

Performance of SNP Students on the Number Framework

Andrew Tagg
Maths Technology Ltd
<andrew@nzmaths.co.nz>

Gill Thomas
Maths Technology Ltd
<gill@nzmaths.co.nz>

The Secondary Numeracy Project (SNP) has been implemented in New Zealand schools since 2005. This paper analyses the results of students in schools participating in the SNP in 2008, with the aim of quantifying any improvement made in their number knowledge and strategies, and compares their results with those of students from previous years. The findings indicate that the progress made by year 9 students in 2008 schools is comparable with that of year 9 students from 2005 to 2007. The end-of-year performance of year 9 students in second-year schools is very similar to the results of year 9 students from the same schools in 2007. However, the impact of the SNP on year 10 students in second-year schools is small.

Background

The Secondary Numeracy Project (SNP) was first implemented in 2005, with 42 schools participating in a pilot project. Since then, new schools have been added each year. 2008 represents the fourth year of the implementation of the SNP. This paper analyses the results of students in schools participating in the SNP in 2008, with the aim of quantifying any improvement made in their number knowledge and strategies. Comparisons are made with the 2007 results of schools in their second year of involvement. The research questions specifically addressed in this paper are:

- Is the SNP continuing to have an impact on student achievement?
- Do teachers in the second year of the SNP have improved student outcomes?
- Do students make progress in numeracy from year 9 to year 10?
- Does the SNP impact equally on all students?

Method

Procedure

The results reported in this paper were obtained by downloading from the online numeracy database on 27 January 2009 all data from schools participating in the SNP. Schools participating in the SNP for the first time in 2008 were required to enter both initial and final data for year 9 students on the three strategy domains and four knowledge domains of the Number Framework. Schools in their second year of participation were required to enter final data on the seven domains for either year 9 or year 10 students. Students were included in analysis if they had results on all seven of the required domains.

Complete results were available for 2468 year 9 students in 25 schools participating in the SNP for the first time and for 3090 year 9 and 2282 year 10 students in 39 schools in their second year in the SNP. The 2468 year 9 students in the first-year schools represent 76% of the year 9 students in first-year schools for whom complete initial data was entered.

Participants

In first-year schools, 49% of the students were of New Zealand European origin, 26% identified as Māori, and 16% identified as Pasifika. In second-year schools, 64% of students were of New Zealand European origin, 19% identified as Māori, and 6% identified as Pasifika. Nationally, 57% of year

9 and 10 students in 2008 were of New Zealand European origin, 22% were Māori, and 9% were Pasifika. In both first- and second-year schools, there were more female students than male (Ministry of Education, 2009).

Table 1 provides a breakdown by year, gender, and ethnicity of the students included for analysis.

Table 1
Profile of SNP Students by Ethnicity and Gender

Ethnicity	First-year Schools		Second-year Schools			
	Year 9		Year 9		Year 10	
	Male	Female	Male	Female	Male	Female
NZ European	47%	51%	61%	65%	56%	68%
Māori	26%	27%	21%	19%	22%	16%
Pasifika	20%	12%	8%	6%	6%	5%
Asian	5%	6%	6%	4%	8%	7%
Other	3%	5%	5%	5%	8%	5%
Total	1169	1299	1338	1752	862	1420

As shown in Table 2, the decile groups of the participating students were not evenly distributed. About half of all students in both first- and second-year schools came from medium-decile (4–7) schools. Only 13% of students in first-year schools came from high-decile (8–10) schools, with 36% from low-decile (1–3) schools. In second-year schools, a disproportionately low percentage of students came from low-decile schools.

Table 2
Profile of SNP Students by Decile Group

	First-year Schools	Second-year Schools	
	Year 9	Year 9	Year 10
Low decile	36%	21%	17%
Medium decile	51%	56%	47%
High decile	13%	24%	36%
Total	2468	3090	2282

Table 3 presents the decile profile of year 9 students in first-year schools for the four years that the SNP has been implemented. The profile of year 9 students in 2008 is different from that for previous years, with a greater proportion of students coming from low-decile schools. Thirty-six percent of students came from low-decile schools in 2008, compared with a previous maximum of 12% in 2006. Correspondingly, only 13% of year 9 students in 2008 came from high-decile schools, compared with a previous low of 27% in 2006. This reflects the priority given by the Ministry of Education to participation by low-decile secondary schools in 2008.

Table 3
Profile of Year 9 SNP Students in First-year Schools by Decile Group for 2005–2007

	2005	2006	2007	2008
Low decile	11%	12%	8%	36%
Medium decile	52%	61%	54%	51%
High decile	37%	27%	38%	13%
Total	3975	5807	5093	2468

Analysis

The focus for the analysis and discussion in this paper is the students' performance on the multiplicative and proportional strategy domains of the Number Framework. This reflects the curriculum level expectation for students at the end of year 9, which is between stage 7 (advanced multiplicative) and stage 8 (advanced proportional) (Ministry of Education, n.d.). There is also some analysis of student performance on the additive strategy domain and the four knowledge domains of forward number word sequence (FNWS), fractions, place value, and basic facts. The analysis examines the achievement of students in relation to the stages on the Number Framework as well as the progress that students made from the start to the end of the year.

T-tests were used to compare the means of variables with only two categories (gender and year level), and an ANOVA (analysis of variance) was used to compare the means of variables with three categories (decile group and ethnicity). Where overall differences are described between groups, this has been verified to at least the 1% significance level, either by the T-test or by a post-hoc analysis using Tukey's honestly significant difference test. In addition, differences in percentages of students at particular levels of each domain of less than 5% and differences in mean stages of less than 0.2 are not reported because these differences are not considered to be of practical significance.

In all tables, percentages have been rounded. 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 have been used to quantify the difference between two groups and were calculated by dividing the average difference between two groups by the pooled standard deviation of the two groups. For the purposes of this paper, 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 (Cohen, cited in Coe, 2002).

Findings

The findings of this research explore aspects of the effectiveness of the SNP. They are reported under four headings. The first section addresses the question "Is the SNP continuing to have an impact on student achievement?" Specifically, it looks at how the performance of students in schools participating for the first time in 2008 compares with that of students from first-year schools in previous years. The second section asks "Do teachers in the second year of the SNP have improved student outcomes?" This section compares the performance of year 9 students from schools in their second year in the SNP with that of the year 9 students from the same schools in 2007. The third section addresses the question "Do students make progress in numeracy from year 9 to year 10?" In this section, the results of year 10 students in schools participating for the second year are compared with their year 9 results from

2007. The final section asks “Does the SNP impact equally on all students?” This section compares the impact of the SNP in 2008 on various demographic subgroups of year 9 students.

Appendices A–D (pp. 80–89) provide a detailed breakdown of the percentages of students rated at each stage of the seven domains of the Number Framework.

Is the SNP Continuing to Have an Impact on Student Achievement?

The annual research reports and compendia papers relating to the Numeracy Development Projects (NDP) have consistently shown that students in schools participating in the NDP make greater progress in numeracy as measured on the Number Framework than do students in other schools (for example, Young-Loveridge, 2007). In considering the concept of progression, there are two aspects that need to be addressed: the first is the achievement level of a student at a given point of time; the second is the degree or amount of progress made by a student over a given period of time. Both of these aspects are addressed in this section.

Tables 4 and 5 show the initial and final percentages of year 9 students at each stage of the multiplicative and proportional domains respectively for schools in their first year of SNP for the four years that the SNP has been implemented.

Table 4
Performance of Year 9 Students on the Multiplicative Domain

Stage	Initial				Final			
	2005	2006	2007	2008	2005	2006	2007	2008
0–3: Counting from One	2%	2%	3%	2%	0%	0%	1%	1%
4: Advanced Counting	12%	14%	10%	16%	6%	5%	4%	7%
5: Early Additive	27%	28%	26%	27%	16%	16%	14%	18%
6: Advanced Additive	34%	32%	36%	36%	32%	35%	35%	34%
7: Advanced Multiplicative	20%	18%	20%	16%	30%	29%	31%	31%
8: Advanced Proportional	5%	6%	5%	3%	16%	14%	14%	9%
N =	3975	5807	5093	2468	3975	5807	5093	2468

Table 5
Performance of Year 9 Students on the Proportional Domain

Stage	Initial				Final			
	2005	2006	2007	2008	2005	2006	2007	2008
0–3: Counting from One	1%	1%	1%	2%	1%	0%	0%	1%
4: Advanced Counting	16%	17%	14%	21%	6%	6%	6%	11%
5: Early Additive	29%	31%	30%	35%	23%	24%	22%	27%
6: Advanced Additive	17%	17%	18%	14%	17%	19%	18%	17%
7: Advanced Multiplicative	31%	30%	32%	24%	41%	38%	41%	36%
8: Advanced Proportional	5%	4%	5%	4%	12%	12%	13%	9%
N =	3975	5807	5093	2468	3975	5807	5093	2468

The initial and final achievement profiles of year 9 students in first-year SNP schools in 2008 are different from those of previous years. On both the multiplicative and proportional domains, the proportions of students at the lower stages were higher than in previous years and correspondingly, the proportions of students at the higher stages were lower. For example, at the end of 2008, 38% of year 9 students were still rated at stage 5 or below on the proportional domain, compared with between 28% and 30% in previous years.

Students still rated at or below stage 5 at the end of year 9 are considered to be “at risk” according to curriculum level expectations cited on the nzmaths website (Ministry of Education, n.d.). While the proportions of students that remain in this at risk category on the multiplicative and proportional domains are higher than in previous years, this is largely explained by the fact that the initial proportion of students in this category was also higher than in previous years. For example, at the start of 2008, 58% of year 9 students were rated at stage 5 or below on the proportional domain, compared with between 45% and 49% in previous years. These lower initial and final ratings of students in 2008 are most likely the result of the higher proportion of students from low-decile schools participating in 2008. Previous findings have consistently shown that students from low-decile schools are likely to be at lower stages on all domains (for example, Young-Loveridge, 2007).

While the achievement profile of year 9 students in 2008 was weaker than in previous years, the shifts in the profile between the initial and final assessments were similar. The proportions of 2008 year 9 students rated at the top two stages of the multiplicative domain increased from 19% to 40% from the start to the end of the year, while the percentage in the same two stages on the proportional domain increased from 28% to 45%. Correspondingly, the percentage of students rated at stage 5 or below decreased from 45% to 26% and from 58% to 39% on the multiplicative and proportional domains respectively.

The progress made by students was investigated in more detail. As well as taking account of how students are performing in relation to expected achievement levels, the progress that each student made over a period of time was examined. For example, a student who started the year at stage 5 and ended the year at stage 6 has remained below expected levels of achievement, but in gaining a stage, could be considered to have made substantial progress. Figures 1 and 2 show the percentages of year 9 students gaining stages on the multiplicative and proportional domains respectively in 2005 to 2008, broken down by initial stage. The results from 2008 are very similar to those from previous years, with approximately half of the students not initially rated at the top stage of each domain gaining at least one stage during the course of the SNP. Generally, students with lower initial stages were more likely to make progress, although, consistent with previous years, the proportion of students initially rated at stage 6 on the proportional domain making gains (63%) was slightly higher than that of students initially rated at stage 5 (50%).

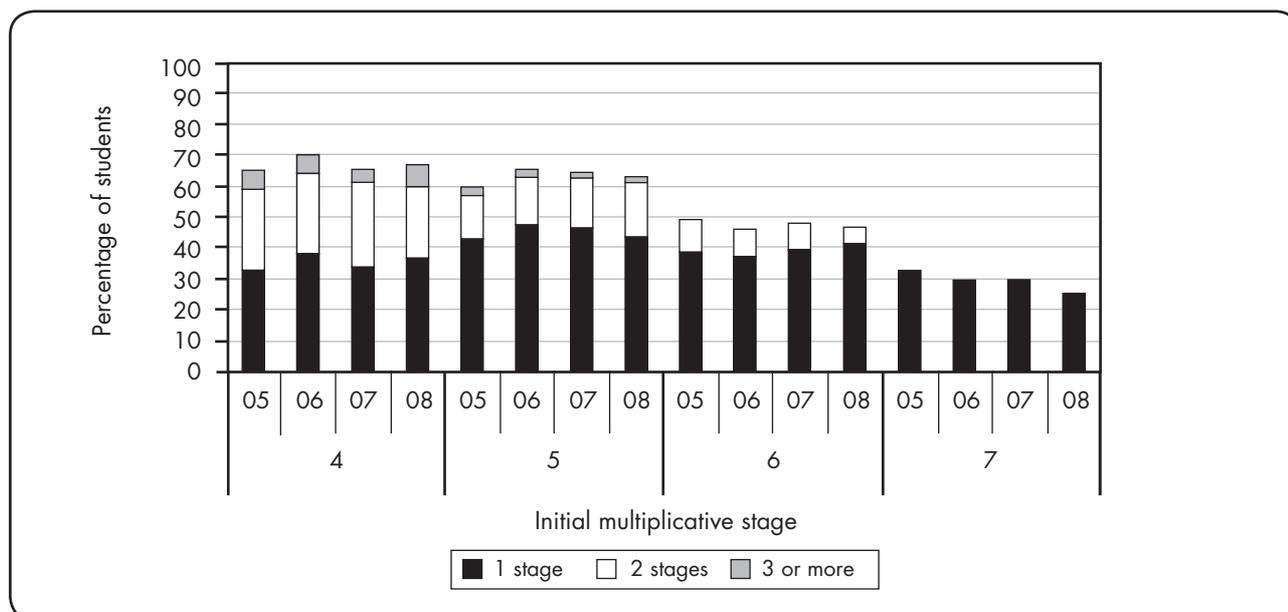


Figure 1. Number of stages gained from initial multiplicative stage for year 9 students in 2005 to 2008

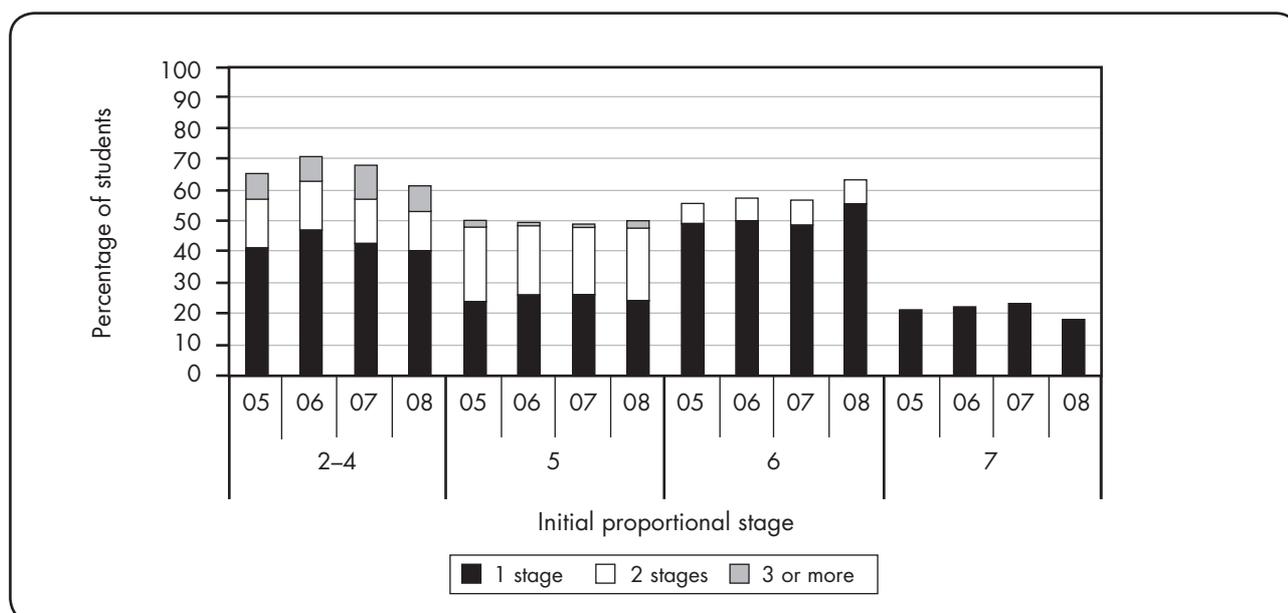


Figure 2. Number of stages gained from initial proportional stage for year 9 students in 2005 to 2008

The mean initial and final stages and effect sizes for the differences for the seven domains are reported in Table 6 to give a measure of the magnitude of the progress made by year 9 students over the course of 2008. Mean gains of at least half a stage were made on all domains, apart from FNWS (0.23) and basic facts (0.33). The apparent lack of progress on the FNWS domain can be explained by a ceiling effect because 49% of all year 9 students rated at the top stage of this domain (stage 6) at the initial assessment. Stages at the top end of the Number Framework are equivalent to levels of the curriculum, so gains of half a stage are in line with expected progress of approximately one level every two years of schooling. On all seven domains, the effect sizes for the gains were medium (between 0.2 and 0.8), with the smallest effect size being for the FNWS domain (0.33) and the largest for the fractions domain (0.56).

Table 6
Effect Sizes for Gains Made by Year 9 SNP Students in 2008

Domain	Mean Initial Stage	Mean Final Stage	Gain	Effect Size
Additive	5.29	5.78	0.50	0.51
Multiplicative	5.56	6.13	0.56	0.50
Proportional	5.22	5.92	0.70	0.46
FNWS	5.37	5.60	0.23	0.33
Fractions	5.23	5.87	0.64	0.56
Place value	5.37	5.95	0.59	0.50
Basic facts	5.63	5.95	0.33	0.34

Do Teachers in the Second Year of the SNP Have Improved Student Outcomes?

Schools are funded to participate in the SNP for two years in the belief that it takes two years of support before teachers and schools are able to effectively implement and sustain SNP teaching practices. This section explores the assumption that teachers in their second year of SNP will have improved outcomes because they have more understanding and experience with SNP practices. This was done by comparing the year 9 results of the 32 second-year SNP schools that entered final results for year 9 in 2008 with the same schools' year 9 results from 2007.

As seen in Table 7, the results of the two groups are very similar, with the most notable difference being the percentage of students reaching the top two stages of the proportional domain. Fifty-two percent of year 9 students in these schools were rated at stage 7 or higher on the proportional domain at the end of 2007, compared with 45% at the end of 2008.

Table 7
Performance on the Multiplicative and Proportional Domains of Year 9 Students in Schools with 2007 and 2008 Data

Stage	Multiplicative		Proportional	
	Year 9 (2007)	Year 9 (2008)	Year 9 (2007)	Year 9 (2008)
0-3: Counting from One	0%	1%	0%	0%
4: Advanced Counting	5%	5%	7%	9%
5: Early Additive	16%	18%	23%	27%
6: Advanced Additive	36%	36%	19%	19%
7: Advanced Multiplicative	31%	30%	38%	32%
8: Advanced Proportional	13%	10%	14%	13%
N =	2771	3090	2771	3090

A T-test was carried out and effect sizes calculated to compare the final scores of year 9 students in second-year SNP schools with the year 9 students from the same schools in 2007. The results are shown in Table 8 below. The shaded cells represent comparisons where the difference was not statistically significant at the 99% confidence level.

Table 8

Effect Sizes for Comparisons of Final Scores of Year 9 SNP Students in Second-year Schools

Domain	2007 Mean Stage	2008 Mean Stage	Difference	Effect Size
Additive	5.95	5.91	-0.04	-0.04
Multiplicative	6.30	6.21	-0.10	-0.09
Proportional	6.21	6.03	-0.18	-0.13
FNWS	5.72	5.69	-0.03	-0.06
Fractions	6.13	6.03	-0.10	-0.09
Place value	6.24	6.14	-0.10	-0.08
Basic facts	6.21	6.24	0.03	0.03

The differences between the final scores of the two groups were not statistically significant on three of the seven domains. While the mean final stages of the students in 2008 on the remaining four domains were statistically lower than in 2007, the effect size for these differences was small (0.2 or less). This indicates, in practical terms, that the performance of year 9 students in SNP schools in the year following the initial implementation of the SNP remains at a similar level to the first year of participation.

Do Students Make Progress in Numeracy from Year 9 to Year 10?

The annual SNP reports have consistently shown that students in year 9 make strong progress in numeracy as measured on the Number Framework (Tagg & Thomas, 2006, 2007, 2008). The challenge is to continue this progress into year 10 so that a greater proportion of students enter year 11 achieving at curriculum level expectations. The online database used to collect numeracy results makes it possible to track the progress of students from one year to the next, as long as schools migrate their students' demographic data at the beginning of the year. It was therefore possible to link 2008 year 10 results for 1510 students in 15 second-year SNP schools to their year 9 results from 2007. Forty-four percent of these students were in high-decile schools, 38% in medium-decile schools, and 18% in low-decile schools.

Table 9 shows the end-of-year results from these 1510 students in 2007 and 2008 on the multiplicative and proportional domains. A comparison of the percentages of students remaining below stage 5 shows that the proportions of students rated as at risk changed little during year 10, with at least as many still in the bottom stages at the end of year 10 as at the end of year 9. A similar comparison at the higher stages shows that the proportions of students in the top two stages increased slightly between the end of year 9 and the end of year 10 on the multiplicative domain but remained fairly similar on the proportional domain.

Table 9

Performance on the Multiplicative and Proportional Domains of the SNP Students with Year 9 and Year 10 Results

Stage	Multiplicative		Proportional	
	Year 9 (2007)	Year 10 (2008)	Year 9 (2007)	Year 10 (2008)
0-3: Counting from One	1%	1%	0%	0%
4: Advanced Counting	4%	6%	6%	7%
5: Early Additive	13%	13%	21%	23%
6: Advanced Additive	39%	31%	17%	16%
7: Advanced Multiplicative	32%	36%	41%	34%
8: Advanced Proportional	11%	13%	15%	20%
N =	1510	1510	1510	1510

While the proportions of students at each stage remain similar, Figure 3 shows that many students' ratings on the multiplicative domain changed between the end of year 9 and the end of year 10. For each starting stage, the numbers of students in each possible category of progress are shown. Those students who either remained at the same stage or moved up at least one stage are shown above zero on the y-axis, while those who were rated at a lower stage at the end of year 10 than they had been at the end of year 9 are shown below zero. Overall, 29% of the students made gains of at least one stage during year 10. Forty-eight percent of students remained at the same stage, and 23% of the students were rated at a lower stage at the end of year 10 than they had been at the end of year 9. The fact that nearly a quarter of students were rated at a lower stage after another year of SNP teaching is both concerning and confusing. Given that the Number Framework represents a progression of learning, it should not be possible for students to regress. One possible explanation is that teachers were more conservative in their judgments at the end of year 10 than at the end of year 9.

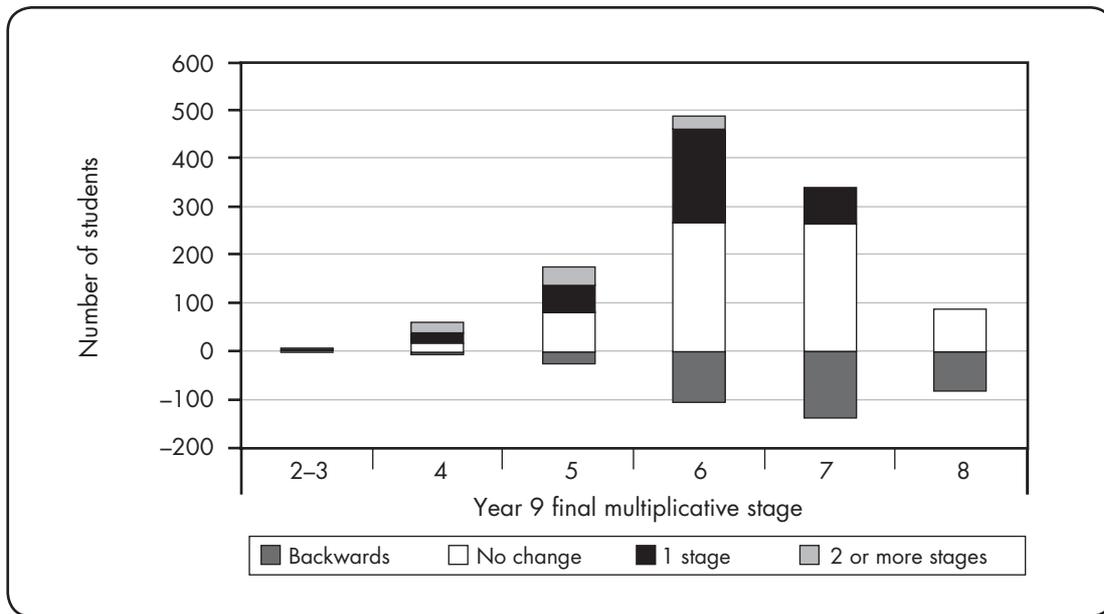


Figure 3. Number of students making gains on the multiplicative domain in year 10 based on year 9 final stage

Table 10 shows the mean initial and final stages of the 1510 students on the seven domains as well as the mean change in stage and the effect size for the impact of the SNP in year 10. The shaded cells represent comparisons where a paired samples T-test indicated that the difference in means was not significant at the 1% level.

Table 10
Effect sizes for Comparisons of Scores of SNP Students with Year 9 and Year 10 Results

Domain	Year 9 Mean Stage	Year 10 Mean Stage	Gain	Effect Size
Additive	5.96	6.14	0.18	0.17
Multiplicative	6.30	6.36	0.06	0.06
Proportional	6.31	6.30	0.00	0.00
FNWS	5.78	5.84	0.06	0.13
Fractions	6.38	6.53	0.15	0.13
Place value	6.49	6.66	0.17	0.14
Basic facts	6.51	6.53	0.01	0.02

As shown by Table 10, the SNP had no measurable impact on these year 10 students in second-year schools for three of the seven domains, while on the remaining four domains (additive, FNWS, fractions, and place value), the effect size of the difference was small.

Does the SNP Impact Equally on All Students?

The results from the SNP from 2005 to 2007 (Tagg & Thomas, 2006, 2007, 2008) indicate that the comparative performances of demographic subgroups of students in the SNP are similar to those found in previous NDP research (Young-Loveridge, 2006). Table 11 shows the mean initial and final stages of demographic subgroups on the multiplicative domain. Mean gains and effect sizes for the differences are included to indicate the magnitude of the impact of the SNP.

Table 11

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

	Mean Initial Stage	Mean Final Stage	Gain	Effect Size
Male	5.62	6.17	0.54	0.47
Female	5.51	6.09	0.58	0.54
Low decile	5.21	5.84	0.62	0.53
Medium decile	5.67	6.23	0.55	0.54
High decile	6.11	6.54	0.43	0.40
NZ European	5.83	6.34	0.51	0.48
Māori	5.41	5.92	0.50	0.47
Pasifika	4.95	5.68	0.73	0.66
Total	5.56	6.13	0.56	0.50

The pattern of comparative performance of demographic subgroups on the multiplicative domain is consistent with that found in previous years. A T-test indicated that, at the final assessment, the difference between the mean stages of males and females was not statistically significant. ANOVA tests with post-hoc analysis were carried out to compare the means of students by ethnicity and decile group. The mean stage of New Zealand European students was higher than that of both Māori and Pasifika students ($p < 0.01$). The mean stage of students from high-decile schools was higher than that of students from medium-decile schools ($p < 0.01$), with both being higher than that of students from low-decile schools ($p < 0.01$). The subgroup of year 9 students with the lowest mean final stage was Pasifika students (5.68), while the highest was students from high-decile schools (6.54). In general, the subgroups with the lower mean initial stages tended to make greater mean gains and have a larger effect size, indicating that the SNP is closing the gap between demographic subgroups. This may be partly explained by a ceiling effect for higher-scoring students and by the previously reported finding that students make greater gains at the lower stages of the Number Framework (Tagg & Thomas, 2007; Thomas, Tagg, & Ward, 2003).

Table 12 shows the mean initial and final stages, gains, and effect sizes of demographic subgroups on the proportional domain. The pattern of results is very similar to that shown in Table 11, although females have slightly higher mean stages than males on the proportional domain.

Table 12
Effect sizes for Gains Made on the Proportional Domain by Demographic Subgroups of Year 9 Students

	Mean Initial Stage	Mean Final Stage	Gain	Effect Size
Male	5.17	5.90	0.73	0.46
Female	5.26	5.94	0.68	0.46
Low decile	4.69	5.46	0.77	0.49
Medium decile	5.36	6.07	0.71	0.49
High decile	6.14	6.62	0.48	0.40
NZ European	5.60	6.28	0.68	0.48
Māori	5.00	5.61	0.61	0.40
Pasifika	4.33	5.21	0.88	0.58
Total	5.22	5.92	0.70	0.46

Table 13 summarises the effect sizes for gains made on all seven domains by demographic subgroups. In general, the effect sizes for the impact of the SNP appear to be greater for females than for males and greater for students from low- and medium-decile schools than for students from high-decile schools. Pasifika students appear to have higher effect sizes than New Zealand European or Māori students. An effect size of -0.11 was found for the basic facts scores of high-decile students. Further analysis of the results showed that one school had recorded 68 of the 79 students as having final scores lower than their initial scores on this domain. It is presumed that this represents a data entry error and that final scores were transposed with initial scores.

Table 13
Effect sizes for Gains Made by Demographic Subgroups of Year 9 Students

	Additive	Multiplicative	Proportional	FNWS	Fractions	Place Value	Basic Facts	N =
Male	0.47	0.47	0.46	0.30	0.51	0.45	0.28	1169
Female	0.54	0.54	0.46	0.37	0.61	0.55	0.41	1299
Low	0.54	0.53	0.49	0.36	0.59	0.51	0.46	886
Medium	0.51	0.54	0.49	0.35	0.56	0.55	0.38	1268
High	0.51	0.40	0.40	0.24	0.53	0.37	-0.11	314
NZ European	0.47	0.48	0.48	0.34	0.54	0.52	0.24	1213
Māori	0.47	0.47	0.40	0.28	0.57	0.41	0.42	645
Pasifika	0.64	0.66	0.58	0.45	0.60	0.57	0.43	383
Total	0.51	0.50	0.46	0.33	0.56	0.50	0.34	2468

Key Findings

This section provides a summary of the key findings of the evaluation of student achievement in the SNP in 2008. The SNP continues to be an effective intervention for year 9 students in both first- and second-year SNP schools. However, the results indicate that the SNP has little or no impact on the performance on the Number Framework of year 10 students in second-year SNP schools.

In first-year schools, a comparison of percentages of students at each stage at the initial and final assessments showed that the proportions of students in the higher stages increased while the proportions of students at the lower stages decreased. A comparison of mean initial and final stages showed that students made gains on all seven domains. The effect sizes for these gains were medium (between 0.2 and 0.8) on all domains, indicating that the SNP had a substantial impact on these students.

Teachers in second-year schools appear to have had a similar impact on year 9 student achievement as they had in their first year. Second-year schools were not required to enter initial data, so it is not possible to determine the progress made by these students. However, the end-of-year performance of year 9 students in second-year schools was very similar to that of year 9 students in the same schools in 2007.

Year 10 students in second-year schools made very little progress, with no significant improvement on three of the seven domains. The effect sizes for the gains made on the additive, FNWS, fractions, and place value domains were small. The fact that nearly a quarter (23%) of students were rated at a lower stage at the end of year 10 than at the end of year 9 casts some doubt on the accuracy of teacher ratings.

Demographic factors impacted on the performance of students. Specifically, New Zealand European students had higher mean stages than Māori or Pasifika students, while students from high-decile schools had higher mean stages than students from medium-decile schools, who in turn had higher stages than students from low-decile schools.

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. [Available from www.leeds.ac.uk/educol]
- Ministry of Education (n.d.). *Using expectations*. Retrieved 1 February 2009 from: www.nzmaths.co.nz/node/1481
- Ministry of Education (2009). *Students by year level 2008*. Retrieved March 2009 from: www.educationcounts.govt.nz/statistics/schooling/julyaschoolrollreturns/14667/32379
- Tagg, A., & Thomas, G. (2006). Performance on the Number Framework. In *Evaluations of the 2005 Secondary Numeracy Pilot Project and the CAS Pilot Project* (pp. 12–35). Wellington: Learning Media.
- Tagg, A., & Thomas, G. (2007). Performance of SNP students on the Number Framework, in *Evaluations of the 2006 Secondary Numeracy Project* (pp. 29–39). Wellington: Learning Media.
- Tagg, A., & Thomas, G. (2008). Performance of SNP students on the Number Framework. In *Findings from the New Zealand Secondary Numeracy Project 2007* (pp. 5–16). 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. (2006). Patterns of performance and progress on the Numeracy Development Projects: Looking back from 2005. In *Findings from the New Zealand Numeracy Development Projects 2005* (pp. 6–21). Wellington: Learning Media.
- Young-Loveridge, J. (2007). Patterns of performance and progress on the Numeracy Development Projects: Findings from 2006 for years 5–9 students. In *Findings from the New Zealand Numeracy Development Projects 2006* (pp. 16–32). Wellington: Learning Media.