

CHAPTER SIX

MATERIAL RESOURCE AND SUPPORT NEEDS OF TEACHERS

6.1 INTRODUCTION

This chapter reports teachers' responses to questions about the material resources and support personnel needed for teaching science, ICT and mathematics. The surveys presented teachers with a set of items relating to these resources, such as textbooks, computers and laboratory equipment, along with support personnel for technical support or to help cater for student diversity. Teachers were asked to rate each item on two scales: the importance of this resource for their current teaching situation, and the availability of this resource at their school. The two ratings for each item were combined to produce a single 'need' rating (see Chapter Three). Teachers were also given the opportunity to comment about resource and support issues not included in the question. The chapter presents the results of analysis of these need ratings across a range of variables for each of the teacher respondent groups. Where appropriate, representative comments are used to illustrate or expand on the findings.

6.2 MATERIAL RESOURCE AND SUPPORT NEEDS OF PRIMARY TEACHERS

Table 6.1 summarises, at the level of the total primary respondent sample, the average scores on the 'need'-transformed items dealing with material resources and support personnel. The areas of greatest overall 'need' related mainly to ICT equipment and support. These included having a suitably skilled assistant to help integrate ICT in the classroom, having suitably skilled ICT support staff, appropriate numbers of computers for student use, and suitable software for teaching and learning science and mathematics. The need for ICT support was reflected in many comments, of which the following are representative:

We are quite well resourced and have good access to computers. However, the lack of an assistant means there is only the classroom teacher to maintain equipment and order new equipment. (Primary Teacher, Provincial City, NSW)

We have no ICT support personnel. The technician is \$80 an hour and rarely travels to our area. ICT resources are not maintained or serviced well. Other material resources are fine! (Primary Teacher, Provincial Area, WA)

Our school is well resourced in ICT. However, without a person managing this area in the past one and a half years there have been many problems and I've lost confidence in things/computers/programs working on a given day, so do not rely heavily on this in my learning programs at the present. (Primary Teacher, Remote Area, Qld)

The highest non-ICT need was for suitable learning support assistants, an area that was also identified in respondents' comments:

Lack of funding means support personnel are only available for certain students/classes where testing has identified them as being below the benchmark or ascertained with special needs. Often classes who need support miss out. Those who receive support may not receive enough. (Primary teacher, Provincial Area, Qld)

Areas of least ‘need’ overall included worksheets for teaching mathematics and science.

Table 6.1 Overall average ‘need’ scores, standard deviations and valid N for primary respondents for Material Resources and Support Personnel items (in descending order of mean ‘need’ score) [Scores can range from 1 to 20] ⁴³

RESOURCE ITEMS	Mean	s.d.	Valid N
Suitably skilled personnel to assist in integrating ICT in your classroom	10.23	4.12	1506
Suitably skilled ICT support staff	10.07	4.04	1498
Appropriate numbers of computers for student use	9.39	4.01	1505
Suitable software for teaching & learning science & mathematics	9.17	3.65	1499
Suitable learning support assistant(s)	9.08	3.72	1500
Effective maintenance & repair of teaching equipment	8.99	3.42	1486
Computer hardware for your teaching & learning situation	8.95	3.76	1513
Adequate consumables for teaching science	8.72	3.34	1469
A fast, reliable internet connection	8.61	3.55	1517
Suitable equipment for teaching science	8.55	3.23	1493
Science & mathematics resources that address the needs of special needs students	8.51	3.58	1456
Suitable Indigenous Education Assistants	8.44	4.26	1387
Science & mathematics resources that address the needs of gifted & talented students	8.43	3.41	1459
Suitable computer resources for teachers use	8.33	3.34	1504
Access to a wide range of internet resources	8.17	3.22	1515
Adequate consumables for teaching mathematics	8.00	2.87	1442
Suitable library resources for teaching & learning science	7.93	2.79	1492
Science & mathematics resources that address the needs of Indigenous students	7.91	4.01	1389
Science & mathematics resources that address the needs of NESB students	7.86	4.04	1340
Suitable equipment for teaching mathematics	7.76	2.67	1486
Suitable library resources for teaching & learning mathematics	7.50	2.68	1476
Suitable AV equipment	7.39	3.03	1467
Worksheets for teaching science	6.04	2.81	1471
Worksheets for teaching mathematics	5.66	2.58	1461

A principal components analysis of ‘need’-transformed material resources and support personnel items (Appendix 6.1) produced four substantive components: ICT Resources and Support, Teaching Resources, Resources for Teaching to Targeted Groups, and Worksheet Resources. Scores on these four 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 6.2 shows the mean ratings and their associated standard errors on the four components across the categories of the comparison variables. The multivariate test for MSGLC category differences across the four material resources and support personnel components was not significant.

⁴³ 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.

Table 6.2 Mean ratings of primary respondents on Material Resources and Support Personnel item components, broken down by MSGLC categories and percentage of students with Indigenous backgrounds^a

			Material Resources & Support Personnel Component				Valid N
			ICT Resources & Support	Teaching Resources	Resources for Teaching to Targeted Groups	Worksheet Resources	
MSGLC categories	Metropolitan Area	Mean s.e. (Mean)	8.88 .20	7.93 .16	8.39 .22	5.71 .19	207
	Provincial City	Mean s.e. (Mean)	8.82 .16	7.93 .12	7.99 .17	5.64 .15	326
	Provincial Area	Mean s.e. (Mean)	9.30 .10	8.19 .08	8.41 .11	5.96 .10	766
	Remote Area	Mean s.e. (Mean)	9.24 .23	8.31 .18	8.91 .24	6.01 .21	154
Percentage of students in your school with Indigenous backgrounds	0%	Mean s.e. (Mean)	8.95 .17	7.96 .13	7.83 .18	5.57 .15	296
	1 - 20%	Mean s.e. (Mean)	9.09 .09	8.08 .07	8.40 .10	5.93 .08	932
	21 - 40%	Mean s.e. (Mean)	9.80 .28	8.52 .22	8.97 .30	6.20 .26	95
	> 40%	Mean s.e. (Mean)	9.97 .35	9.02 .27	10.12 .37	5.89 .33	62

^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 population

The multivariate test comparing the four material resources and support personnel components across schools with different percentages of student with Indigenous backgrounds was significant⁴⁴. Follow-up tests revealed that the reasons for this significant multivariate difference were significant univariate differences on the Teaching Resources and Resources for Teaching to Targeted Groups and a suggestive difference on the ICT Resources and Support component. In each case, respondents from schools having more than 40% of students with Indigenous backgrounds indicated substantially greater levels of ‘need’ in these three components compared to respondents from schools where the percentage was 20% or less. Figure 6.1 displays the profile plot of the original material resources and support personnel ‘need’ transformed items by percentage of students with Indigenous backgrounds. Greater ‘need’ is shown on nearly every material resource and support personnel item for respondents from schools where the percentage of Indigenous students exceeded 40%. However, this trend was especially notable for teaching science and mathematics to Indigenous, special needs and gifted and talented students, having suitable learning support assistants, having sufficient consumables for teaching both science and mathematics, having a wide range of internet resources, having a suitably skilled assistant to help integrate ICT in the classroom and having suitable ICT support staff.

The typical comments below elaborate concerns about assistance and ICT support in schools with high Indigenous student populations:

⁴⁴ Wilks' lambda = .969, $F(12, 3638.2) = 5.74$, $p < .001$, partial $\eta^2 = .01$

We have good physical and human resources but have great difficulty accessing Indigenous teacher aides. (Primary Teacher, Remote Area, WA, Indigenous student population >60%)

We have two Aboriginal Education Assistants, but due to large number of Indigenous students AEAs are often not available for classroom activities. ICT support is exceptional given that we have no on-site technical support. It's a combination of a labour of love for interested staff and the fact that school pays local business a retainer (not DET funded) to upgrade and maintain equipment. (Primary Teacher, Provincial City, NSW, Indigenous student population >60%)

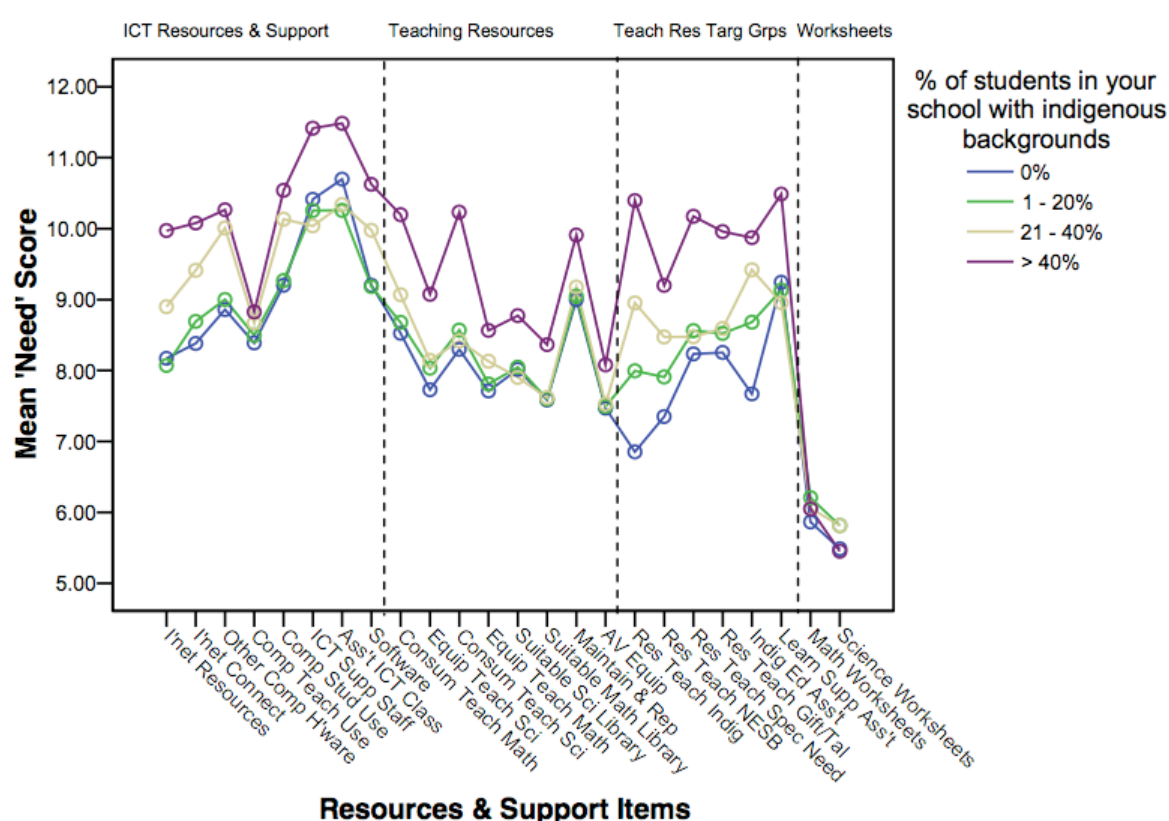


Figure 6.1 Profile plot of mean 'need' scores of primary respondents for the Material Resources and Support Personnel components, compared by percentage of students from Indigenous backgrounds (Table 6.1 for item names in full)

Summary of findings and implications

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.

6.2 MATERIAL RESOURCE AND SUPPORT NEEDS OF SECONDARY SCIENCE TEACHERS

Table 6.3. summarises, at the level of the entire science teacher sample, the average scores on the 'need'-transformed items dealing with material resources and support personnel. As was the case among primary respondents, the areas of greatest overall 'need' related to ICT. These included appropriate numbers of computers for student use, having a suitably skilled assistant to help integrate ICT in the classroom, having suitable software for teaching and learning science, having suitable learning support assistant(s) and having other computer hardware for teaching and learning science. Areas of least 'need' overall included worksheets for classroom teaching and having class sets of suitable texts.

Table 6.3 Overall average 'need' scores, standard deviations and valid N for science respondents' ratings of the Material Resources and Support Personnel items (items listed in descending order of mean 'need' score) [Scores can range from 1 to 20]

SCIENCE RESOURCE AND SUPPORT PERSONNEL ITEMS	Mean	s.d.	Valid N
Appropriate numbers of computers for student use	10.11	3.83	552
Suitably skilled personnel to assist in integrating ICT in your classroom	9.80	4.07	549
Suitable software for teaching & learning science	9.73	3.77	542
Suitable learning support assistant(s)	9.65	3.60	538
Other computer hardware for teaching & learning science	9.56	3.63	542
Suitably skilled ICT support staff	8.99	3.76	542
Effective maintenance & repair of teaching equipment	8.88	3.60	544
Classroom resources suitable for teaching science to gifted & talented students	8.85	3.54	531
Classroom resources suitable for teaching science to special needs students	8.85	3.76	520
A fast, reliable internet connection	8.81	3.70	551
Suitable computer resources for teachers use	8.62	3.71	554
Suitable Indigenous Education Assistants	8.54	4.38	518
Access to a wide range of internet science resources	8.42	3.49	546
Well-equipped science laboratories	8.24	3.10	552
Classroom resources suitable for teaching science to Indigenous students	8.15	4.05	519
Classroom resources suitable for teaching science to NESB students	7.87	3.89	489
Suitable laboratory assistant(s)	7.74	3.70	545
Suitable library resources (e.g., magazines, books) for teaching & learning science	7.73	3.24	547
Sufficient laboratory consumables	7.70	2.87	548
Suitable AV equipment	7.33	2.91	546
Class sets of suitable texts	6.69	3.32	543
Worksheets for classroom teaching	6.01	2.90	544

A principal components analysis of 'need'-transformed material resources and support personnel items (Appendix 6.2) produced four substantial components: ICT Resources, Teaching Resources for Targeted Groups, General Teaching Resources, and General Teaching Support. Scores on these four 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 6.4 shows the mean ratings and their associated standard errors on the four components across the categories of the comparison variables.

Table 6.4 Mean ratings of science respondents on Material Resources and Support Personnel item components, broken down by MSGLC categories and percentage of students with Indigenous backgrounds^a

			Material Resources & Support Personnel Component				Valid N
			ICT Resources	Teaching Resources for Targeted Groups	General Teaching Resources	General Teaching Support	
MSGLC categories	Metropolitan Area	Mean s.e. (Mean)	8.45 .29	7.27 .30	6.51 .21	7.89 .26	135
	Provincial City	Mean s.e. (Mean)	9.37 .30	8.80 .32	7.44 .22	9.00 .28	113
	Provincial Area	Mean s.e. (Mean)	9.72 .21	8.69 .21	7.62 .15	9.06 .19	250
	Remote Area	Mean s.e. (Mean)	9.67 .52	9.87 .53	7.65 .38	9.47 .47	36
Percentage of students in your school with Indigenous backgrounds	0%	Mean s.e. (Mean)	9.27 .42	7.30 .43	7.10 .30	8.52 .38	51
	1 - 20%	Mean s.e. (Mean)	9.22 .15	8.33 .15	7.14 .11	8.67 .13	402
	21 - 40%	Mean s.e. (Mean)	10.91 .51	10.80 .53	8.60 .37	9.99 .46	33
	> 40%	Mean s.e. (Mean)	10.10 .75	10.34 .77	10.10 .53	10.63 .37	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 four material resources and support personnel components was significant⁴⁵. Follow-up tests revealed that the reasons for this significant multivariate difference were significant univariate differences on the Teaching Resources for Targeted Groups and General Teaching Resources components and suggestive differences on the ICT Resources and General Teaching Support components. Teaching Resources for Targeted Groups, General Teaching Resources and General Teaching Support were components exhibiting the highest level of ‘need’ for respondents from Remote areas and the lowest ‘need’ for respondents from Metropolitan Areas. In absolute terms, ICT Resources exhibited the highest level of ‘need’ across the four components and across the four MSGLC categories, followed by General Teaching Support. Comparatively speaking, though, ‘need’ was highest in the area of ICT Resources for respondents from both Remote and Provincial Areas. Figure 6.2 displays the profile plot of the original material resources and support personnel ‘need’ transformed items by MSGLC code. The clear trend in Figure 6.2 is that respondents from Metropolitan Areas uniformly indicated a lower level of ‘need’ across all 22 original material resources and support personnel items. Also particularly notable is that respondents from Remote Areas generally indicated a higher level of ‘need’ for resources for teaching science to Indigenous and special needs students. Respondents from Provincial Areas and Cities indicated the greatest level of ‘need’ for having appropriate numbers of computers for student use.

⁴⁵ Wilks’ lambda = .941, $F(12, 1386.67) = 7.03$, $p = .001$, partial $\eta^2 = .02$

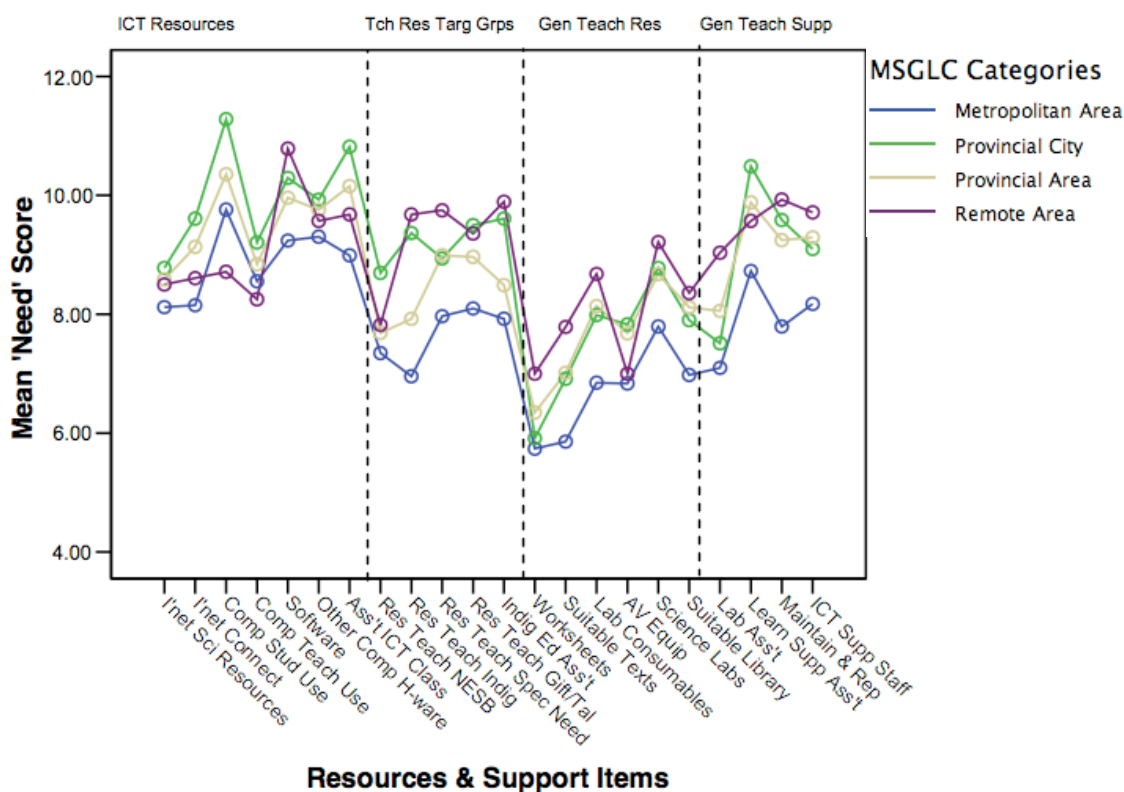


Figure 6.2 Profile plot of mean 'need' scores of science respondents for the Material Resources and Support Personnel components, compared by MSGLC categories

Over forty percent of science respondents' comments about resources concerned the availability and quality of support staff for laboratory assistance, ICT technical help, or learning assistance. The comments were of two general types: expressions of appreciation for existing support staff, or dissatisfaction with the unavailability of such staff. A greater than expected proportion of the first type of comment came from metropolitan science teachers, whereas a greater than expected proportion of the second type of comment came from teachers in Provincial and Remote Areas. For example:

Excellent and professional lab technicians increase the range of practical activities that can be conducted, and reduce the time taken by individual teachers to prepare pracs. (Science Teacher, Metropolitan Area, NSW)

Being a rural school makes it difficult to access qualified lab assistants. We only have a 0.2FTE allocation as well, which makes it doubly hard to get someone for one day a week. Material resources aren't really a problem. (Science teacher, Provincial Area, Tas.)

Adequate resources are available, however the lack of qualified laboratory assistance is a significant issue. A lot of teacher time is spent preparing laboratory work ... In addition to poor resourcing there is a massive lack of technical support. Once again teacher time is significantly affected trying to set up and/or fix and maintain resources, particularly technology resources. (Science Teacher, Provincial Area, NSW)

Variation with Indigenous population

The multivariate test comparing the four material resources and support personnel components across schools with different percentages of students with Indigenous backgrounds was significant⁴⁶. Follow-up tests revealed that the reasons for this significant multivariate difference were significant univariate differences on the Teaching Resources for Targeted Groups and General Teaching Resources components and a suggestive difference on the General Teaching Support component. In each case, respondents from schools having more than 21% of students with Indigenous backgrounds indicated substantially greater levels of ‘need’ in these three components compared to respondents from schools where the percentage was 20% or less. Figure 6.3 displays the profile plot of the original material resources and support personnel ‘need’ transformed items by percentage of students with

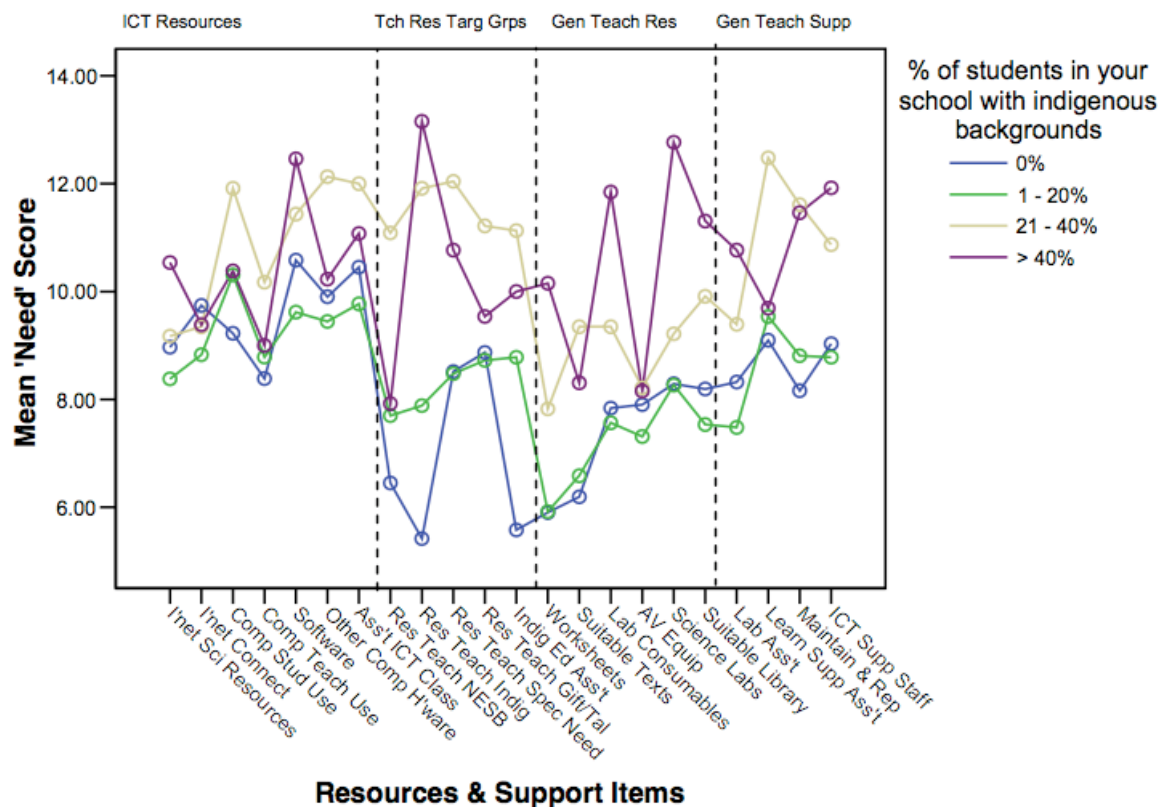


Figure 6.3 Profile plot of mean ‘need’ scores of science respondents for the Material Resources and Support Personnel components, compared by percentage of students from Indigenous backgrounds

Indigenous backgrounds. The figure shows that ‘needs’ are greatest in the specific areas of resources for teaching science to Indigenous students, having sufficient laboratory consumables, having well-equipped science laboratories and having suitable ICT support staff for respondents from schools having more than 40% of students with Indigenous backgrounds. In schools where the percentage of students with Indigenous backgrounds was between 21% and 40%, ‘needs’ were greatest in the specific areas of resources for teaching to all targeted groups, having suitable Indigenous Education Assistants and learning support assistants and having appropriate numbers of computers for student use. In general, however, it is clear that in schools where the percentage of students with Indigenous backgrounds exceeds 20%, ‘needs’ are greater in most areas.

⁴⁶ Wilks’ lambda = .873, $F(12, 1302) = 5.74$, $p < .001$, partial $\eta^2 = .04$.

The resourcing priorities identified by respondents in schools with high Indigenous student populations were illustrated by their comments:

This is a small school, which means the teacher is the Lab Assistant, ICT coordinator, Special Needs teacher, Gifted & Talented assistant, etc. We make do with what we have, and try and find substitutes for what we don't have. (Science teacher, Remote Area, SA, Indigenous student population 21-40%)

ICT support is me ... but that is limited by time as I'm often assisting others. Indigenous area is limited and lacking in support staff. We have a good structure to focus on literacies and numeracy [my area as well], and I support others in science resourcing for science challenges and do lab tech work, though poorly due to time limitations. I also take the primary students twice a week with arts/technology focus. (Science teacher, Provincial Area, Tas., Indigenous student population 21-40%)

I am only new to this school (4 weeks) and resources really need to be built up to an acceptable standard. There are Aboriginal support staff, but they are shared across all subjects. (Science teacher, Remote Area, WA, Indigenous student population >40%)

Summary of findings and implications

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.

6.3. MATERIAL RESOURCE AND SUPPORT NEEDS OF SECONDARY ICT TEACHERS

Table 6.5 summarises, at the level of the entire ICT teacher sample, the average scores on the ‘need’-transformed items dealing with material resources and support personnel. The areas of greatest overall ‘need’ included having a suitably skilled assistant to help integrate ICT in the classroom, having skilled ICT management personnel, having suitable learning support assistants, having up-to-date ICT resources for teacher use and effective maintenance and repair of teaching equipment. Areas of least ‘need’ overall included having worksheets for classroom teaching, suitable library resources and class sets of suitable texts.

Table 6.5 Overall average ‘need’ scores, standard deviations and valid N for ICT respondents’ ratings of the Material Resources and Support Personnel items (items are listed in descending order of mean ‘need’ score) [Scores can range from 1 to 20]

ICT RESOURCES AND SUPPORT ITEMS	Mean	s.d.	Valid N
Suitably skilled personnel to assist in integrating ICT in your classroom	10.14	4.00	223
Skilled ICT resource management personnel	9.71	4.16	217
Suitable learning support assistant(s)	9.65	3.77	220
Up-to-date ICT resources for teacher use	9.43	3.49	224
Effective maintenance & repair of teaching equipment	9.32	3.16	223
ICT resources that address the needs of gifted/talented students	9.18	3.95	211
Appropriate number of computers for student use	9.08	3.390	225
Suitable Indigenous Education assistant(s)	8.90	4.30	210
ICT resources that address the needs of special needs students	8.87	3.89	213
Well-equipped learning spaces for teaching ICT	8.78	3.31	223
ICT resources that address the needs of NESB students	8.59	3.90	198
Suitable AV equipment	8.55	3.34	224
Other computer hardware for teaching & learning ICT	8.48	3.13	224
Suitable software for teaching & learning ICT	8.44	3.03	224
Fast, reliable internet connection	8.23	3.65	224
ICT resources that address the needs of Indigenous students	8.08	3.91	209
Class sets of suitable texts	7.60	3.62	216
Suitable library resources for teaching & learning ICT	7.58	3.26	217
Worksheets for classroom teaching	7.03	3.01	214

A principal components analysis of ‘need’-transformed material resources and support personnel items (Appendix 6.3) produced four substantial components: ICT Resources, Resources for Teaching to Targeted Groups, ICT Teaching Resources and Support, and General Teaching Resources. Scores on these four 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 6.6 shows the mean ratings and their associated standard errors on the four components across the categories of the comparison variables. The multivariate test for percentage of students with Indigenous backgrounds differences across the four material resources and support personnel components was not significant (this would not have been helped by the very low cell size of seven respondents in the over 40% Indigenous percentage category).

Table 6.6 Mean ratings of ICT respondents on Material Resources and Support Personnel item components, broken down by MSGLC categories and percentage of students with Indigenous backgrounds ^a

			Material Resources & Support Personnel Component				Valid N
			ICT Resources	Teaching resources for targeted groups	ICT teaching resources & support	General teaching resources	
MSGLC categories	Metropolitan Area	Mean	7.93	7.63	8.57	6.46	56
		s.e. (Mean)	.33	.53	.47	.42	
	Provincial City	Mean	8.41	8.75	9.12	7.08	44
		s.e. (Mean)	.32	.50	.45	.40	
	Provincial Area	Mean	9.13	9.24	10.39	7.68	97
		s.e. (Mean)	.22	.35	.32	.28	
	Remote Area	Mean	8.01	9.30	10.51	9.97	17
		s.e. (Mean)	.53	.84	.75	.67	
Percentage of students in your school with Indigenous backgrounds	0%	Mean	7.69	7.93	9.59	7.82	22
		s.e. (Mean)	.43	.68	.64	.59	
	1 - 20%	Mean	8.48	8.50	9.54	7.38	154
		s.e. (Mean)	.16	.25	.23	.22	
	21 - 40%	Mean	9.81	10.17	10.61	7.31	21
		s.e. (Mean)	.43	.67	.63	.59	
	> 40%	Mean	9.10	9.90	10.11	8.43	7
		s.e. (Mean)	.76	1.18	1.11	1.03	

^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 comparing the four material resources and support personnel components across schools from different MSGLC categories was significant⁴⁷. Follow-up tests revealed that the reason for this significant multivariate difference was a significant univariate difference on the General Teaching Resources component. Respondents from Remote Area schools indicated substantially greater levels of ‘need’ on this component compared to respondents from schools in other MSGLC categories. Figure 6.4 displays the profile plot of the original material resources and support personnel ‘need’ transformed items by MSGLC category. The figure shows that ‘needs’ for respondents from Remote Areas are greatest in all three specific areas of having worksheets for classroom teaching, having class sets of suitable texts, and having suitable library resources.

While there was no significant geographical difference on the ICT Teaching Resources and Support component, Figure 6.4 shows the higher ‘needs’ rating given to the contributing item ‘ICT Resource Management and Support’ by Provincial and Remote Area respondents. This pattern is reflected in the many comments about lack of support, which were dominated by ICT respondents from these areas. For example:

We are allocated technical support for approximately 3 hours per fortnight from a technician who services something like 15 schools over a huge region (ICT teacher, Remote Area, Vic.)

⁴⁷ Wilks’ lambda = .829, $F(12, 540.025) = 3.30$, $p < .001$, partial $\eta^2 = .06$

We have one technician to manage a huge number of schools – work that needs to be done is left for months as this person also looks after admin computers. (ICT teacher, Provincial Area, Qld)

This is a joke!!!! I spend almost all of my time providing the resources listed above [questionnaire items]. We run 250 PCs in a school of 1000 plus students. The (education authority) has not allowed for any administration, support or maintenance. They buried their heads in the sand 20 years ago and are still buried (ICT teacher, Provincial Area, NSW).

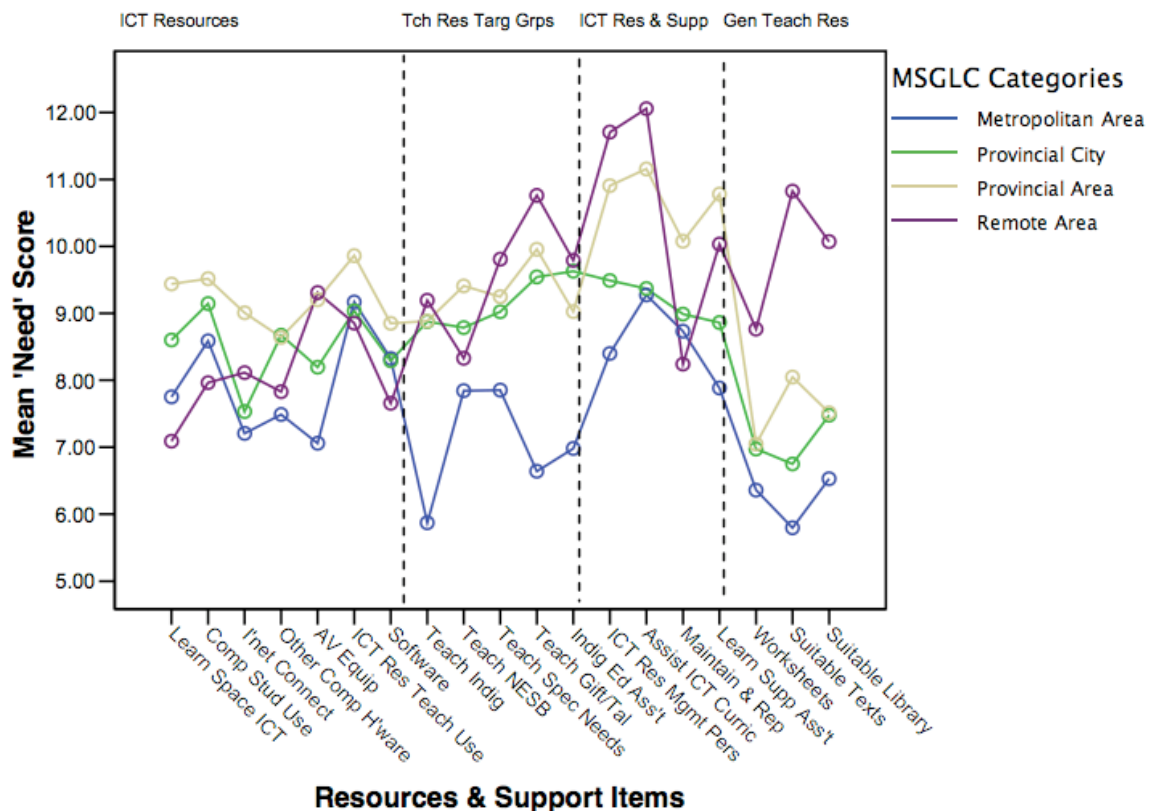


Figure 6.4 Profile plot of mean 'need' scores of ICT respondents for the Material Resources and Support Personnel components, compared by MSGLC categories

6.3.1. ICT resources and time management in schools

ICT teachers were asked to estimate the proportion of their time spent managing and maintaining ICT resources, and for assisting other staff to use ICT resources. They were then asked to estimate the amount of time officially allocated to them for these activities. All three items were recoded into two categories (in order to collapse small n cells): 20% or less of their time spent on/allocated to a specific issue and more than 20% of their time spent on/allocated to that issue. Figure 6.5 shows that overall, nearly 40% of respondents indicating spending more than 20% of their time managing and maintaining ICT resources, while about 30% indicated that they spent over 20% of their time assisting other staff to use ICT resources. However, only about 17% indicated that their school actually allocated more than 20% of their time to manage resources and assist other staff.

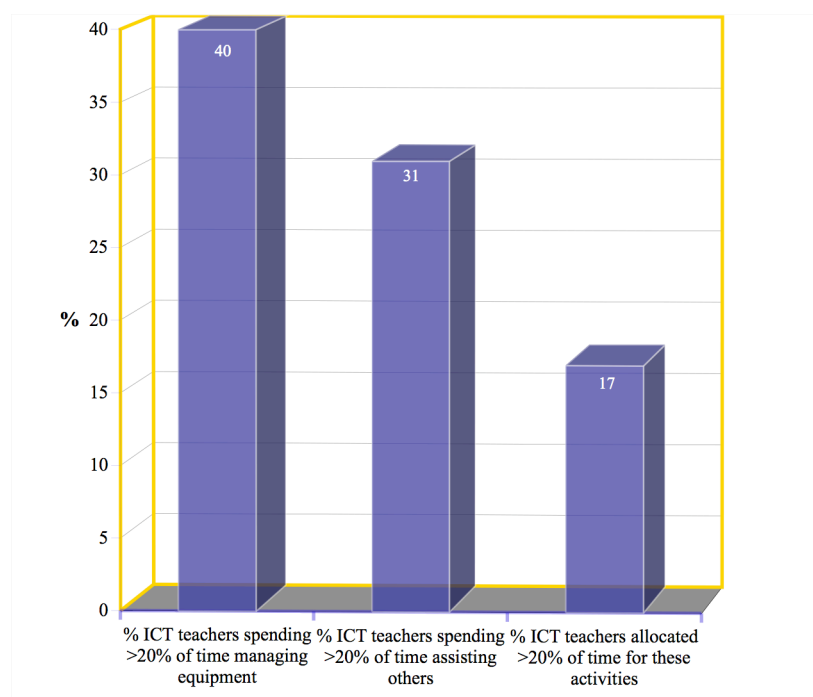


Figure 6.5 Percentages of ICT respondents reporting that >20% of their time is spent managing equipment and assisting others

Table 6.7 summarises the relationships between MSGLC category and the three items on the ICT survey dealing with how much time respondents estimated that they spent in dealing with or were allocated to deal with ICT management issues. There were no significant or suggestive differences in time spent on or allocating managing ICT resources and assisting staff across the MSGLC categories.

ICT respondents' comments highlighted the contrast between the demands placed on them to maintain equipment and support other staff, and the amount of time allocated:

I am expected to maintain and network software, hardware, develop and enforce policies and procedures, conduct professional development for staff, provide assistance to all staff concerning computer usage, facilitate computers and peripheral booking, system develop and maintain the school's website. I am given (officially) one and a half hours a week to do that. More time is required (and I am a full time teacher). (ICT Teacher, Provincial Area, Qld)

My role involves managing ICT across the school, as well as maintaining all ICT resources and running three ICT courses (including staff and student discipline). This is far too much for one person to manage. I believe I do none of my jobs to the best of my ability nor do I feel any of the areas under my control are achieving at a level that they should (or could) be ... Finding a way to get more than 24hrs in a day would help as well. I work 60 hrs (plus) per week on ICT for my school – this is just to maintain current standards. (ICT teacher, Provincial City, Qld)

Public schools must be assigned a technical IT support person (Network Administrator) so that all hardware and software is utilised and functioning close to 100% of the time. Teachers should not be Network Administrators, rather they should be teaching and assisting other teachers to integrate ICT into their curriculum. (ICT Teacher, Metropolitan Area, NSW)

Table 6.7 Breakdown of ICT respondents' time management issues by MSGLC category of school ^a

			MCEETYA SGLC codes				Overall
			Metropolitan Area	Provincial City	Provincial Area	Remote Area	
Estimated proportion of time spent managing & maintaining ICT resources	20% of time or less	Count	34	21	68	11	134
		% of Row	25.4%	15.7%	50.7%	8.2%	100.0%
		% of Column	60.7%	46.7%	67.3%	55.0%	60.4%
	> 20% of time	Count	22	24	33	9	88
		% of Row	25.0%	27.3%	37.5%	10.2%	100.0%
		% of Column	39.3%	53.3%	32.7%	45.0%	39.6%
Estimated proportion of time spent assisting other staff to use ICT resources	20% of time or less	Count	35	30	77	13	155
		% of Row	22.6%	19.4%	49.7%	8.4%	100.0%
		% of Column	61.4%	66.7%	76.2%	65.0%	69.5%
	> 20% of time	Count	22	15	24	7	68
		% of Row	32.4%	22.1%	35.3%	10.3%	100.0%
		% of Column	38.6%	33.3%	23.8%	35.0%	30.5%
Estimated proportion of time school allocates to you to manage ICT resources & assist staff	20% of time or less	Count	46	32	87	17	182
		% of Row	25.3%	17.6%	47.8%	9.3%	100.0%
		% of Column	80.7%	71.1%	88.8%	85.0%	82.7%
	> 20% of time	Count	11	13	11	3	38
		% of Row	28.9%	34.2%	28.9%	7.9%	100.0%
		% of Column	19.3%	28.9%	11.2%	15.0%	17.3%

^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.

Summary of findings and implications

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.

6.4 MATERIAL RESOURCE AND SUPPORT NEEDS OF SECONDARY MATHEMATICS TEACHERS

Table 6.8 summarises, at the level of the entire sample, the average scores on the ‘need’-transformed items dealing with material resources and support personnel. The areas of greatest overall ‘need’ included having a suitably skilled assistant to help integrate ICT in the classroom, having appropriate numbers of computers for student use, having suitable learning support assistant(s) and having other computer hardware for teaching and learning mathematics. Areas of least ‘need’ overall included having worksheets for classroom teaching and having suitable AV equipment.

Table 6.8 Overall average ‘need’ scores, standard deviations and valid N for mathematics respondents’ ratings of the Material Resources and Support Personnel items (items are listed in descending order of mean ‘need’ score) [Scores can range from 1 to 20]

MATHEMATICS RESOURCE AND SUPPORT ITEMS	Mean	s.d.	Valid N
Suitably skilled personnel to assist in integrating ICT in your classroom	9.72	4.34	517
Appropriate number of computers for student use	9.44	3.69	520
Suitable learning support assistant(s)	9.24	3.61	523
Other computer hardware for teaching & learning mathematics	9.06	3.76	512
Suitable software for teaching & learning mathematics	8.91	3.69	520
Suitably skilled ICT support staff	8.87	3.75	518
Mathematical resources that address the needs of gifted/talented students	8.59	3.48	511
Suitable computer resources for teacher use	8.58	3.63	523
Mathematical resources that address the needs of special needs students	8.57	3.72	514
Suitable Indigenous Education assistant(s)	8.21	4.05	501
Effective maintenance & repair of teaching equipment	8.07	3.21	515
Sufficient mathematics equipment & materials	8.02	3.03	525
Fast, reliable internet connection	7.98	3.68	523
Mathematical resources that address the needs of Indigenous students	7.91	4.24	488
Concrete materials for mathematics teaching	7.85	3.11	524
Mathematical resources that address the needs of NESB students	7.80	4.05	462
Access range of internet mathematics resources	7.78	3.45	517
Student access to scientific calculators	7.55	3.30	520
Student access to graphics calculators for in class	6.84	3.41	519
Class sets of suitable texts	6.50	3.22	518
Suitable library resources for teaching & learning mathematics	6.46	2.97	515
Suitable AV equipment	6.39	3.24	520
Worksheets for classroom teaching	6.14	2.77	526

Mathematics respondents’ comments about ICT resources helped explain why they, along with the science respondents, tended to rate the need for ‘appropriate number of computers for student use’ higher than did ICT respondents. These comments concerned the difficulty of gaining access to existing computer labs:

It’s about accessibility. Computers are used up by ICT faculty and seldom accessible for classes. (Mathematics Teacher, Provincial City, NSW)

Lack of suitable teaching spaces to house ICT is a major problem. ICT classes have consistent access but other subjects trying to integrate ICT into their lessons have trouble booking into a lab. (Mathematics teacher, Provincial Area, Vic.)

We have three student laboratories. These labs are usually used by computing classes. Some classes are physically unable to access these labs. (Mathematics teacher, Metropolitan Area, ACT)

We have the 'latest' equipment etc. however it is difficult to access computer labs unless timetabled in. (There are) very few gaps. (Mathematics teacher, Provincial City, Tas.)

Support for students' learning needs was also a high priority with mathematics respondents:

Class sizes are larger in maths because preparation and marking in Mathematics is seen as less time-consuming. Students with learning difficulties rarely have support personnel in class. (Mathematics teacher, Provincial Area, SA)

A principal components analysis of 'need'-transformed material resources and support personnel items (Appendix 6.4) produced three substantive components: ICT Resources and Support, Mathematics Teaching Resources and Support, and Teaching Resources for Targeted Groups. 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 6.9 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 material resources and support personnel components was not significant.

Table 6.9 Mean ratings of mathematics respondents on Material Resources and Support Personnel item components, broken down by MSGLC categories and percentage of students with Indigenous backgrounds ^a

			Material Resources & Support Personnel Component			Valid N
			ICT Resources & Support	Mathematics Teaching Resources & Support	Teaching Resources for Targeted Groups	
MSGLC categories	Metropolitan Area	Mean s.e. (Mean)	8.30 .30	6.65 .23	7.38 .33	122
	Provincial City	Mean s.e. (Mean)	8.68 .28	7.31 .21	7.97 .31	123
	Provincial Area	Mean s.e. (Mean)	9.17 .21	7.21 .16	8.76 .23	233
	Remote Area	Mean s.e. (Mean)	9.33 .56	7.35 .42	8.91 .61	29
Percentage of students in your school with Indigenous backgrounds	0%	Mean s.e. (Mean)	8.32 .39	6.34 .30	6.65 .43	54
	1 - 20%	Mean s.e. (Mean)	8.81 .15	7.12 .11	8.25 .16	368
	21 - 40%	Mean s.e. (Mean)	9.90 .44	7.97 .34	9.83 .48	40
	> 40%	Mean s.e. (Mean)	10.21 .73	8.07 .56	10.23 .79	15

^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 comparing the three material resources and support personnel components across schools with different percentages of student with Indigenous backgrounds was significant⁴⁸. Follow-up tests revealed that the reasons for this significant multivariate difference were significant univariate differences on the Mathematics Teaching Resources & Support and Teaching Resources for Targeted Groups components. Respondents from schools having more than 21% of students with Indigenous backgrounds indicated substantially greater levels of ‘need’ in these two components compared to respondents from schools where the percentage was 20% or less. Figure 6.6 displays the profile plot of the original material resources and support personnel ‘need’ transformed items by percentage of students with Indigenous backgrounds. The figure shows that ‘needs’ are greatest in the specific areas of resources for teaching mathematics to Indigenous students, having suitable Indigenous Education Assistants, students having access to scientific calculators for respondents and having suitably skilled personnel to assist in integrating ICT in the classroom from schools having more than 40% of students with Indigenous backgrounds. In schools where the percentage of students with Indigenous backgrounds was between 21% and 40%, ‘needs’ were greatest in the specific areas of resources for teaching to gifted and talented students and having concrete materials for mathematics teaching. In general, however, it is clear that in schools where the percentage of students with Indigenous backgrounds exceeds 20%, ‘needs’ are greater in most areas.

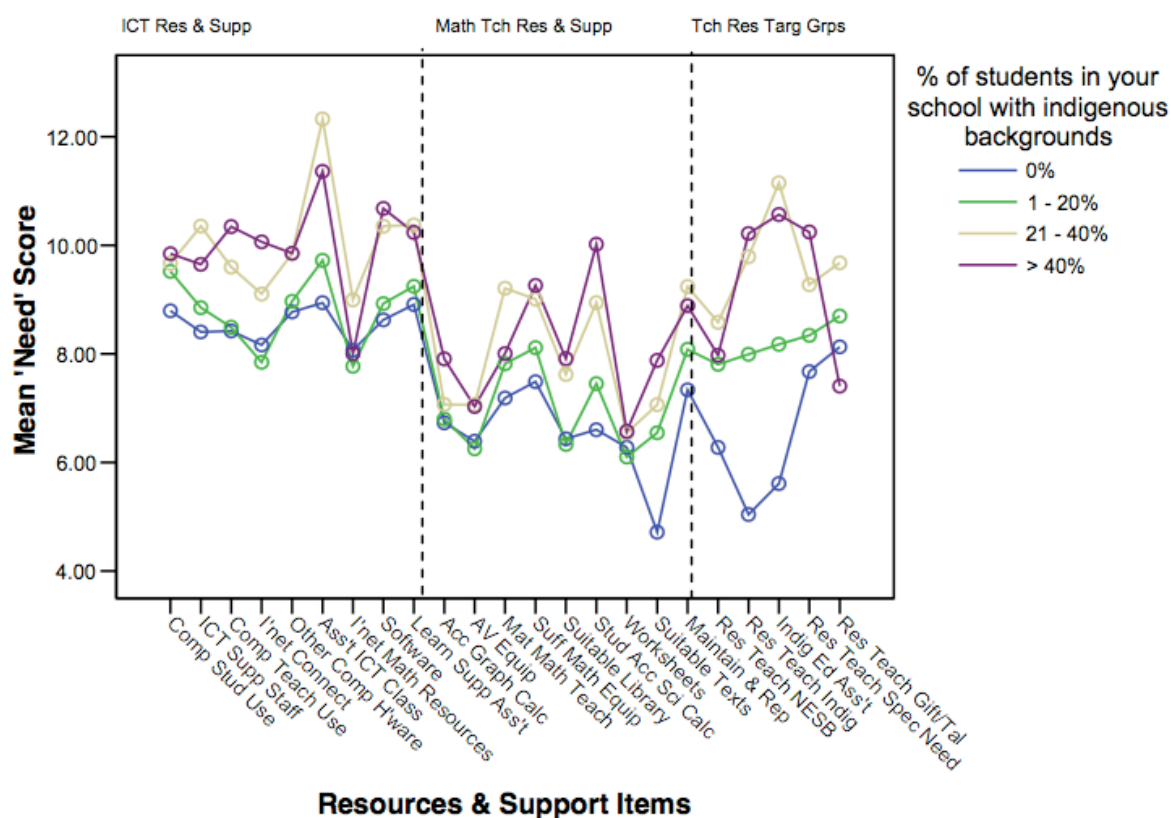


Figure 6.6 Profile plot of mean ‘need’ scores of mathematics teachers for the Material Resources and Support Personnel components, compared by percentage of students from Indigenous backgrounds

⁴⁸ Wilks’ lambda = .931, $F(9, 1139.14) = 3.77$, $p < .001$, partial $\eta^2 = .02$

The comments of mathematics respondents from schools with relatively high proportions of Indigenous student illustrate some of their concerns:

We have one Aboriginal Assistant who works very hard but cannot support all the Indigenous students who need it. We have a large number of students who need STLD (Support Teachers Learning Difficulties) help but have only 0.6 allocation for our school of 1250 students! (Mathematics Teacher, Provincial City, NSW, Indigenous student population 21-40%)

(It is) difficult to find able Indigenous support personnel. There are generally limited times available and the priority tends to be with literacy support. (Mathematics teacher, Remote Area, NT, Indigenous student population >40%)

Summary of findings and implications

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.

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