

# Performance of SNP Students on the Number Framework

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## Introduction

One of the aims of the Secondary Numeracy Project (SNP) is to improve students' learning in mathematics, particularly in number and algebra, so a key aspect in evaluating the project is to quantify any improvement. This chapter aims to address the following research questions:

- What progress have SNP students made on the Number Framework in 2006?
- How does this progress compare with that made in 2005?
- What is the numeracy profile of year 10 students in schools that are in their second year in the SNP?
- What demographic factors impact on the progress and performance of SNP students?

This chapter first describes the participating students and the methods used to analyse student results. The findings are then discussed in three sections. The first section describes the performance and progress of year 9 SNP students in 2006 and compares this with the performance of year 9 SNP students in 2005. The second section compares the end-of-year performance of year 10 SNP students in 2006 with the end-of-year performance of year 9 SNP students in 2006. The final section analyses the impacts of demographic factors (gender, decile, and ethnicity) on the performance and progress of students.

## Sample

The results reported in this chapter were obtained by downloading from the online numeracy database on 1 February 2007 all the data from schools participating in the SNP. Students were only included in the subsequent analysis if complete data had been entered for them. For year 9 students, this meant both initial and final data on the three strategy domains and the four knowledge domains of the Number Framework, while year 10 students only required final data on the seven domains. Complete results were available for 5807 year 9 and 2324 year 10 students from 55 schools. Of the 5807 year 9 students, 4189 were from schools participating in the SNP for the first time in 2006 and 1618 were from schools that had also participated in 2005.

Table 1 comprises a breakdown of the students by year, gender, and ethnicity. Sixty-five percent of the students were of New Zealand European origin, 18% identified as Māori, and approximately 8% identified as Pasifika. There were more male students than female (52% compared with 48%). The overall percentages of students in New Zealand schools by ethnicity are provided for comparison (Education Counts, n.d.). The ethnic breakdown of the SNP sample is not dissimilar to that of the general population.

Table 1  
*Profile of 2006 SNP Students by Ethnicity and Gender*

| Ethnicity   | Year 9 |        | Year 10 |        | National (all domestic school students) |
|-------------|--------|--------|---------|--------|---|
|             | Male   | Female | Male    | Female |   |
| NZ European | 64%    | 63%    | 69%     | 64%    | 59%                                     |
| Māori       | 19%    | 18%    | 18%     | 19%    | 22%                                     |
| Pasifika    | 8%     | 11%    | 4%      | 6%     | 9%                                      |
| Asian       | 4%     | 3%     | 3%      | 3%     | 8%                                      |
| Other       | 5%     | 5%     | 6%      | 8%     | 2%                                      |
| N =         | 2878   | 2929   | 1328    | 996    | 751 044                                 |

## Analysis

A t-test was used to compare the means of variables with only two categories (gender and year level), while an ANOVA test was used to compare the means of variables with three or more categories (decile band and ethnicity). Where statistically significant differences are described between groups, a difference has been verified to at least the 99% confidence level, either by the t-test or by a post-hoc analysis using Tukey's honestly significant difference test. In addition, differences of less than 5% in percentages of students at particular levels of each domain and differences in mean stages of less than 0.2 are not reported. It also needs to be noted that in some instances significantly different mean gains and effect sizes may be smaller than other gains and effect sizes shown that are not statistically significant due to differences in sample size.

In all tables, rounded percentages are presented. Percentages less than 0.5% are therefore shown as 0%, and where there are no students represented, the cell is left blank. Due to rounding, percentages in some tables may not total to 100.

Effect sizes, where used, have been calculated by dividing the average difference between two groups by the pooled standard deviation of the two groups. Effect sizes of 0.2 are considered "small", effect sizes of 0.5 are "medium", and effect sizes of 0.8 or higher are "large" (Cohen, cited in Coe, 2002). For the purposes of this chapter, effect sizes of 0.2 or less are described as small, effect sizes between 0.2 and 0.8 are described as medium, and effect sizes of 0.8 or higher are described as large.

## Performance of Year 9 SNP Students

The annual Numeracy Development Projects (NDP) research reports have consistently shown that many students move to higher stages on the Framework between the start of the project and their final assessment (Young-Loveridge, 2006). Table 2 shows the initial and final percentages of year 9 students in 2006 at each stage of the three strategy domains.

Table 2  
*Initial and Final Strategy Stages of 2006 Year 9 SNP Students*

| Stage                      | Additive |       | Multiplicative |       | Proportional |       |
|----------------------------|----------|-------|----------------|-------|--------------|-------|
|                            | Initial  | Final | Initial        | Final | Initial      | Final |
| 0-3: Counting from one     | 1%       | 0%    | 2%             | 0%    | 1%           | 0%    |
| 4: Advanced counting       | 14%      | 5%    | 14%            | 5%    | 17%          | 6%    |
| 5: Early additive          | 44%      | 29%   | 28%            | 16%   | 31%          | 24%   |
| 6: Advanced additive       | 33%      | 44%   | 32%            | 35%   | 17%          | 19%   |
| 7: Advanced multiplicative | 8%       | 22%   | 18%            | 29%   | 30%          | 38%   |
| 8: Advanced proportional   | n/a      | n/a   | 6%             | 14%   | 4%           | 12%   |
| N =                        | 5807     | 5807  | 5807           | 5807  | 5807         | 5807  |

Year 9 students in SNP schools in 2006 made progress on all three strategy domains, with the percentage of students rated as at least advanced multiplicative (stage 7) increasing from 8% to 22% on the additive domain, from 24% to 43% on the multiplicative domain, and from 34% to 50% on the proportional domain between the initial and final assessments. Correspondingly, the percentages of students still rated as using counting strategies (stage 4 or below) decreased from 15% to 5%, from 16% to 5%, and from 18% to 6%, on the additive, multiplicative, and proportional domains respectively.

Table 3 compares the final results of year 9 students in 2006 with the final results of year 9 students in 2005, showing that the performance of students was similar across all three domains.

Table 3  
*Final Strategy Stages of Year 9 SNP Students in 2005 and 2006*

| Stage                      | Additive |      | Multiplicative |      | Proportional |      |
|----------------------------|----------|------|----------------|------|--------------|------|
|                            | 2005     | 2006 | 2005           | 2006 | 2005         | 2006 |
| 0-3: Counting from one     | 1%       | 0%   | 0%             | 0%   | 1%           | 0%   |
| 4: Advanced counting       | 5%       | 5%   | 6%             | 5%   | 6%           | 6%   |
| 5: Early additive          | 26%      | 29%  | 16%            | 16%  | 23%          | 24%  |
| 6: Advanced additive       | 46%      | 44%  | 32%            | 35%  | 17%          | 19%  |
| 7: Advanced multiplicative | 23%      | 22%  | 30%            | 29%  | 41%          | 38%  |
| 8: Advanced proportional   | n/a      | n/a  | 16%            | 14%  | 12%          | 12%  |
| N =                        | 3975     | 5807 | 3975           | 5807 | 3975         | 5807 |

Table 4 gives the initial and final percentages of year 9 students in 2006 at each stage of the four knowledge domains and shows a similar pattern to Table 2, with students making progress across all domains.

**Table 4**  
*Performance of 2006 Year 9 SNP Students on the Knowledge Domains*

| Stage | FNWS    |       | Fractions |       | Place Value |       | Basic Facts |       |
|-------|---------|-------|-----------|-------|-------------|-------|-------------|-------|
|       | Initial | Final | Initial   | Final | Initial     | Final | Initial     | Final |
| 0–3   | 2%      | 0%    | 4%        | 1%    | 3%          | 1%    | 2%          | 1%    |
| 4     | 4%      | 2%    | 12%       | 6%    | 11%         | 3%    | 6%          | 2%    |
| 5     | 40%     | 25%   | 41%       | 29%   | 45%         | 30%   | 20%         | 12%   |
| 6     | 54%     | 72%   | 22%       | 25%   | 21%         | 27%   | 49%         | 43%   |
| 7     | n/a     | n/a   | 16%       | 28%   | 12%         | 20%   | 23%         | 42%   |
| 8     | n/a     | n/a   | 4%        | 11%   | 8%          | 19%   | n/a         | n/a   |
| N =   | 5807    | 5807  | 5807      | 5807  | 5807        | 5807  | 5807        | 5807  |

While the proportions of students at the higher stages of all seven domains increased and the proportions of students at the lower stages decreased, it is important to note that on each domain between 2% and 7% of students finished year 9 still rated at stage 4 or below. The recently released draft curriculum (Ministry of Education, 2006) includes objectives in the Number strand linked closely to the Framework. Students in year 9 are expected to be working at levels 4 or 5 of the curriculum, which are equivalent to stages 7 and 8 of the Framework. Expectations provided on the nzmaths website (Maths Technology Ltd, n.d.) identify year 8 students still rated at stage 5 or below as “at risk”. While there are no expectations provided for year 9 students, comparisons of the expectations for year 8 students with the final results of year 9 students on the strategy domains indicate that between 21% and 34% of students are “sufficiently below norm expectations that their future learning in mathematics is in jeopardy” (ibid).

Figures 1–3 show the percentages of year 9 students gaining stages on each of the three strategy domains in 2005 and 2006, broken down by initial stage. Over half of all year 9 students not initially rated at the top stage of the domain made progress on the additive and multiplicative domains, with higher proportions of students making progress from the lower stages of the domains. A slightly lower proportion of students made progress on the proportional domain (45% in 2005 and 47% in 2006).

On the proportional domain, while students initially at the lower stages tended to be more likely to make progress, a slightly higher proportion of students initially rated at stage 6 made progress (56% in 2005 and 58% in 2006) than did students initially rated at stage 5 (50% in both years). Previous research has shown generally that the stages of the Framework are not equal in size (Thomas, Tagg, & Ward, 2003; Young-Loveridge, 2004). The finding that a higher proportion of students made the transition from stage 6 to stage 7 suggests that stage 6 is smaller than both stage 5 and stage 7 on the proportional domain, and hence easier to make progress from. This is further supported by the fact that around half of those students initially rated at stage 5 who made gains moved up more than one stage.

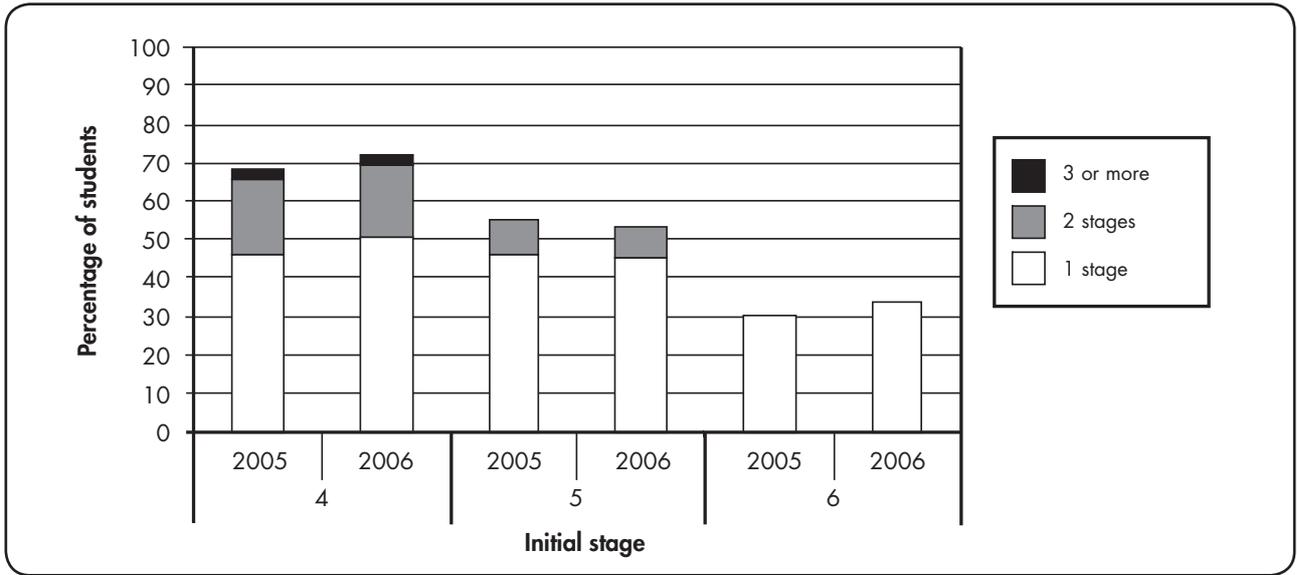


Figure 1: Number of stages gained by initial additive stage for year 9 SNP students in 2005 and 2006

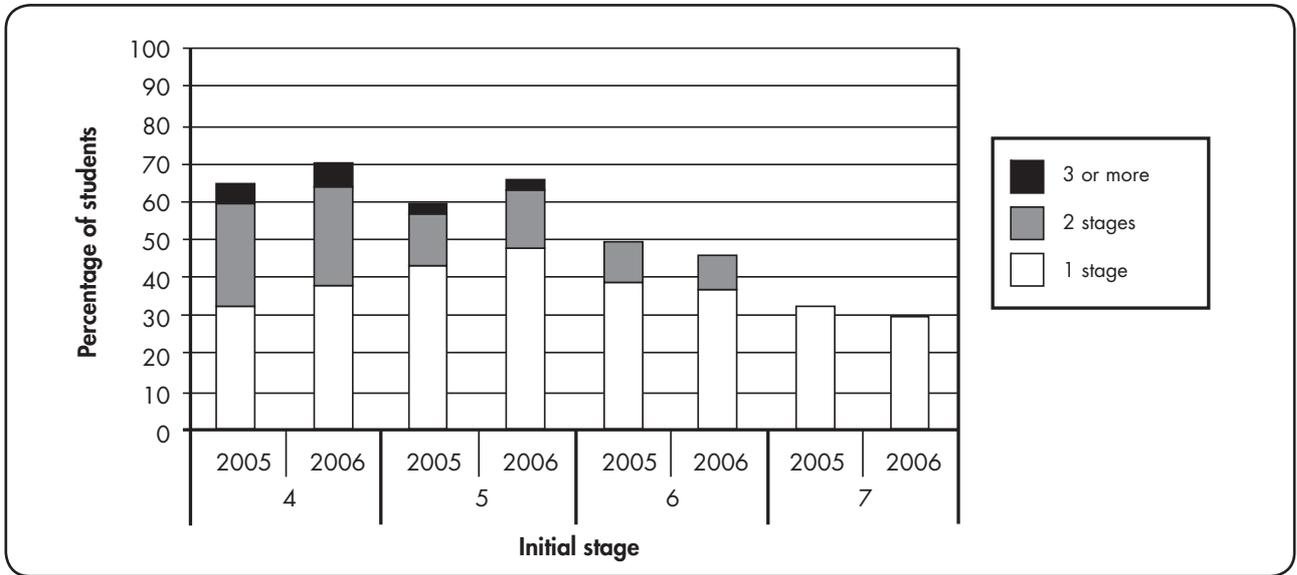


Figure 2: Number of stages gained by initial multiplicative stage for year 9 SNP students in 2005 and 2006

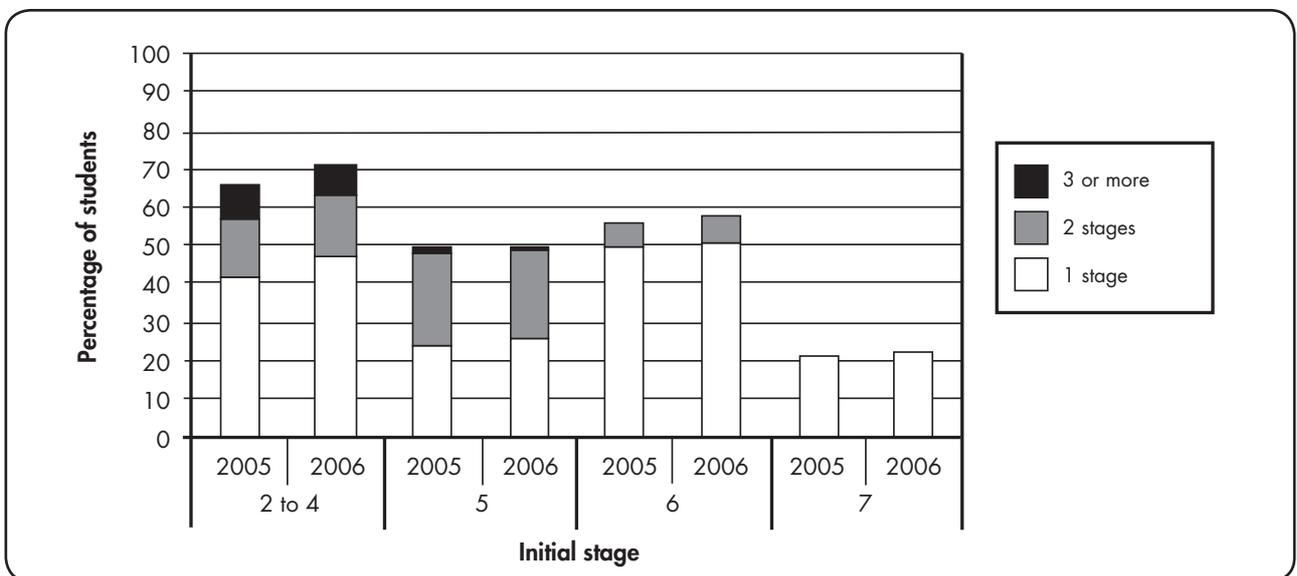


Figure 3: Number of stages gained by initial proportional stage for year 9 SNP students in 2005 and 2006

Effect sizes were calculated to examine the magnitude of the impact of the SNP on year 9 students. Table 5 presents the mean stages and effect sizes for the seven domains.

**Table 5**  
*Effect Sizes for Comparisons of Initial and Final Scores of Year 9 SNP Students*

| Domain         | Mean Score |       | Difference | Effect Size |
|----------------|------------|-------|------------|-------------|
|                | Initial    | Final |            |             |
| Additive       | 5.31       | 5.81  | 0.50       | 0.58        |
| Multiplicative | 5.69       | 6.30  | 0.61       | 0.54        |
| Proportional   | 5.54       | 6.20  | 0.66       | 0.47        |
| FNWS           | 5.45       | 5.69  | 0.24       | 0.38        |
| Fractions      | 5.44       | 6.05  | 0.62       | 0.52        |
| Place value    | 5.51       | 6.19  | 0.68       | 0.57        |
| Basic facts    | 5.83       | 6.23  | 0.40       | 0.45        |

Mean gains of at least half a stage were made on all domains apart from FNWS (0.24) and basic facts (0.40). The apparent lack of progress on the FNWS domain can be explained by a ceiling effect; over half of the year 9 students were rated at the top stage of this domain (stage 6) at the initial assessment and 94% of students were rated as at least stage 5, restricting their potential to move to higher stages.

With the SNP now in its second year of implementation, it is possible to compare the performance of year 9 students in first-year SNP schools with those in second-year SNP schools. The results of t-tests showed that the mean scores of the students in 2005 were significantly higher ( $p < 0.01$ ) for both assessments in all domains except for the final assessment on the additive domain. The means and effect sizes for the strategy domains are shown in Table 6 below. These results represent 4189 students in schools participating in the SNP for the first time in 2006 and 1618 students in schools in their second year of implementation. The shaded cell represents the comparison where the difference was not statistically significant at the 99% confidence level.

**Table 6**  
*Comparisons of Performance of Year 9 Students in First-year and Second-year SNP Schools*

| Domain         | Assessment | Mean Score |        | Difference | Effect Size |
|----------------|------------|------------|--------|------------|-------------|
|                |            | 2nd yr     | 1st yr |            |             |
| Additive       | Initial    | 5.38       | 5.28   | 0.09       | 0.10        |
|                | Final      | 5.82       | 5.81   | 0.01       | 0.02        |
| Multiplicative | Initial    | 5.82       | 5.63   | 0.18       | 0.16        |
|                | Final      | 6.37       | 6.27   | 0.10       | 0.09        |
| Proportional   | Initial    | 5.75       | 5.46   | 0.29       | 0.19        |
|                | Final      | 6.30       | 6.16   | 0.14       | 0.11        |

While the differences between the two groups on the multiplicative and proportional domains were statistically significant, the effect sizes for the differences between the two cohorts were small (less than 0.2) in all cases. Practically, this indicates that the mean strategy stages of the two groups are very similar. At both the initial and final assessment, students from schools in their second year of implementation had higher mean stages on all three domains. However, the gains made on all three domains were greater for students from schools in their first year of implementation. Correspondingly, the effect sizes for the differences between the cohorts were smaller for the final assessments than for the initial assessments, indicating that over the 2006 teaching year the differences between the two groups of students reduced.

### Comparison of 2006 Year 9 and Year 10 Results

Table 7 shows the percentages of year 9 and year 10 SNP students in 2006 at each stage of the three strategy domains at the final assessment.

Table 7

*Performance of Year 9 and 10 SNP Students in 2006 on the Strategy Domains*

| Stage                      | Additive |       | Multiplicative |       | Proportional |       |
|----------------------------|----------|-------|----------------|-------|--------------|-------|
|                            | Yr 9     | Yr 10 | Yr 9           | Yr 10 | Yr 9         | Yr 10 |
| 0–3: Counting from one     | 0%       | 0%    | 0%             | 1%    | 0%           | 1%    |
| 4: Advanced counting       | 5%       | 7%    | 5%             | 5%    | 6%           | 8%    |
| 5: Early additive          | 29%      | 21%   | 16%            | 16%   | 24%          | 21%   |
| 6: Advanced additive       | 44%      | 42%   | 35%            | 30%   | 19%          | 20%   |
| 7: Advanced multiplicative | 22%      | 29%   | 29%            | 32%   | 38%          | 33%   |
| 8: Advanced proportional   | n/a      | n/a   | 14%            | 17%   | 12%          | 17%   |
| N =                        | 5807     | 2324  | 5807           | 2324  | 5807         | 2324  |

Slightly higher percentages of year 10 students than year 9 students reached the top two stages of the additive domain (71% compared with 66%) and of the multiplicative domain (49% compared with 43%). On the proportional domain, while 5% more year 10 students (17%) than year 9 students (12%) reached stage 8, the same proportion of students from each year level (50%) reached at least stage 7. At the lower stages, the difference between the percentages of students remaining at stage 4 or below was 3% or less on each domain. A t-test and analysis of effect sizes indicates that the difference between the two groups is not statistically significant ( $p < 0.01$ ) on the proportional domain, and that on all three domains, the effect size is small (less than 0.2). In fact, the effect sizes for the difference between year 9 and year 10 students on the three domains were 0.13, 0.07, and 0.00 respectively. It is a cause for concern that year 10 students who should have had two years of teaching in schools that are implementing the SNP perform so similarly to year 9 students with one year of exposure to the SNP.

Table 8 shows the percentages of year 9 and year 10 students at each stage of the four knowledge domains at the final assessment.

**Table 8**  
*Performance of Year 9 and 10 SNP Students in 2006 on the Knowledge Domains*

| Stage | FNWS |       | Fractions |       | Place Value |       | Basic Facts |       |
|-------|------|-------|-----------|-------|-------------|-------|-------------|-------|
|       | Yr 9 | Yr 10 | Yr 9      | Yr 10 | Yr 9        | Yr 10 | Yr 9        | Yr 10 |
| 0–3   | 0%   | 0%    | 1%        | 1%    | 1%          | 0%    | 1%          | 1%    |
| 4     | 2%   | 1%    | 6%        | 6%    | 3%          | 3%    | 2%          | 3%    |
| 5     | 25%  | 21%   | 29%       | 23%   | 30%         | 25%   | 12%         | 12%   |
| 6     | 72%  | 78%   | 25%       | 24%   | 27%         | 29%   | 43%         | 40%   |
| 7     | n/a  | n/a   | 28%       | 31%   | 20%         | 18%   | 42%         | 45%   |
| 8     | n/a  | n/a   | 11%       | 16%   | 19%         | 25%   | n/a         | n/a   |
| N =   | 5807 | 2324  | 5807      | 2324  | 5807        | 2324  | 5807        | 2324  |

The pattern of performance on the knowledge domains is similar to that of performance on the strategy domains, with similar or very slightly higher proportions of year 10 students reaching the higher stages of each domain. The proportions of students still rated at stage 4 or below were similar for the two year groups on all four domains. Between 15% and 36% of year 9 students and between 16% and 32% of year 10 students obtained a final rating of stage 5 or below on the knowledge domains. This is a real concern given that the acquisition of this knowledge base is a requirement for future success in mathematics.

### Impacts of Demographic Factors

The results from the SNP in 2005 (Tagg & Thomas, 2006) indicated that the comparative performances of demographic subgroups of students in the SNP were similar to those found in previous NDP research (Young-Loveridge, 2006). Appendices E and F (pp. 50–56) provide a detailed breakdown of the percentages of students in 2006 from each demographic subgroup rated at each stage of the seven domains of the Framework. These results follow a similar pattern to previous findings.

This section compares the 2006 results of demographic subgroups on the multiplicative and basic facts domains, which are representative of the other strategy and knowledge domains. Table 9 shows the mean initial and final stages of demographic subgroups of year 9 students on the multiplicative domain as well as the mean final stages of year 10 students.

**Table 9**  
*Mean Multiplicative Stages of Demographic Subgroups*

|               | Year 9 Initial | Year 9 Final | Year 10 Final |
|---------------|----------------|--------------|---------------|
| Male          | 5.81           | 6.41         | 6.43          |
| Female        | 5.56           | 6.19         | 6.31          |
| Low decile    | 5.15           | 5.91         | 5.92          |
| Medium decile | 5.67           | 6.26         | 6.38          |
| High decile   | 5.97           | 6.57         | 6.52          |
| NZ European   | 5.83           | 6.41         | 6.52          |
| Māori         | 5.51           | 6.11         | 5.92          |
| Pasifika      | 4.97           | 5.83         | 6.06          |
| Total         | 5.69           | 6.30         | 6.38          |

In general, the pattern of performance of year 9 SNP students reflects that found in 2005. The mean stage of male students was higher than that of females, the mean stage of New Zealand European students was higher than that of Māori and Pasifika students, and the mean stage of students from high-decile schools was higher than that of those from medium-decile schools, with both higher than that of students from low-decile schools. The mean final stages of year 9 students ranged from 5.83 for Pasifika students to 6.57 for students from high-decile schools. In year 10, Māori students and students from low-decile schools shared the lowest mean stage (5.92), while New Zealand European students and students from high-decile schools shared the highest mean stage (6.52). All the subgroups of year 9 students made mean gains on the multiplicative domain of at least half a stage, with the smallest gains made by New Zealand European students (0.58) and the largest made by Pasifika students (0.86). The mean final multiplicative stages of year 9 and year 10 students were similar, with Pasifika students being the only subgroup for which the mean final stage of year 10 students was more than 0.2 of a stage higher than the mean final stage for year 9 students.

To further investigate the significance of the impact of demographic factors on students' performance on the Framework, effect sizes were calculated for comparisons between males and females; New Zealand European, Māori, and Pasifika students; and students from low-, medium-, and high-decile schools. The results of this analysis for all seven domains are shown in full in Appendix G, pg. 57.

Table 10 shows the effect sizes for demographic factors on the multiplicative domain. The shaded cells represent comparisons where the difference was not statistically significant at the 99% confidence level.

**Table 10**  
*Effect Sizes for Comparisons between Demographic Subgroups on the Multiplicative Domain*

|                    | Year 9 Initial | Year 9 Final | Year 10 Final |
|--------------------|----------------|--------------|---------------|
| Male/Female        | 0.21           | 0.21         | 0.10          |
| High/Medium decile | 0.27           | 0.30         | 0.12          |
| High/Low decile    | 0.70           | 0.59         | 0.53          |
| Medium/Low decile  | 0.45           | 0.32         | 0.40          |
| NZE/Māori          | 0.28           | 0.27         | 0.55          |
| NZE/Pasifika       | 0.76           | 0.54         | 0.42          |
| Māori/Pasifika     | 0.50           | 0.27         | -0.13         |

Table 10 shows that the effect sizes for comparisons of final results for individual year levels varied from 0.10 for the difference between year 10 male and female students and -0.13 between year 10 Māori and Pasifika students to 0.59 for the difference between year 9 students from high- and low-decile schools. The difference between the final results of year 9 and year 10 students on this domain, while statistically significant, had a very small effect size (0.06).

Effect sizes were also calculated for the differences between the initial and final stages of year 9 students to compare the impact of the SNP on the demographic subgroups. The results of this analysis for all seven domains are shown in full in Appendix G, pg. 57.

Table 11 shows the mean gains and effect sizes for the impact of the SNP on year 9 students on the multiplicative domain.

Table 11

*Effect Sizes for Gains Made on the Multiplicative Domain by Demographic Subgroups of Year 9 SNP Students*

|               | Mean Initial Stage | Mean Final Stage | Gain | Effect Size |
|---------------|--------------------|------------------|------|-------------|
| Male          | 5.81               | 6.41             | 0.60 | 0.51        |
| Female        | 5.56               | 6.19             | 0.63 | 0.59        |
| Low decile    | 5.15               | 5.91             | 0.76 | 0.62        |
| Medium decile | 5.67               | 6.26             | 0.59 | 0.54        |
| High decile   | 5.97               | 6.57             | 0.60 | 0.54        |
| NZ European   | 5.83               | 6.41             | 0.57 | 0.52        |
| Māori         | 5.51               | 6.11             | 0.60 | 0.54        |
| Pasifika      | 4.97               | 5.83             | 0.86 | 0.83        |
| Total         | 5.69               | 6.30             | 0.61 | 0.54        |

The overall effect size for the impact of the SNP on year 9 students' performance on the multiplicative domain was 0.54. While all demographic subgroups made mean gains of over half a stage, the greatest mean gain (0.86) and, correspondingly, the highest effect size (0.83) were for Pasifika students. It is interesting to note that for all demographic factors, the subgroups for which the impact was greatest tended to be those whose mean starting stage was lowest. This further supports previous findings that students make greater progress on the Framework from the lower stages (Thomas, Tagg, & Ward, 2003).

Table 12 shows the effect sizes for demographic factors on the basic facts domain. The effect sizes on this domain tended to be smaller than those on the other six domains. The shaded cells represent comparisons where the difference was not statistically significant at the 99% confidence level.

Table 12

*Effect Sizes for Comparisons of Demographic Subgroups on the Basic Facts Domain*

|                      | Year 9 Initial | Year 9 Final | Year 10 Final |
|----------------------|----------------|--------------|---------------|
| Male/Female          | 0.04           | 0.06         | -0.09         |
| High/Medium decile   | 0.11           | 0.18         | -0.09         |
| High/Low decile      | 0.46           | 0.33         | 0.27          |
| Medium/Low decile    | 0.35           | 0.18         | 0.36          |
| NZ European/Māori    | 0.14           | 0.13         | 0.27          |
| NZ European/Pasifika | 0.47           | 0.30         | 0.07          |
| Māori/Pasifika       | 0.30           | 0.15         | -0.18         |

The largest effect size calculated on this domain was 0.47, for the difference between the initial stages of year 9 New Zealand European and Pasifika students. The largest effect size calculated for final assessment results was 0.33, for the difference between year 9 students in high- and low-decile schools. The fact that the effect sizes for the differences in final results tended to be smaller than those for initial results would seem to indicate that the differences between subgroups are reduced over the course of the SNP. The difference between the final results of year 9 and year 10 students on this domain was not statistically significant.

## Concluding Comment and Key Findings

Generally, year 9 students in schools participating in the SNP made progress on all domains of the Number Framework. Although year 10 students performed better than year 9 students on all domains apart from the proportional domain, the effect sizes of the difference between year levels were small, suggesting that a second year of implementation of the SNP has had little impact on student performance. Consistent with previous results from the NDP, demographic factors were shown to have impacted on the performance of students.

Among the findings were:

- The percentages of year 9 students rated in the top two stages of the additive, multiplicative, and proportional domains increased from 41% to 66%, 24% to 43%, and 34% to 50% respectively.
- The percentages of year 9 students still rated stage 5 or lower on the additive, multiplicative, and proportional domains decreased from 59% to 34%, 44% to 21%, and 49% to 30% respectively.
- By the final assessment, the percentage of students at the top two stages of the knowledge domains had increased from 20% to 39% for fractions, from 20% to 39% for place value, and from 23% to 42% for basic facts.
- Between 15% and 36% of year 9 students and between 16% and 32% of year 10 students remained at stage 5 or below on the knowledge domains at the end of the year.
- New Zealand European students performed better than Māori or Pasifika students, male students generally performed slightly better than female students, and students from high-decile schools performed better than students from medium- and low-decile schools.

While the SNP has had a positive impact on the performance of year 9 students on the Framework, the proportions of students in both year 9 and year 10 with final ratings of stage 5 or below on the Framework are a cause for concern. Given that students' progress on the strategy domains is dependent on their number knowledge, it is important that efforts are made to address the significant proportions of year 9 and 10 students remaining at the lower stages of the knowledge domains.

## References

- Coe, R. (2002). It's the effect size, stupid: What effect size is and why it is important. Paper presented at the annual conference of the British Educational Research Association, University of Exeter, England, 12–14 September 2002. Retrieved February 2007: [www.leeds.ac.uk/educol/](http://www.leeds.ac.uk/educol/)
- Education Counts (n.d.). Student numbers as at 1 July 2006. Retrieved February 2007: <http://educationcounts.edcentre.govt.nz/statistics/schooling/student-numbers-at-july-2006.html>
- Maths Technology Ltd (n.d.). Norms and benchmarks. Retrieved December 2006 from NZ Maths website: [www.nzmaths.co.nz/Numeracy/Lead\\_Teacher/PLC/Norms\\_and\\_Benchmarks/index.aspx](http://www.nzmaths.co.nz/Numeracy/Lead_Teacher/PLC/Norms_and_Benchmarks/index.aspx)
- Ministry of Education (2006). *The New Zealand Curriculum: Draft for consultation 2006*. Wellington: Learning Media.
- Tagg, A. & Thomas, G. (2006). Performance on the Number Framework. In *Evaluations of the 2005 Secondary Numeracy Pilot Project and the CAS Pilot Project*. Wellington: Learning Media.
- Thomas, G., Tagg, A., & Ward, J. (2003). *An evaluation of the Early Numeracy Project 2002: Exploring issues in mathematics education*. Wellington: Ministry of Education.
- Young-Loveridge, J. (2004). *Patterns of performance and progress on the Numeracy Projects 2001–2003: Exploring issues in mathematics education*. Wellington: Ministry of Education.
- Young-Loveridge, J. (2006). Patterns of performance and progress on the Numeracy Development Project: Looking back from 2005. In *Findings from the New Zealand Numeracy Development Projects 2005*. Wellington: Learning Media.