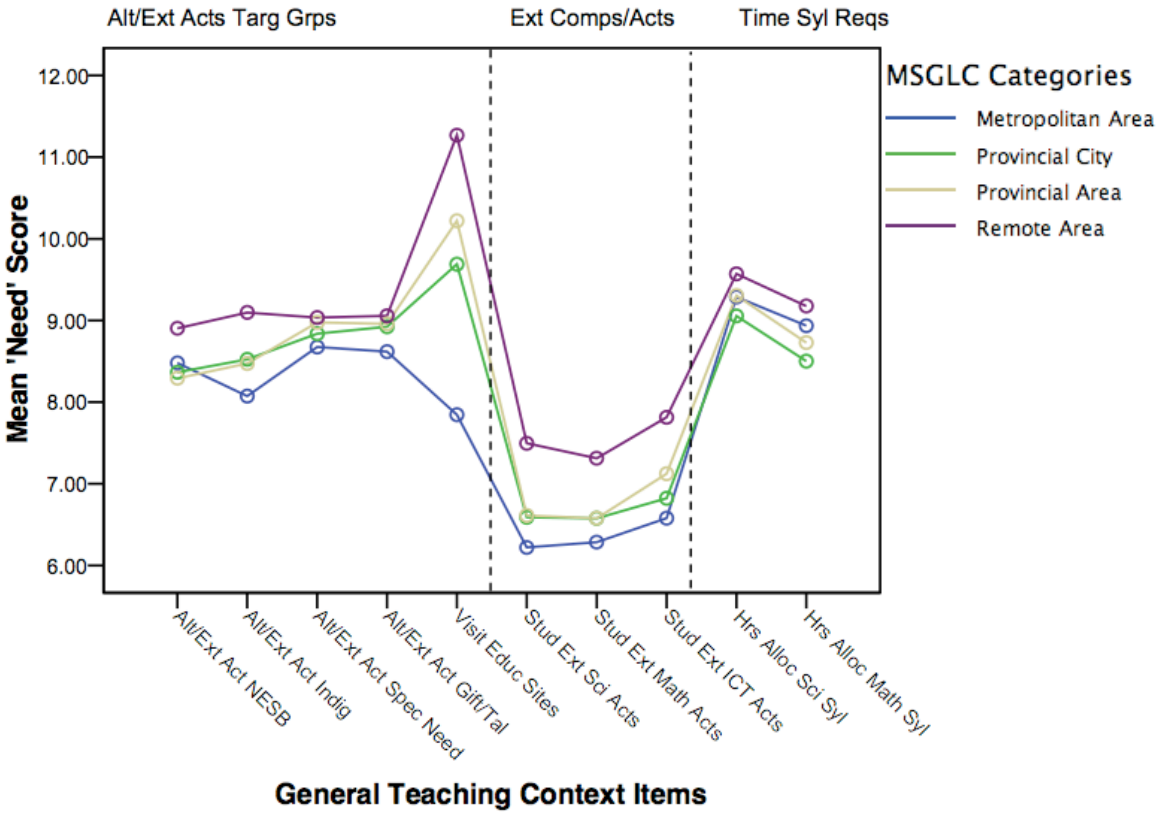

Figure 7.1 Profile plot of mean 'need' scores of primary respondents for the Student Learning Experience components, compared by MSGLC categories (Table 7.1 for item names in full)

Variation with Indigenous student population

The multivariate test for differences between schools having different percentages of students with Indigenous backgrounds across the three primary Student Learning Experience components was significant[51]. Follow-up investigation revealed that the reasons for this significant multivariate difference were significant univariate differences on the Alternative and Extension Activities for Targeted Groups and External Competitions and Activities for

[51] Wilks' lambda = .956, $F(9, 3297.865) = 6.83$, $p < .001$, partial $\eta^2 = .02$

Students components. The greatest level of 'need' in these two components was expressed by respondents from schools having a percentage of Indigenous students exceeding 40%, followed by respondents from schools where the percentage was between 21% and 40%. Figure 7.2 displays the profile plot of the original Student Learning Experience 'need' transformed items by percentage of students with Indigenous backgrounds. Within the Alternative/Extension Activities for Targeted Groups component, the disparity between the high level of 'need' for alternative or extension activities for all specific targeted groups of students as well as for opportunities to visit science or mathematics related educational sites, expressed by respondents from schools where greater than 20% of students were from Indigenous backgrounds compared to respondents from other schools, was quite marked. A similar trend was observed for all items comprising the External Competitions and Activities for Students component, albeit at a relatively lower level of absolute 'need'.

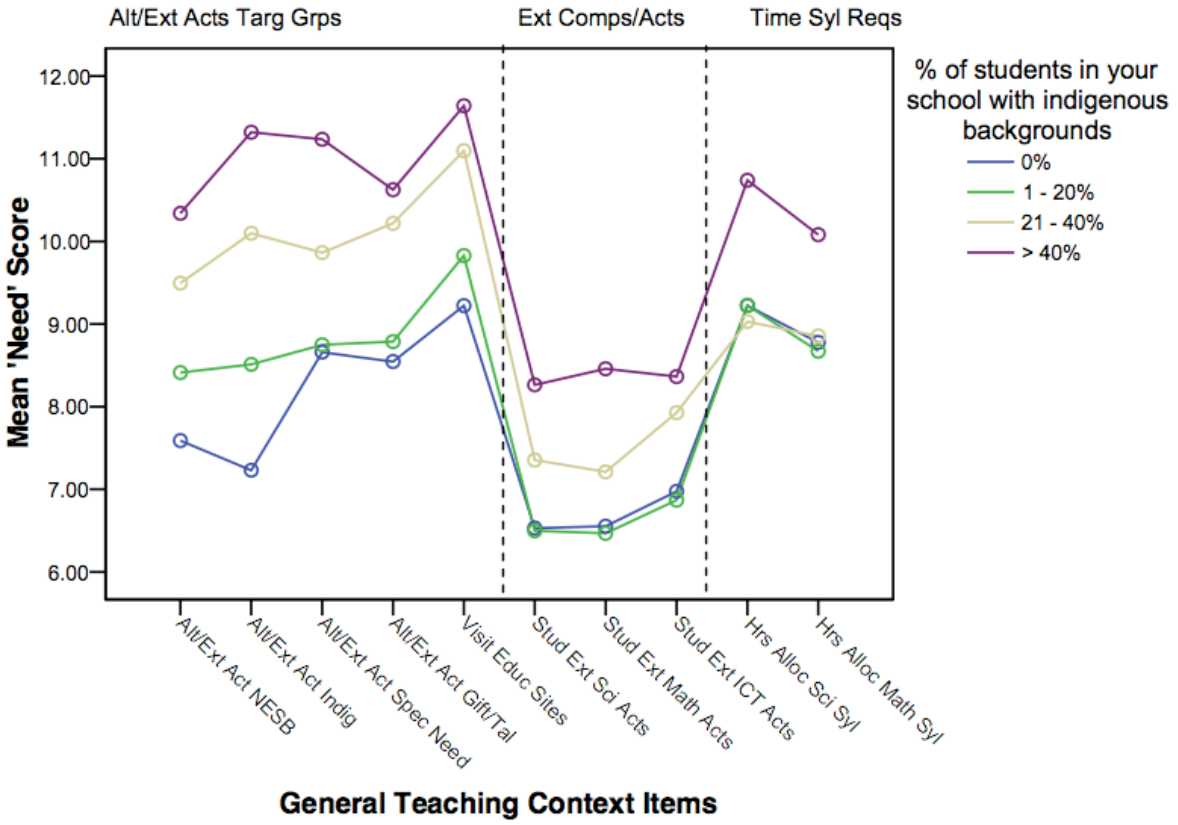

Figure 7.2 Profile plot of mean 'need' scores of primary respondents for the Student Learning Experience components, compared by percentage of students from Indigenous backgrounds (Table 7.1 for item names in full)

A number of respondents commented on the need for alternative activities for engaging Indigenous students:

> The indigenous people have a rich scientific background: their ability to navigate by the stars, read the tides and the seasons is hugely reflective of a culture steeped in scientific and mathematical thinking. This type of thinking could be nurtured in the young ones, but as we have a Western view of science we often forget to explore what has been natural to the local indigenous people for many, many generations. (Primary teacher, Remote Area, Qld)

More science support materials are required, particularly for Indigenous students and NESB students. (Primary teacher, Provincial Area, WA)

Summary of findings and implication

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.

7.3 SCIENCE TEACHERS' VIEWS ON STUDENT LEARNING NEEDS

Table 7.3 summarises, at the level of the entire science teacher sample, the average scores on the 'need'-transformed items dealing with the secondary students' learning experiences. The areas of greatest overall 'need' include students having opportunities to visit science-related educational sites, alternative/extension activities in science teaching programs for gifted and talented and for special needs students. The area of least 'need' overall concerned students being able to participate in external science competitions and activities.

Table 7.3 Overall average 'need' scores, standard deviations and valid N for science respondents' ratings of the Student Learning Experience items (items are listed in descending order of mean 'need' score) [Scores can range from 1 to 20]

STUDENT LEARNING NEEDS ITEMS - SCIENCE	Mean	s.d.	Valid N
Opportunities for students to visit science related educational sites	**10.14**	3.62	545
Alternative or extension activities in science teaching programs for gifted & talented students	**9.69**	3.88	523
Alternative or extension activities in science teaching programs for special needs students	**9.38**	3.98	511
Alternative or extension activities in science teaching programs for NESB students	**8.79**	4.30	496
Alternative or extension activities in science teaching programs for Indigenous students	**8.78**	4.32	513
Having the total indicative hours allocated to face-to-face teaching	**8.48**	3.65	513
Having the full range of senior science courses available in your school	**8.08**	3.53	535
Teachers qualified to teach the science courses offered in your school	**8.03**	2.78	544
Student participation in external science competitions and activities	**6.77**	2.73	543

A principal components analysis of the 'need'-transformed Student Learning Experience items for science (Appendix 7.2) produced three substantive components: Alternative and Extension Activities for Targeted Groups, Teaching Context in the School and Student Learning Opportunities. Scores on these three components were analysed using a series of MANCOVAs in order to make specific group comparisons. Two MANCOVAs were conducted comparing mean component 'need' scores by MSGLC category and percentage of students with Indigenous backgrounds. Table 7.4 shows the mean ratings and their associated standard errors on the three components across the categories of the comparison variables.

Table 7.4 Mean ratings of science respondents on Student Learning Experience item components, broken down by MSGLC categories and percentage of students with Indigenous backgrounds [a]

			Student Learning Experience Components			
			Alternative & Extension Activities for Targeted Groups	Teaching Context in the School	Student Learning Opportunities	Valid N
MSGLC categories	Metropolitan Area	Mean	8.24	7.57	6.88	
		s.e. (Mean)	.36	.25	.26	129
	Provincial City	Mean	9.56	8.41	8.60	
		s.e. (Mean)	.38	.26	.27	106
	Provincial Area	Mean	9.20	8.41	9.01	
		s.e. (Mean)	.25	.17	.18	245
	Remote Area	Mean	11.22	8.65	10.20	
		s.e. (Mean)	.62	.43	.44	37
Percentage of students in your school with Indigenous backgrounds	0%	Mean	8.42	8.08	7.93	
		s.e. (Mean)	.51	.35	38	50
	1 - 20%	Mean	8.98	8.15	8.34	
		s.e. (Mean)	.18	.12	.13	387
	21 - 40%	Mean	11.57	9.82	10.20	
		s.e. (Mean)	.60	.41	.44	35
	> 40%	Mean	10.90	7.77	9.96	
		s.e. (Mean)	.90	.61	.66	16

[a] Shading denotes components where significant or suggestive mean differences exist between the groups being compared. Gold shading indicates significant differences ($p < .001$) on a component; light blue shading indicates suggestive differences ($p < .01$) on a component.

Variation with geographic region

The multivariate test for MSGLC category differences across the Student Learning Experience components was significant[52]. Follow-up tests revealed that the primary reasons for this significant multivariate difference were significant univariate differences in the mean 'need' scores on the Alternative and Extension Activities for Targeted Groups and Student Learning Opportunities components. Respondents from Remote Areas perceived substantially greater 'need' for these two components. Figure 7.3 displays the profile plot of the original science Student Learning Experience 'need' transformed items by MSGLC category. Within the Alternative/Extension Activities for Targeted Groups component, the disparity between the high level of 'need' for alternative or extension activities for all specific targeted groups, expressed by respondents from Remote Areas compared to respondents in Metropolitan Areas, was quite marked. Within the Student Learning Opportunities component the item that most strongly differentiated respondents from Remote Areas (highest level of 'need') and from Metropolitan Areas (lowest level of 'need') from the rest was perceived need for opportunities for students to visit science related educational sites.

[52] Wilks' lambda = .891, $F(9, 1236.49) = 6.69$, $p < .001$, partial $\eta^2 = .04$

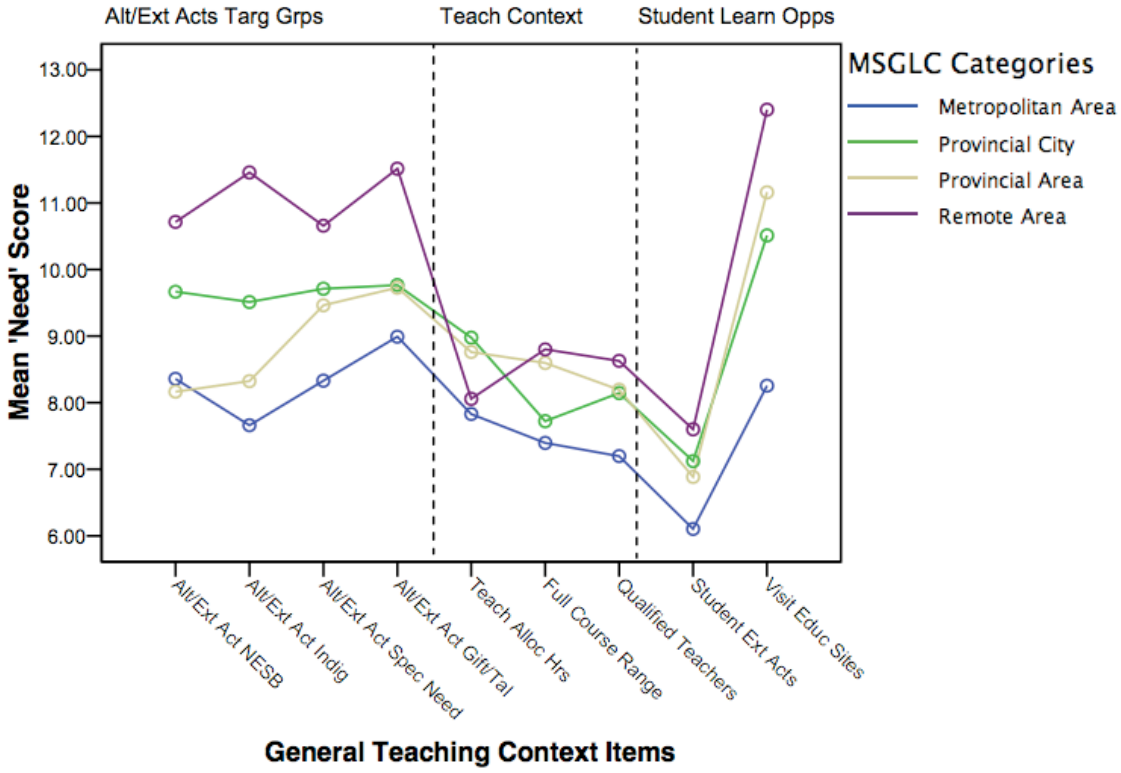

Figure 7.3 Profile plot of mean 'need' scores of science respondents for the Student Learning Experiences components, compared by MSGLC categories (Table 7.3 for item names in full)

The comments of respondents in Provincial and Remote Areas identified distance and cost as major impediments to science excursions:

> As the lack of museums (and) science-based local businesses and places to visit – cost is a big factor in organising excursions here (Science teacher, Provincial Area, Qld).
>
> Distance from venues (e.g. zoo, museum) and the entry costs makes excursions expensive and less well utilised than in the past. (Science teacher, Provincial Area, Vic.).
>
> The problem with excursions to capital cities for Questacon, CSIRO, Taronga Zoo, etc. – is that they all have to be done in one day a year and (are) seen in isolation. (Science teacher, Provincial Area, NSW).

Variation with Indigenous student population

The multivariate test for differences between schools having different percentages of students with Indigenous backgrounds across the three Student Learning Experience components was significant[53]. Follow-up investigations revealed that the reasons for this significant multivariate difference were significant univariate differences on all three components. The greatest level of 'need' in all three components 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.

[53] Wilks' lambda = .918, $F(9, 1165.91) = 4.61$, $p < .001$, partial $\eta^2 = .03$

Figure 7.4 displays the profile plot of the Student Learning Experience 'need' transformed items by percentage of students with Indigenous backgrounds. Within the Alternative/Extension Activities for Targeted Groups component, the disparity between the high level of 'need' for alternative or extension activities for the specific targeted group of Indigenous students, expressed by respondents from schools where greater than 20% of students were from Indigenous backgrounds compared to respondents from other schools, was quite marked.

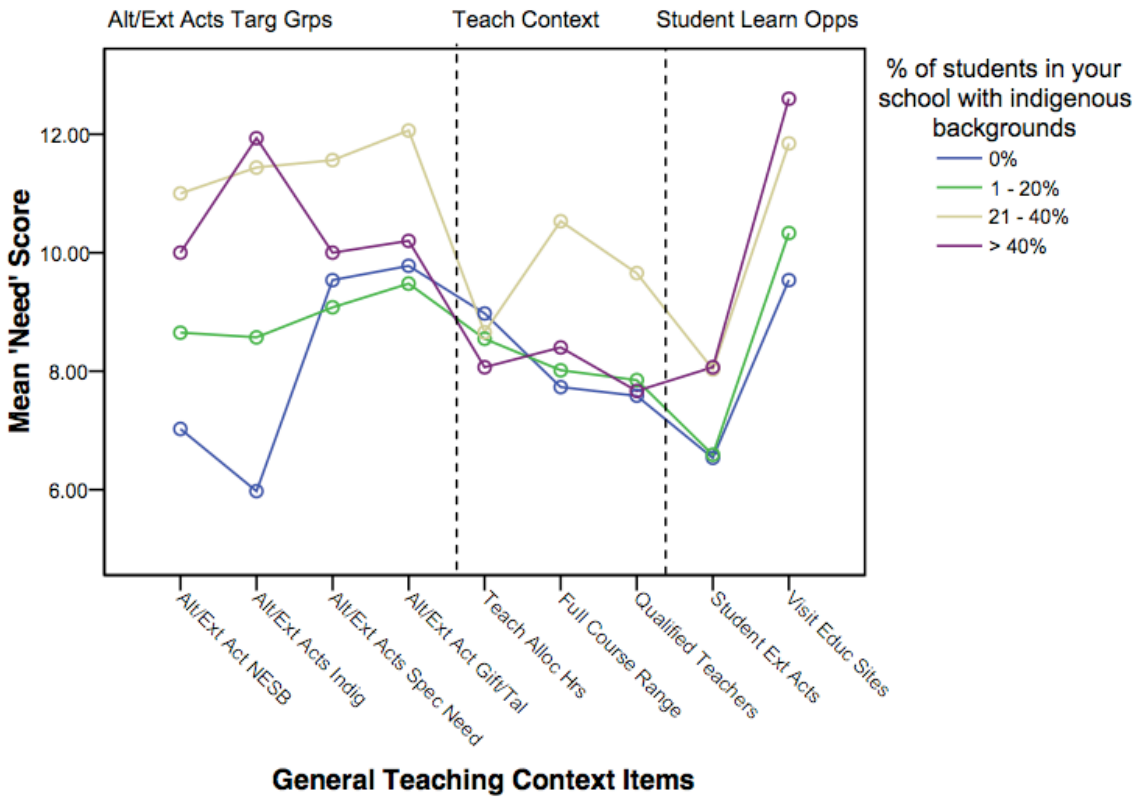

Figure 7.4 Profile plot of mean 'need' scores of science respondents for the Student Learning Experiences components, compared by percentage of students from Indigenous backgrounds (Table 7.3 for item names in full)

Respondents from schools where between 21% and 40% of students were from Indigenous backgrounds indicated a generally high 'need' for alternative or extension activities with respect to all four targeted groups. Within the Teaching Context in the School component having a full range of science courses on offer and having qualified teachers reflected a markedly higher level of 'need' from respondents from schools where between 21% and 40% of students were from Indigenous backgrounds. Within the Student Learning Opportunities component respondents from schools where greater than 20% of students were from Indigenous backgrounds indicated a substantially greater level of 'need' in the areas of student participation in external science competitions and activities and opportunities for students to visit science related educational sites.

Summary of findings and implications

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.

7.4 ICT TEACHERS' VIEWS ON STUDENT LEARNING NEEDS

Table 7.5 summarises, at the level of the entire ICT teacher sample, the average scores on the 'need'-transformed items dealing with the secondary ICT student learning experiences. The areas of greatest overall 'need' include students having opportunities to visit ICT-related educational sites, qualified teachers of ICT, and alternative/extension activities in ICT teaching programs for gifted and talented and for special needs students. The area of least 'need' overall concerned students being able to participate in external ICT competitions and activities.

Table 7.5 Overall average 'need' scores, standard deviations and valid N for ICT respondents' ratings of the Student Learning Experience items (items are listed in descending order of mean 'need' score) [Scores can range from 1 to 20]

STUDENT LEARNING NEEDS ITEMS - ICT	Mean	s.d.	Valid N
Opportunities for students to visit ICT related educational sites	**9.81**	3.53	219
Teachers qualified to teach the ICT courses offered in your school	**9.47**	3.52	223
Alternative/extension activities in ICT teaching programs for gifted & talented students	**9.21**	3.91	213
Having the full range of senior ICT courses available in your school	**9.04**	3.58	218
Alternative/extension activities in ICT teaching programs for special needs students	**8.99**	3.72	209
Alternative/extension activities in ICT teaching programs for NESB students	**8.92**	3.85	206
Alternative/extension activities in ICT teaching programs for Indigenous students	**8.67**	4.07	206
Having the total indicative hours allocated to face-to-face teaching	**8.19**	3.24	203
Student participation in external ICT competitions and activities	**7.29**	2.72	222

A principal components analysis of the 'need'-transformed Student Learning Experience items (Appendix 7.3) showed three substantive components: Alternative and Extension Activities for Targeted Groups, Teaching Context in the School, and Student Learning Opportunities. Scores on these three components were analysed using a series of MANCOVAs in order to make

specific group comparisons. Two MANCOVAs were conducted comparing mean component 'need' scores by MSGLC category and percentage of students with Indigenous backgrounds. Table 7.6 shows the mean ratings and their associated standard errors on the three components across the categories of the comparison variables. The multivariate test for differences in the percentage of students with Indigenous backgrounds across the three Student Learning Experience components was not significant.

Table 7.6 Mean ratings of ICT respondents on Student Learning Experience item components, broken down by MSGLC categories and percentage of students with Indigenous backgrounds [a]

			Student Learning Experience Components			
			Alternative/ Extension Activities for Targeted Groups	Teaching Context in the School	Student Learning Opportunities	Valid N
MSGLC categories	Metropolitan Area	Mean	**7.08**	**7.68**	**7.20**	
		s.e. (Mean)	.59	.43	.43	53
	Provincial City	Mean	**9.49**	**9.27**	**9.09**	
		s.e. (Mean)	.55	.40	.40	43
	Provincial Area	Mean	**9.41**	**9.22**	**8.78**	
		s.e. (Mean)	.38	.28	.28	96
	Remote Area	Mean	**10.57**	**9.73**	**10.63**	
		s.e. (Mean)	.95	.69	.68	16
Percentage of students in your school with Indigenous backgrounds	0%	Mean	**8.33**	**8.43**	**8.67**	
		s.e. (Mean)	.79	.58	.58	21
	1 - 20%	Mean	**8.67**	**8.81**	**8.45**	
		s.e. (Mean)	.29	.21	.21	149
	21 - 40%	Mean	**10.38**	**10.13**	**9.23**	
		s.e. (Mean)	.78	.57	.58	20
	> 40%	Mean	**10.42**	**8.13**	**8.80**	
		s.e. (Mean)	1.34	.98	.99	7

[a] Shading denotes components where significant or suggestive mean differences exist between the groups being compared. Gold shading indicates significant differences ($p < .001$) on a component; light blue shading indicates suggestive differences ($p < .01$) on a component.

Variation with geographic region

The multivariate test for differences between schools from different MSGLC categories across the three Student Learning Experience components was also suggestive[54]. Follow-up investigation revealed that the reasons for this suggestive multivariate difference were suggestive univariate differences on the Alternative and Extension Activities for Targeted Groups and Student Learning Opportunities components. Respondents from Remote Area schools perceived a substantially greater 'need' on both components. Figure 7.5 displays the profile plot of the original Student Learning Experience 'need' transformed items (ordered by component and labelled across the top of the graph) by MSGLC category. Within the Alternative/Extension Activities for Targeted Groups component the disparity between the high level of 'need' for alternative or extension activities for all four specifically-targeted student groups, expressed by respondents from Remote schools, and to a lesser extent from Provincial Cities and Areas, compared to respondents from schools in Metropolitan Areas, was quite marked. Within the Student Learning Opportunities component, respondents from Remote Area schools indicated a far greater level of 'need' in the area of opportunities for students to

[54] Wilks' lambda = .891, $F(9, 484.464) = 4.51$, $p = .006$, partial $\eta^2 = .04$

visit ICT-related educational sites compared to all other MSGLC categories; the 'need' was relatively greater for respondents from Provincial Cities and Areas compared to respondents from Metropolitan Areas.

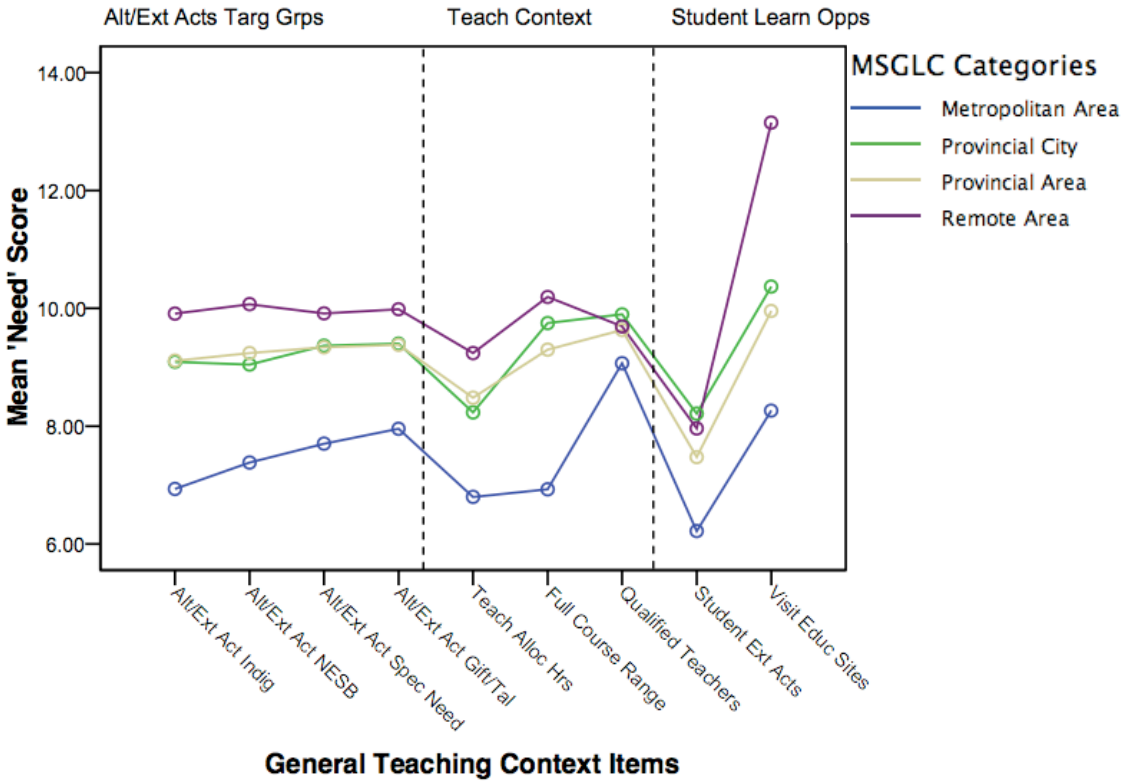

Figure 7.5 Profile plot of mean 'need' scores of ICT respondents for the Student Learning Experience components, compared by MSGLC categories (Table 7.5 for item names in full)

The comments of some ICT respondents in Provincialand Remote Areas reflected on the distance to relevant excursion sites and the time required to organise alternative activities. For example:

> Remoteness to large business ICT infrastructures for excursion purposes. (ICT teacher, Provincial City NSW)
>
> (we need) more time release for professional development and collaboration for teachers to improve their implementation of ICT rich activities in the classroom. (ICT teacher, Provincial Area, Vic.)

Summary of findings and implications

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.

7.5 MATHEMATICS TEACHERS' VIEWS ON STUDENT LEARNING NEEDS

Table 7.7 summarises, at the level of the entire mathematics teacher sample, the average scores on the 'need'-transformed items dealing with secondary mathematics student learning experiences. The areas of greatest overall 'need' include students having opportunities to visit mathematics-related educational sites, alternative/extension activities in mathematics teaching programs for gifted and talented and for special needs students. The area of least 'need' overall concerned students being able to participate in external mathematics competitions and activities.

Table 7.7 Overall average 'need' scores, standard deviations and valid N for mathematics respondents' ratings of the Student Learning Experience items (items are listed in descending order of mean 'need' score) [Scores can range from 1 to 20]

STUDENT LEARNING NEED ITEMS	Mean	s.d.	Valid N
Opportunities for students to visit mathematics related educational sites	**9.36**	3.70	505
Alternative/extension activities in mathematics teaching programs for gifted & talented students	**9.22**	3.58	500
Alternative/extension activities in mathematics teaching programs for special needs students	**8.86**	3.64	496
Alternative/extension activities in mathematics teaching programs for Indigenous students	**8.47**	4.16	474
Alternative/extension activities in mathematics teaching programs for NESB students	**8.43**	4.05	455
Teachers qualified to teach the mathematics courses offered in your school	**8.15**	3.06	505
Having the total indicative hours allocated to face-to-face teaching	**8.12**	3.48	492
Having the full range of senior mathematics courses available in your school	**7.14**	3.24	506
Student participation in external mathematics competitions and activities	**5.92**	2.49	510

Mathematics respondents' mean need rating for opportunities for students to visit educational sites was lower than that of science, primary and ICT respondents, indicating that this is a moderate rather than high need. In contrast to primary and science respondents, for example, no comments from mathematics respondents referred to excursions or visits.

A principal components analysis of the 'need'-transformed Student Learning Experience items (Appendix 7.4) showed three substantive components: Alternative and Extension Activities for Targeted Groups, Teaching Context in the School, and Student Learning Opportunities. Scores on these three components were analysed using a series of MANCOVAs in order to make specific group comparisons. Two MANCOVAs were conducted comparing mean component 'need' scores by MSGLC category and percentage of students with Indigenous backgrounds. Table 7.8 shows the mean ratings and their associated standard errors on the three components across the categories of the comparison variables. The multivariate test for MSGLC category differences across the three Student Learning Experience components was not significant.

Table 7.8 Mean ratings of mathematics respondents on Student Learning Experience item components, broken down by MSGLC categories and percentage of students with Indigenous backgrounds [a]

			Student Learning Experience Components			
			Alternative/ Extension Activities for Targeted Groups	Teaching Context in the School	Student Learning Opportunities	Valid N
MSGLC categories	Metropolitan Area	Mean	8.39	7.34	6.82	
		s.e. (Mean)	.35	.25	.28	114
	Provincial City	Mean	8.22	7.82	7.19	
		s.e. (Mean)	.33	.23	.27	117
	Provincial Area	Mean	9.27	7.92	8.07	
		s.e. (Mean)	.24	.17	.20	225
	Remote Area	Mean	9.05	8.31	8.53	
		s.e. (Mean)	.64	.46	.52	28
Percentage of students in your school with Indigenous backgrounds	0%	Mean	7.82	6.78	6.52	
		s.e. (Mean)	.45	.32	.36	52
	1 - 20%	Mean	8.71	7.79	7.56	
		s.e. (Mean)	.17	.12	.13	354
	21 - 40%	Mean	9.91	9.17	8.52	
		s.e. (Mean)	.52	.36	.41	37
	> 40%	Mean	10.64	8.01	9.43	
		s.e. (Mean)	.85	.59	.68	14

[a] Shading denotes components where significant or suggestive mean differences exist between the groups being compared. Gold shading indicates significant differences ($p < .001$) on a component; light blue shading indicates suggestive differences ($p < .01$) on a component.

Variation with Indigenous student population

The multivariate test for differences between schools having different percentages of students with Indigenous backgrounds across the three Student Learning Experience components was significant[55]. Follow-up investigation revealed that the reasons for this significant multivariate difference were significant univariate differences on the Teaching Context in the School and Student Learning Opportunities components as well as a suggestive difference on the Alternative and Extension Activities for Targeted Groups component. 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.

Figure 7.6 displays the profile plot of the original Student Learning Experience 'need' transformed items by percentage of students with Indigenous backgrounds. Within the Alternative/Extension Activities for Targeted Groups component, the disparity between the high level of 'need' for alternative or extension activities for the specific targeted groups of NESB, Indigenous and special needs students, expressed by respondents from schools where greater than 40% of students were from Indigenous backgrounds compared to respondents from other schools, was quite marked. Respondents from schools where between 21% and 40% of students were from Indigenous backgrounds indicated generally high 'need' for alternative or extension activities with respect to all four targeted groups. Within the General School Teaching Context component, having a full range of mathematics courses on offer and having total indicative hours allocated to face-to-face teaching reflected a markedly higher level of 'need' from respondents from schools where between 21% and 40% of students were from Indigenous backgrounds; having qualified teachers was at a high level of need for respondents from schools where the percentage of student with Indigenous backgrounds exceeded 20%.

[55] Wilks' lambda = .915, $F(9, 1090.465) = 4.51$, $p < .001$, partial $\eta^2 = .03$

Within the Student Learning Opportunities component, respondents from schools where greater than 20% of students were from Indigenous backgrounds indicated a substantially greater level of 'need' in the area of opportunities for students to visit mathematics related educational sites (the 'need' was relatively greater for respondents from schools where more than 40% of students had Indigenous backgrounds).

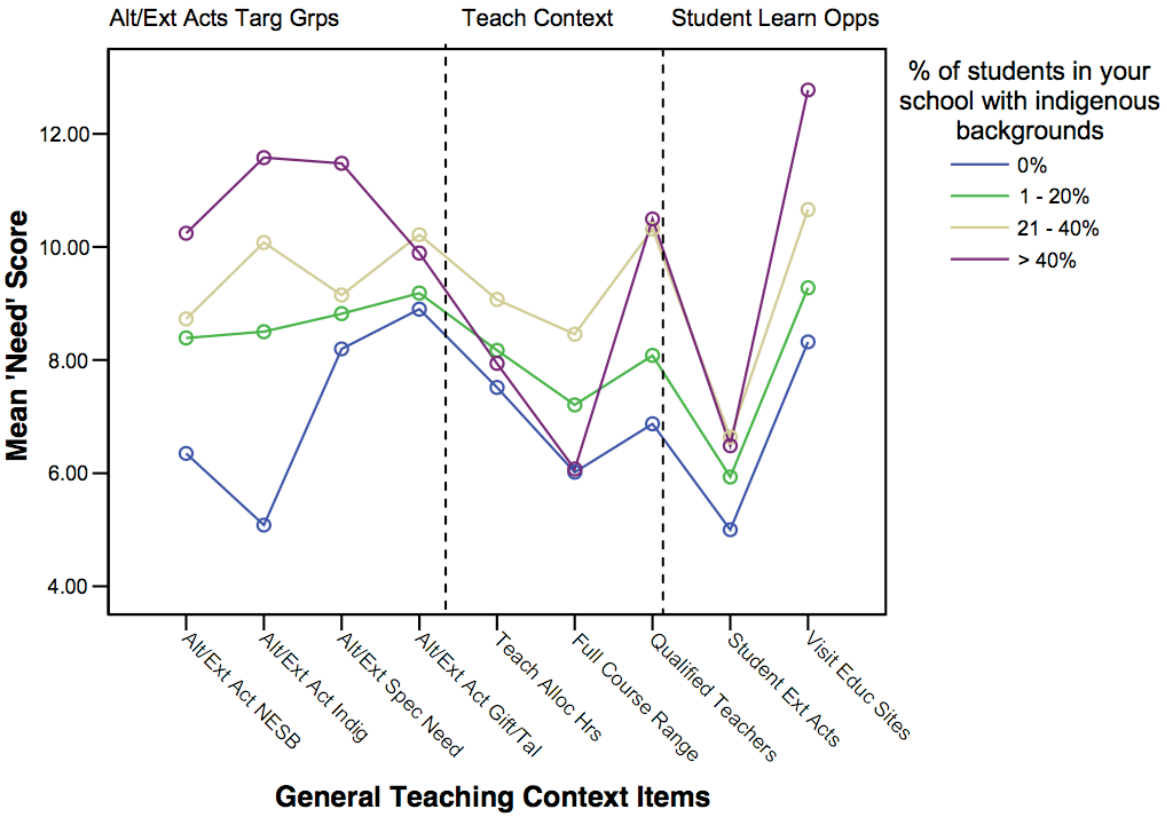

Figure 7.6 Profile plot of mean 'need' scores of mathematics respondents for the Student Learning Experience components, compared by percentage of students from Indigenous backgrounds (Table 7.7 for item names in full)

Summary of findings and implications

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.

7.6 STUDENTS LEARNING IN COMPOSITE CLASSES

Secondary teachers were asked whether senior science, ICT or mathematics courses at their schools were being taught in composite classes (e.g. Years 11 and 12 physics students taught in the same class) in order to have sufficient numbers to offer courses in these subject areas. 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. Figure 7.7 shows that a greater percentage of ICT respondents reported this arrangement for their senior classes compared with science or mathematics respondents.

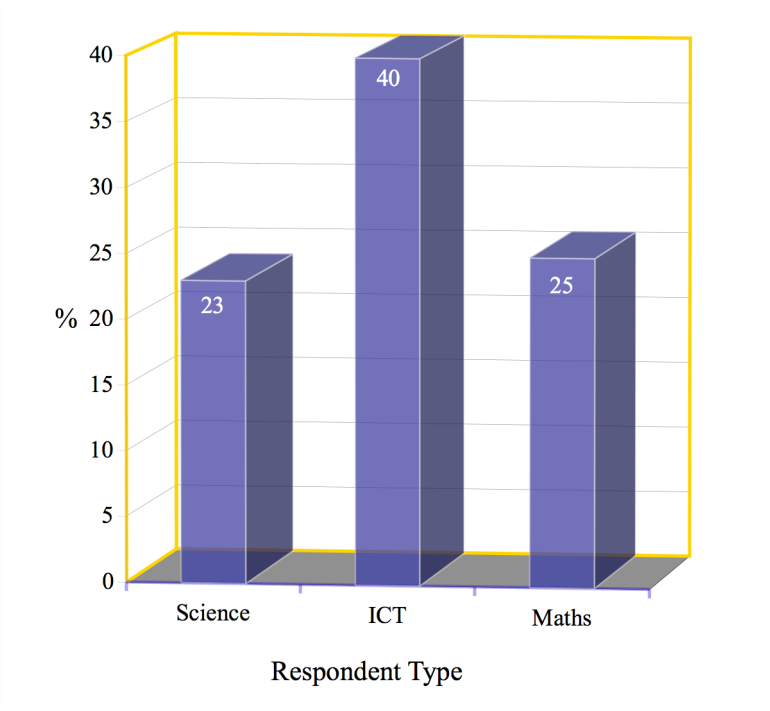

Figure 7.7 Percentages of secondary respondents in different subject areas indicating that composite senior courses in these subjects were taught in their schools

Table 7.9 summarises the variations in responses to this question across MSGLC categories. For each subject area, MSGLC category and secondary courses being taught in composite classes were significantly associated[56]. This was primarily due to significantly fewer respondents than expected from Metropolitan Areas and significantly more respondents than expected from Provincial and Remote Areas coming from schools where some secondary courses in these subject areas were taught in composite classes.

[56] Science: $\chi^2(3) = 46.43$; $p < .001$; Cramer's V = .29; ICT: ($\chi^2(3) = 67.56$; $p < .001$; Cramer's V = .36; Mathematics: $\chi^2(3) = 67.56$; $p < .001$; Cramer's V = .36.

Table 7.9 Science, ICT and mathematics respondents reporting senior courses taught in composite classes, by MSGLC categories [a]

			MSGLC categories				
			Metropolitan Area	Provincial City	Provincial Area	Remote Area	*Overall*
Are some science courses taught in composite classes?	No	Count	132	103	176	25	436
		% within Row item	30.3%	23.6%	40.4%	5.7%	100.0%
		% within MSGLC	91.0%	87.3%	67.4%	56.8%	76.8%
	Yes	Count	13	15	85	19	132
		% within Row item	9.8%	11.4%	64.4%	14.4%	100.0%
		% within MSGLC	9.0%	12.7%	32.6%	43.2%	23.2%
Are some ICT courses taught in composite classes?	No	Count	44	30	57	4	135
		% within Row item	32.6%	22.2%	42.2%	3.0%	100.0%
		% within MSGLC	77.2%	69.8%	53.3%	20.0%	59.5%
	Yes	Count	13	13	50	16	92
		% within Row item	14.1%	14.1%	54.3%	17.4%	100.0%
		% within MSGLC	22.8%	30.2%	46.7%	80.0%	40.5%
Are some mathematics courses taught in composite classes?	No	Count	129	105	154	11	399
		% within Row item	32.3%	26.3%	38.6%	2.8%	100.0%
		% within MSGLC	92.8%	82.7%	65.0%	34.4%	74.6%
	Yes	Count	10	22	83	21	136
		% within Row item	7.4%	16.2%	61.0%	15.4%	100.0%
		% within MSGLC	7.2%	17.3%	35.0%	65.6%	25.4%

[a] Shaded cells indicate categories making a significant ($p < .001$) contribution to the overall association between a pair of variables. Pink means *more than an expected number were observed*; Light green means *fewer than an expected number were observed*. 'Expected' refers to what would be expected if the pair of variables were not associated.

The overall pattern across MSGLC categories is illustrated in Figure 7.8. 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.

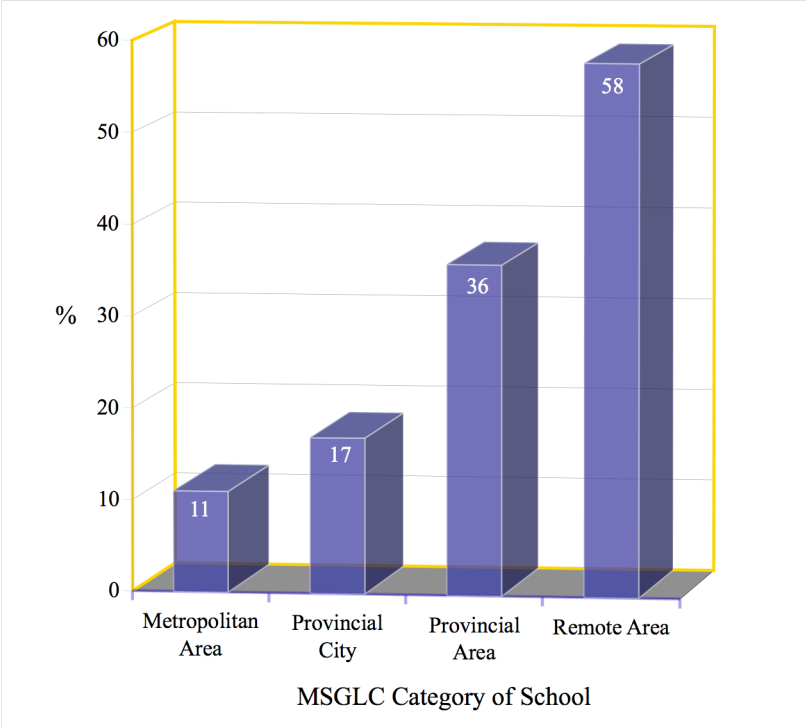

Figure 7.8 Percentages of secondary teachers in different MSGLC categories indicating that science, ICT or mathematics courses were taught in composite classes

Respondents outlined some of the reasons for, and implications of, this arrangement:

> …the loss of specialist teachers results in teachers teaching out of their subject area and teaching composite stage classes. (Science teacher, Provincial Area, NSW)

> It is a significant compromise for student learning to have composite classes in senior science. To be successful, composite classes require students with a high degree of self-motivation, and independent learning skills. Many students in this school are from disadvantaged homes: single parent, low income, dysfunctional family. Because the school has a small population, the more capable, and talented students are few in number, and have a significant pressure on them to fit the mould of under-performing. (Science teacher, Provincial Area, NSW)

> …changes to syllabus requirements then impose great strain upon the teacher who is trying to cope with two different year levels with different spirits to their course requirements. (Science teacher, Provincial Area, Qld)

The findings reported in this chapter are discussed in more detail in Chapter Nine, where they are linked to recommendations.