THE EVALUATION OF BREAKING THE CYCLE: A FOLLOW-UP OF THE ACHIEVEMENTS OF 6TH CLASS PUPILS IN URBAN SCHOOLS IN 2003

Susan Weir

Educational Research Centre

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Summary

The aim of the *Breaking the Cycle* scheme is to assist selected primary schools in addressing problems associated with catering for large numbers of pupils from disadvantaged backgrounds. The scheme, which was introduced to 33 schools in urban areas in 1996/97, provides for reduced class size at junior level; grants for the purchase of books, teaching materials and equipment; enhanced capitation grants; and incareer development programmes for teachers. Since its inception, the Educational Research Centre has been evaluating the scheme's overall effectiveness and its effects on participants. Much of the evaluation effort was directed towards assessing the scheme's impact on pupils, and attempts were made to assess the extent to which a range of factors such as pupil attendance, attitudes, attainments, and achievements were affected by participation in the scheme. The achievements in reading and Mathematics of 3rd and 6th class pupils were assessed using standardised tests in the first and fourth years of the scheme. The results indicated that the achievements of pupils on both occasions were significantly lower than those of pupils nationally, and that there was a statistically significant decrease in the average literacy and numeracy achievements of pupils in 6th class between 1997 and 2000. The present report focuses on documenting the results of follow-up testing of 6th class pupils in 2003. Unlike the 6th class cohorts tested on previous occasions, the majority of pupils in the 2003 cohort should have benefited from the key provisions of the scheme, including junior education in small classes. However, the reading and Mathematics levels of pupils in the 2003 cohort did not differ from those in the 2000 cohort, and were significantly lower than those of pupils in 6th class when the scheme began. The failure of the scheme to effect improvements in key areas of pupil achievement is discussed with reference to a number of factors, including attendance levels, staffing problems, and teachers' and pupils' educational expectations.

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1. INTRODUCTION

In a preliminary evaluation report on the *Breaking the Cycle* scheme, the mean English reading and Mathematics achievements of 3rd and 6th class pupils in the selected schools in 1997 were found to be between half and one standard deviation lower than the norm group (Weir & Eivers, 1998). In 2000, the average score of 6th class pupils had extended to almost a full standard deviation below the mean in reading, and to over one standard deviation in Mathematics (Weir, Milis & Ryan, 2002). Furthermore, the later participation rates (as measured by Junior Certificate completion) of students who received their primary education in participating schools was much lower than that of students nationally (completion rates were 76% and 95% respectively) (Weir & Ryan, 2000). For those students from *Breaking the Cycle* schools who remained in school until the Junior Certificate, average achievement in the Junior Certificate Examination was considerably below that of students nationally. They also differed from the general population in their subject choice and levels at which papers were taken. Thus, all of the available data point to levels of scholastic achievement and attainment among students originating in *Breaking the Cycle* primary schools that are significantly below those of students nationally.

In this report, the reading and Mathematics achievements of pupils in 6th class in 2003 are described against the background of those of their 6th class counterparts in 2000 and 1997. The achievement data were collected in May and June of 2003 as part of the ongoing effort to monitor the achievements of pupils in participating schools.

2. TOTAL SAMPLE

In the 2002/2003 school year, 32 schools were participating in the urban dimension of *Breaking the Cycle*, of which 23 catered for pupils at 6th class level. All 6th class pupils in these schools were eligible for assessment in reading and Mathematics. However, as was the case in previous years, teachers were given the option of excluding any pupils for whom reading the test booklets would present major difficulties. The numbers and percentages of pupils excluded at the discretion of teachers in 1997, 2000, and 2003 are given in Table 1. It should be noted that achievement data were not obtained in 2003 in one small school in which there were only two pupils in 6th class, both of whom were non-nationals and had serious language difficulties. This means that the 2003 data in Table 1 were obtained in 22 schools.

Table 1. Numbers and percentages of excluded 6th class pupils in 1997, 2000, and 2003.

Year	Total number of pupils	Number of excluded pupils	% of cohort excluded
1997	871	8	0.9%
2000	789	33	4.2%
2003	714	55*	7.7%*

*These figures do not include 14 pupils who were excluded by teachers from the Mathematics test but not the English test, and three pupils who were excluded by teachers from the English test but not the Mathematics test.

As can be seen from Table 1, teachers excluded a greater percentage of pupils in 2003 than in 1997 or 2000. Indeed, the percentage of pupils excluded from testing increased almost tenfold between 1997 (0.9%) and 2003 (7.7%). This increase may be a result of teachers more readily excluding weaker pupils in 2003, as they may have expected that poor performance might reflect poorly on the effectiveness of the scheme. An alternative explanation is that, in 2003, schools were catering for an increased number of refugee and asylum-seeking families, and that language difficulties experienced by children from such backgrounds accounted for the increase in exclusions. Although information on the family backgrounds of pupils taking the tests was not collected, an examination of the pupils' names from one school with a relatively large number of non-national children revealed that the only pupil excluded by the teacher from testing was *not* one of the six non-national children in the class. This suggests that the increase in the number of exclusions in 2000 cannot be completely explained by the number of non-national children enrolled in participating schools.

The mean age of pupils at time of testing was 12 years and 6 months. A majority of pupils who were tested in 6th class in 2003 had been in 3rd class in 2000, and a significant number of these would have been in Senior Infants in 1996/1997 when *Breaking the Cycle* was introduced. While all pupils received additional benefits under the scheme (e.g., extra learning materials, opportunities to participate in out-of-school activities), the pupils in 6th class in 2003 had the benefit of being taught in classes in which the pupil-teacher ratio was about 15:1 at Senior Infant, 1st, and 2nd class levels. Therefore, the comparison of the achievements of pupils in 6th class in 2003 with those of pupils in 6th class in 2000 and 1997 is of particular interest, as pupils in the latter two cohorts did not receive their early education in small classes. Furthermore, a core group of pupils were tested when in 3rd class in 2000 and again when in 6th class in 2003 (N=599), which permits any changes in achievement levels for this group to be examined. Although the achievements of pupils in 1997 and 2000 have

already been reported (Weir & Eivers, 1998; Weir, Milis & Ryan, 2002), many of the summary tables in this report include data from 1997 and 2000 for purposes of comparison.

3. READING ACHIEVEMENT

3.1. THE SAMPLE OF PUPILS ASSESSED IN READING

The numbers of pupils in 6th class who were assessed in English reading in 1997, 2000, and 2003 are shown in Table 2.

Table 2. Numbers and percentages of pupils tested in English reading at 6th class level in 1997, 2000, and 2003.

	1997	2000	2003
Test / subtest	(total *N*=863*)	(total *N*=756*)	(total *N*=655*)
Vocabulary	711 (82.4%)	646 (85.4%)	555 (84.7%)
Comprehension	708 (82.0%)	618 (81.7%)	544 (83.1%)
Total reading	653 (75.7%)	567 (75.0%)	502 (76.6%)

*Totals do not include pupils excluded from testing by teachers. In 2003, 58 pupils were excluded from the reading test and one pupil refused to sit the test.

As Table 2 shows, the total numbers of pupils in 6th class was lower in 2003 than in 2000 and 1997. In fact, the total number of pupils across all schools fell by about 100 over each three-year period. In 2003, 84.7% of pupils had scores for Vocabulary, 83.1% for Comprehension, and 76.6% had total reading scores. The percentage of pupils taking each of the tests was fairly similar on all three occasions. Table 3 presents the previous information slightly differently, and shows the numbers and percentages of pupils who sat for one, both, or neither of the reading subtests in 2003. A total of 8.9% of pupils missed both subtests due to their absence from school, while 14.5% were absent for one subtest.

Table 3. Numbers and percentages of 6th class pupils in 2003 who sat for both subtests, for one subtest, or for neither of the subtests in reading (*N*=655*).

Both subtests	Only one subtest	Neither subtest
76.6% (502)	14.5% (95)	(8.9%) (58)

* Total does not include pupils who were excluded from reading (*N*=58) or pupils who refused to sit the test (*N*=1).

3.2. THE READING ACHIEVEMENT TEST

The Drumcondra Primary Reading Test (DPRT) was used to assess pupils' English reading achievements (Educational Research Centre, 1993). The DPRT is a group-administered test designed for use in primary schools. Levels 3, 4, 5, and 6 are for use in 3rd, 4th, 5th, and 6th classes respectively. At each level of the DPRT, there are two forms (Form A and Form B). Form A was used in the present study. The test assesses two aspects of reading: Reading Vocabulary and Reading Comprehension. The content of the subtests is based on an analysis of the English curriculum, and of textbooks in English and other subjects that were in use at the time the test was developed. The Reading Vocabulary subtest consists of 40 questions, each containing a target word embedded in a short sentence, and four alternatives. The pupil must choose which of the four alternative words is closest in meaning to the target word. The Reading Comprehension subtest consists of three passages, each followed by 12 questions. For each question, the pupil must choose which of four possible answers is the correct one.

The total test takes about 90 minutes to administer, including time for distributing test materials, giving instructions, and collecting materials. In *Breaking the Cycle* schools, the two parts of the DPRT were administered in separate testing sessions so as not to tire pupils.

3.3. THE READING ACHIEVEMENTS OF PUPILS

Achievement test results are first reported according to mean total reading score (i.e., a combined score for both parts of the DPRT), followed by mean scores for the subtests of Vocabulary and Comprehension. The scores presented for the subtests and for the overall test are mean raw scores, which represent the number of items correctly answered. The scores are used to compare the performance of pupils in *Breaking the Cycle* schools with that of the norm group (the national sample of pupils on whom the test was standardised) at 6th class level. For purposes of comparison, reading scores for pupils in 1997 and 2000 are also reported. The maximum possible total raw score on the DPRT is 76, which is achieved if all answers in the Vocabulary (40 items) and Comprehension (36 items) subtests are correct. Figures 1 to 3 show the distribution of pupils' reading raw scores at 6th class level in 1997, 2000, and 2003. As the test was constructed to generate a normal distribution, all three sample distributions in Figures 1 to 3 are characterised by a marked positive skew, indicating an overrepresentation of low scores and an underrepresentation of high scores.

Figure 1. Distribution of reading raw scores among 6th class *Breaking the Cycle* pupils in 1997.

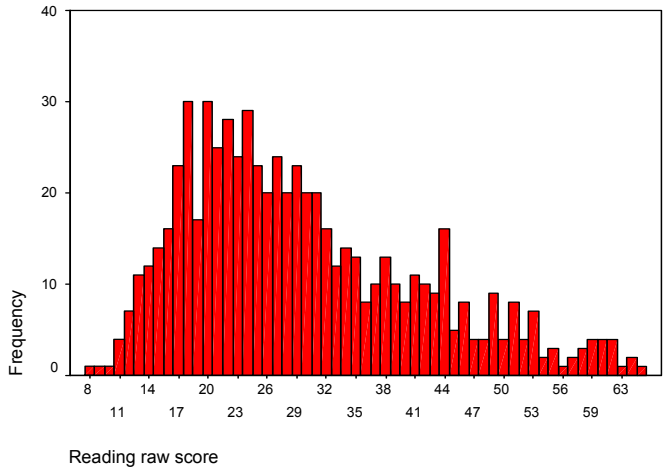


Figure 2. Distribution of reading raw scores among 6th class *Breaking the Cycle* pupils in 2000.

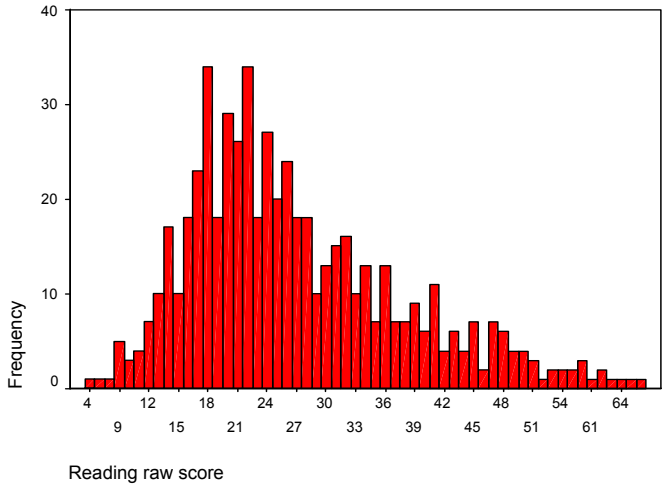
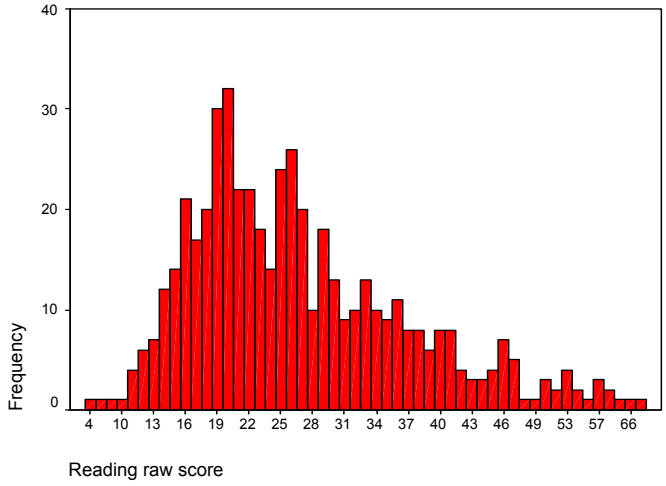


Figure 3. Distribution of reading raw scores among 6th class *Breaking the Cycle* pupils in 2003.



In 2003, the mean raw score of urban pupils on the reading test as a whole was 26.81 which compares with a mean of 40.38 for the norm group (Table 4). The percentile rank which

corresponds with their mean score is 21, indicating that they performed as well or better than 21% of pupils at this level nationally. A mean raw score of 26.81, when expressed as the average percentage of correctly answered items, is 35.3%, which compares with 53.1% for the norm group. Thus, the overall reading achievement of 6th class pupils in *Breaking the Cycle* schools is considerably poorer than the mean achievement of 6th class pupils nationally, and is almost a full standard deviation below the national mean. The 2003 mean is also significantly lower than that of the 6th class cohort in 1997 (t=3.93; df=1153; p<.001), but is not significantly different from the mean of 6th class in 2000 (t=0.25; df=1067; *ns*).

Table 4. Means and standard deviations (raw scores) of pupils in 6th class in *Breaking the Cycle* urban schools in 1997, 2000, and 2003, and in a national sample (norm group) on Level 6 of the Drumcondra Primary Reading Test.

Breaking the Cycle			
1997	2000	2003	National Sample
M = 29.46 SD = 11.93 (N = 653)	M = 26.98 SD = 11.06 (N = 567)	M = 26.81 SD =10.55 (N = 502)	M = 40.38, SD = 14.95

As well as looking at average scores for the groups, it is also useful to examine achievement levels in terms of the number of high-scoring and low-scoring pupils. One way of doing this is to examine the percentage of pupils whose scores were one or more standard deviations below and above the national mean (Tables 5 and 6).

Table 5. Percentage of 6th class pupils in *Breaking the Cycle* urban schools in 1997, 2000, and 2003, and in a national sample, scoring one standard deviation[1] or more below the national mean on the Drumcondra Primary Reading Test.

Breaking the Cycle			
1997	2000	2003	National sample
45.3%	54.0%	53.2%	18.0%

[1]Equivalent to raw score of 25

Table 6. Percentage of 6th class pupils in *Breaking the Cycle* urban schools in 1997, 2000, and 2003, and in a national sample, scoring one standard deviation[1] or more above the national mean on the Drumcondra Primary Reading Test.

Breaking the Cycle			
1997	2000	2003	National sample
3.4%	2.5%	1.8%	21.0%

[1]Equivalent to raw score of 55

In 2003, 53.2% of pupils had scores that were one standard deviation or more below the national mean, whereas the scores of only 1.8% of pupils were one standard deviation or more above it. This contrasts with the performance of pupils nationally, where there were similar percentages of scores lying one standard deviation or more below (18%) and above (21%) the mean. A greater percentage of 6th class pupils in 2003 had scores that are one standard deviation below the mean than was the case in 1997 (χ^2=6.8; *df*=1; *p*<.01), but the differences between the percentages of pupils achieving at this level in 2003 and 2000 are not significant (χ^2=0.04; *df*=1; *ns*).

Achievement levels may be further examined by identifying the percentage of pupils with extreme scores (i.e., below the 10th percentile and above the 90th percentile). Since the Special Education Review Body (Department of Education, 1993) proposed that scores below the 10th percentile signal the need for learning support, this cut-off point may be regarded as appropriate for defining low reading achievement. In 2003, the total reading score of over one-third of pupils (37.6%) fell below the 10th percentile, while only 0.6% of scores (*N*=3 pupils) were above the 90th percentile (Table 7). A higher percentage of pupils in 2003 than in 1997 achieved very low scores (χ^2=8.07; *df*=1; *p*<.01), although the percentages achieving at this level in 2003 and 2000 did not differ significantly (χ^2=0.07; *df*=1; *ns*). The percentage of pupils with very high scores was small in each year, and there were no significant differences in the percentages of pupils achieving scores in excess of the 90th percentile over the three occasions of testing.

Table 7. Percentage of 6th class *Breaking the Cycle* pupils in 1997, 2000, and 2003 scoring below the 10th percentile[1] and above the 90th percentile[2] on the Drumcondra Primary Reading Test.

	Percentile	
Year	<10th	>90th
1997	29.4%	0.6%
2000	36.5%	1.1%
2003	37.6%	0.6%

[1] Equivalent raw score : 21
[2] Equivalent raw score : 62

Finally, the available data may be used to determine if the magnitude of the *discrepancy* between the achievements of the three independent cohorts of 6th class pupils in the scheme and the norm group changed since the first occasion of testing. To do this, one needs to look at the relative achievement gaps that existed between pupils in 1997 and 2000 and the norm group, and the equivalent gaps in 2003. Table 8 shows the difference in the percentile ranks associated with the mean raw scores achieved by pupils in 1997, 2000, and 2003.

Table 8. Percentile ranks associated with mean reading raw scores of 6th class pupils in *Breaking the Cycle* schools in 1997, 2000, and 2003, and differences in percentile ranks between them and the norm group in each year.

	Percentile rank associated with mean score			
	BTC pupils 1997	*BTC* pupils 2000	*BTC* pupils 2003	Norm group[1]
	27	21	21	53
Difference in percentile rank from norm group	- 26	- 32	-32	

[1]The percentile rank that corresponds to the mean score of the norm group is 53 rather than 50 due to a slight skewing of the norm group achievement data.

As Table 8 shows, mean reading achievement at 6th class level dropped 6 percentile points between 1997 and 2000, but remained static between 2000 and 2003.

3.4. PUPILS' ACHIEVEMENTS IN READING VOCABULARY AND COMPREHENSION

In 2003, *Breaking the Cycle* pupils answered correctly 33% of Vocabulary and 37% of Comprehension items (Table 9). They performed less well than pupils in 1997 in both Vocabulary (t=2.7; df=1264; p<.01) and Comprehension (t=3.8; df=1250; p<.001). However, pupils' Vocabulary and Comprehension subtest scores in 2003 and 2000 did not differ significantly.

Table 9. Mean raw scores, and mean percentage of items correct, achieved by *Breaking the Cycle* pupils in 1997, 2000, and 2003, and by a national sample, by reading content area.

	Reading content area		
Group / level	Vocabulary (Number of items = 40)	Comprehension (Number of items = 36)	Total test (Number of items = 76)
6th class 1997 (*BTC*)	*M*=14.4 (*N*=711) (36%)	*M*=14.7 (*N*=708) (41%)	*M*=29.5 (*N*=653) (39%)
6th class 2000 (*BTC*)	*M*=12.7 (*N*=646) (32%)	*M*=13.9 (*N*=618) (39%)	*M* = 27.0 (*N*=567) (36%)
6th class 2003 (*BTC*)	*M*=13.4 (*N*=555) (33%)	*M*=13.4 (*N*=544) (37%)	*M* = 26.8 (*N*=502) (35%)
6th class (national)	*M*=20.8 (*SD*=8.6) (52%)	*M*=19.6 (*SD*=7.2) (54%)	*M*=40.4 (*SD*=14.9) (53%)

3.5. THE ACHIEVEMENTS IN VOCABULARY AND COMPREHENSION OF PUPILS WHO SAT ONLY ONE SUBTEST

The reading Vocabulary and Comprehension scores of pupils who do not have total reading scores for 2003 (i.e., those pupils who were absent from school on the day on which one of the two reading subtests was administered) were examined. Analysis of data from 2000 revealed that pupils who were absent for one of the reading subtests were characterised by poorer achievement levels than those who were present in school on both testing occasions (Weir, et al., 2002). To investigate if this was also the case in 2003, the mean scores of pupils who sat only one subtest were computed separately (Table 10). The mean subtest scores of pupils who were present for both parts of the reading test in 2003 and those who were present for only one do not differ significantly.

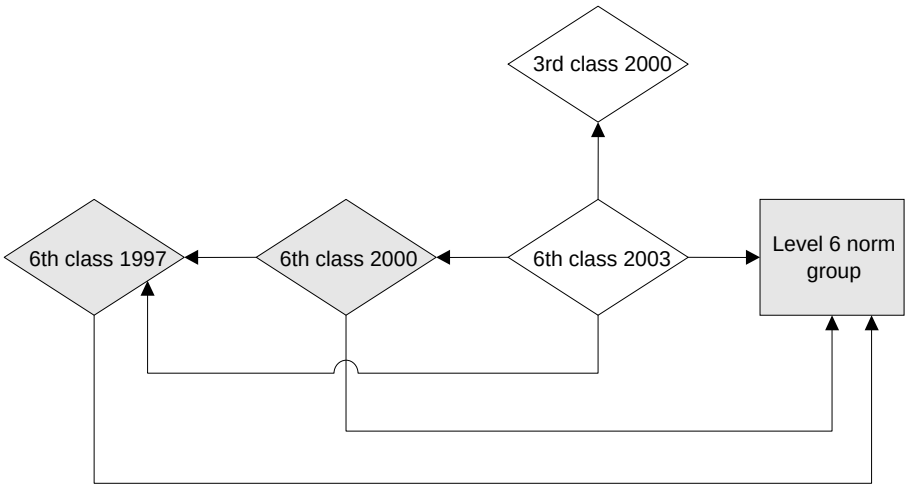
Table 10. Mean raw scores of 6th class pupils on reading Vocabulary and Comprehension subtests according to whether they sat both reading subtests or were absent for one subtest.

	Number of pupils	Vocabulary mean	Comprehension mean
6th class pupils *present* for both subtests	502	13.4	13.4
6th class pupils *absent* for one subtest	95	13.1	13.6
6th class pupils *absent* for both subtests	58	-	-

3.6. COMPARISONS OF PUPILS' READING ACHIEVEMENTS USING DATA FROM 2000 AND 2003

Descriptions of pupils' achievements in reading have so far relied on comparisons of the mean scores of groups of pupils tested in 1997, 2000, and 2003 (i.e., independent groups). For example, the mean reading score achieved by all 6th class pupils tested in 1997 was compared with the mean score of the 6th class cohort in 2003. Within each cohort, the performance of pupils in our sample has been described with reference to that of the norm group. However, other comparisons are possible given the availability of achievement data for a core group of pupils on two occasions. Figure 4 shows a graphical representation of the possible comparisons.

Figure 4. A graphical representation of possible ways of comparing pupil achievements in 2003 with those of pupils in the 1997 and 2000 cohorts, with arrows used to indicate the nature of the possible comparisons.



The majority of 3rd class pupils in 2000 were in 6th class in 2003, and so their relative achievement gains or losses over the three years of the scheme can be examined. However, due to pupil absences during the testing sessions in 2000 and 2003, as well as pupil migration

in and out of participating schools, only 371 pupils (of a total of 760 pupils in 3rd class in 2000) have complete reading scores on both occasions. It is not possible to compare mean raw scores on the tests, as different levels of the test were taken by 3rd and 6th class pupils, and the norms for each test level differ. A way of overcoming this difficulty is to use standard scores[1] to describe achievement (Table 11).

Table 11. Comparison of the English reading achievement (mean standard score) of 3rd class pupils in *Breaking the Cycle* schools in 2000 (Level 3) with their achievement in 6th class in 2003 (Level 6).

	Reading achievement (mean standard score on DPRT) (*N*=371)	Associated percentile rank
3rd class 2000	90.6	27
6th class 2003	86.5	19

As Table 11 shows, the core group of pupils for whom complete reading achievement data exist in 2000 and 2003 did less well relative to national norms in 2003 than in 2000 (t=-7.7; df=370; p<.001). In 2000, the mean score of the group corresponded to a percentile rank of 27, indicating that their reading levels were as good or better than 27% of the standardisation sample. By 2003, their mean score had fallen to a level corresponding to a percentile rank of 19, meaning that they were performing as well or better than only 19% of pupils nationally.

In light of the relatively high attrition rate of pupils between 3rd and 6th class, mean 3rd class reading scores in 2000 of pupils who were subsequently enrolled in 6th class in 2003 and those who were not enrolled were compared (Table 12). While the mean scores of pupils who were present in 6th class in 2003 were higher than those of pupils who were not for Vocabulary, Comprehension, and overall reading, the difference was significant only for reading Comprehension.

[1] Standard scores express test results on a single common scale. For example, in deriving standard score scales for the DPRT, the cumulative frequency distributions of raw scores for Total reading were normalised and transformed so that the resulting standard score distributions were normally distributed, with a mean of 100 and a standard deviation of 15 (Educational Research Centre, 1993). Approximately 34% of standard scores are found between the mean and one standard deviation above the mean (standard scores between 100 and 115) while 34% of standard scores are found between the mean and one standard deviation below the mean (standard scores between 85 and 100). A further 14% of scores are found between standard scores of 70 and 85, and between standard scores of 115 and 130. Finally, about 2% of scores are below a standard score of 70 and above a standard score of 130.

Table 12. Mean (and SD) Vocabulary, Comprehension, and total reading scores of 3rd class pupils in 2000 according to whether they were or were not later enrolled in 6th class in 2003.

	Group		
	In 6th class	Not in 6th class	Difference
Vocabulary	14.32 (6.6) *N*=521	13.35 (5.8) *N*=89	*t*=-1.3; *df*=608; *ns*
Comprehension	14.03 (6.3) *N*=523	12.69 (5.1) *N*=89	*t*=-2.2; *df*=610; *p*<.05
Total reading	28.38 (11.6) *N*=481	25.70 (9.7) *N*=81	*t*=-1.9; *df*=560; *ns*

3.7. PUPIL GENDER AND READING ACHIEVEMENT

Approximately 53% of pupils who participated in achievement testing in 2003 were boys, while 47% were girls (Table 13).

Table 13. Numbers and percentages of 6th class boys and girls in *Breaking the Cycle* schools in 2003 (*N*=714).

Pupil Gender	Number %
Girls	334 (46.8%)
Boys	379 (53.1%)
Not known	1 (0.1%)

Table 14 summarises the gender differences found in pupils' achievement on the two reading subtests, as well as in overall reading, in 1997, 2000, and 2003. Girls outperformed boys on the reading Comprehension subtest (*t*=2.57; *df*=541; *p*=.01) in 2003. However, no significant gender differences were observed on the Vocabulary subtest or total reading scores.

Table 14. Mean Vocabulary and Comprehension raw scores and mean total reading raw scores of pupils in urban *Breaking the Cycle* schools, by gender in 1997, 2000, and 2003.

	1997			2000			2003		
Reading Content Area	Girls	Boys	Boys vs girls	Girls	Boys	Boys vs girls	Girls	Boys	Boys vs girls
Vocabulary	14.0 (*N*=348)	14.8 (*N*=363)	*ns*	11.9 (*N*=300)	13.5 (*N*=346)	<.01	13.5 (*N*=271)	13.3 (*N*=283)	*ns*
Comprehension	14.9 (*N*=340)	14.6 (*N*=368)	*ns*	14.0 (*N*=293)	13.8 (*N*=324)	*ns*	14.0 (*N*=262)	12.8 (*N*=281)	<.01
Total Reading	29.1 (*N*=318)	29.8 (*N*=335)	*ns*	26.3 (*N*=265)	27.5 (*N*=302)	*ns*	27.6 (*N*=245)	26.1 (*N*=256)	*ns*

The mean scores of girls on the reading test in 2003 were compared with girls' mean scores in 1997 and 2000. As shown in Table 15, there were no differences in the mean scores of girls in 1997 and 2003 in reading. However, girls' mean score on the Vocabulary subtest was significantly higher in 2003 than in 2000 (t=3.4; df=569; p<.001), although there were no differences between their test scores on Comprehension or overall reading.

Table 15. Mean Vocabulary and Comprehension raw scores and mean total reading raw scores of 6th class girls in *Breaking the Cycle* schools in 1997, 2000, and 2003.

	Girls 1997		Girls 2000		Girls 2003		2003 vs 1997	2003 vs 2000
Reading Content Area	Mean	*SD*	Mean	*SD*	Mean	*SD*	*p*	*p*
Vocabulary	14.0	7.1	11.9	5.6	13.5	5.9	*ns*	<.001
Comprehension	14.9	6.2	14.0	5.8	14.0	5.9	*ns*	*ns*
Total Reading	29.1	12.1	26.4	10.5	27.6	10.7	*ns*	*ns*

Boys achieved a significantly lower Comprehension score in 2003 than in 2000 (t=2.1; df=603; p<.05), although the Vocabulary and total reading scores in the two cohorts did not differ (Table 16). When compared with the 1997 cohort, boys in 2003 performed more poorly in Vocabulary (t=2.9; df=634; p<01), Comprehension (t=3.9; df=642; p<.001), and on overall reading (t=4.0; df=589; p<.001).

Table 16. Mean Vocabulary and Comprehension raw scores and mean total reading raw scores of 6th class boys in *Breaking the Cycle* schools in 1997, 2000, and 2003.

	Boys 1997		Boys 2000		Boys 2003		2003 vs 1997	2003 vs 2000
Reading Content Area	Mean	*SD*	Mean	*SD*	Mean	*SD*	*p*	*p*
Vocabulary	14.8	6.5	13.5	6.6	13.3	6.6	<.01	*ns*
Comprehension	14.6	6.2	13.8	5.9	12.8	5.3	<.001	<.05
Total Reading	29.8	11.8	27.5	11.5	26.1	10.4	<.001	*ns*

The performance of boys and girls on Level 3 of the reading test, which they had taken when they were in 3rd class in 2000, was compared (using paired t-tests) with their performance on Level 6 of the reading test, which they took in 6th class in 2003. Only pupils who had participated in testing in both years and who had test scores available for one or more of the subtests were included in analysis. Tables 17 and 18 present girls' and boys' mean standard scores in reading in 2000 and 2003. Girls' mean standard scores on the reading test overall (t=6.2; df=185; p<.001) and on both the Vocabulary (t=5.6; df=212;

p<.001) and Comprehension (t=5.1; df=216; p<.001) subtests in 2003 were significantly lower than their standard scores in 2000. The pattern of achievement was similar for boys. Boys in 2003 achieved significantly lower mean standard scores on Level 6 of the test in Vocabulary (t=3.1; df=220; p<.001), Comprehension (t=5.8; df=214; p<.001), and overall reading (t=4.8; df=184; p<.001), than they did on Level 3 of the test in 2000.

Table 17. Achievements (mean standard scores) in reading of 3rd class girls in *Breaking the Cycle* schools in 2000 (DPRT Level 3) and in 6th class in 2003 (DPRT Level 6).

	3rd Class (Level 3) Girls 2000		6th Class (Level 6) Girls 2003		2000 vs 2003
Reading Content Area	Mean	*SD*	Mean	*SD*	*p*
Vocabulary (*N*=213)	91.4	12.5	87.1	12.1	<.001
Comprehension (*N*=217)	92.7	13.3	88.2	13.5	<.001
Total Reading Score (*N*=186)	91.8	12.4	87.3	12.7	<.001

Table 18. Achievements (mean standard scores) in reading of 3rd class boys in *Breaking the Cycle* schools in 2000 (DPRT Level 3) and in 6th class in 2003 (DPRT Level 6).

	3rd Class (Level 3) Boys 2000		6th Class (Level 6) Boys 2003		2000 vs 2003
Reading Content Area	Mean	*SD*	Mean	*SD*	*p*
Vocabulary (*N*=221)	89.3	13.9	86.6	13.2	<.001
Comprehension (*N*=215)	91.1	12.9	86.5	11.6	<.001
Total Reading Score (*N*=185)	89.4	12.8	85.7	11.7	<.001

4. MATHEMATICS ACHIEVEMENT

4.1. THE SAMPLES OF PUPILS

The numbers of pupils in 6th class who sat tests in Mathematics in 1997, 2000, and 2003 are given in Table 19. In 2003, 79.3% of 6th class pupils had scores for Computation, 81.8% for Concepts, 78.0% for Problems, and 62.3% had total Mathematics scores. Due to increases in absenteeism since 1997, the percentages of pupils taking each of the subtests, with the exception of the Concepts subtest, as well as the percentage completing all three parts of the Mathematics test was lower in 2003 than in 2000 or 1997. In 2003, 7.9% of pupils missed all three subtests due to absence from school, while a further 7.3% were in attendance for only one of the three subtests (Table 20).

Table 19. Numbers and percentages of pupils tested in Mathematics, by Mathematics subtest, in 1997, 2000, and 2003.

	1997	2000	2003
Test / subtest	Total *N*=863*	Total *N*=756*	Total *N*=644*
Computation	*N* = 726 (84.1%)	*N* = 615 (81.3%)	*N* = 511 (79.3%)
Concepts	*N* = 731 (84.7%)	*N* = 603 (79.8%)	*N* = 527 (81.8%)
Problems	*N* = 735 (85.2%)	*N* = 599 (79.2%)	*N* = 502 (78.0%)
Total Mathematics	*N* = 605 (70.1%)	*N* = 479 (63.4%)	*N* = 401 (62.3%)

*Total does not include pupils excluded from testing by teachers. In 2003, 69 pupils were excluded from Mathematics and one pupil refused to sit the test.

Table 20. Numbers and percentages of pupils in 2003 who sat for all three subtests, for one or two subtests, or for none of the subtests in Mathematic (*N*=644).*

All three subtests	Two subtests	One subtest	No subtests
62.3% (401)	22.5% (145)	7.3% (47)	7.9% (51)

* Total does not include pupils who were excluded from Mathematics (*N*=69) or pupils who refused to sit the test (*N*=1).

4.2. THE MATHEMATICS ACHIEVEMENT TEST

The Drumcondra Primary Mathematics Test (DPMT) is group-administered and is designed for use in primary schools (Educational Research Centre, 1997). As is the case with the DPRT, Levels 3, 4, 5 and 6 are for use in standards 3, 4, 5, and 6 respectively. The content of all levels of the DPMT was based on the Mathematics curriculum and textbooks in Mathematics in use in Irish primary schools. Levels 3 - 6 of the DPMT assess three aspects of Mathematics: Computation, Concepts, and Problem-solving. These three content areas are represented by three separate subtests. The Computation and Concepts subtests each consist of 35 questions, whereas the Problems subtest has 30 questions. For each question, the pupil must determine which of four possible answers is correct. The DPMT takes approximately 2½ hours to administer. This includes time for distributing test materials, completing sample questions and doing the test itself. In administering the DPMT to pupils in *Breaking the Cycle* schools, the three subtests were administered separately, with testing spread over two or three days to avoid tiring pupils.

4.3 THE MATHEMATICS ACHIEVEMENTS OF PUPILS

Levels of achievement in Mathematics are first reported according to mean total Mathematics score (i.e., a raw score in all three parts of the DPMT combined). This is followed by mean raw scores for the Computation, Concepts, and Problems subtests. Figures 5 to 7 show the distribution of pupils' Mathematics raw scores in 1997, 2000, and 2003. As the figures illustrate, the distributions in each year are markedly positively skewed. As was the case with reading achievement, there is a proportionately greater number of low scores and a relative dearth of high Mathematics scores in each of the three years.

Figure 5. Distribution of Mathematics raw scores among 6th class *Breaking the Cycle* pupils in 1997.

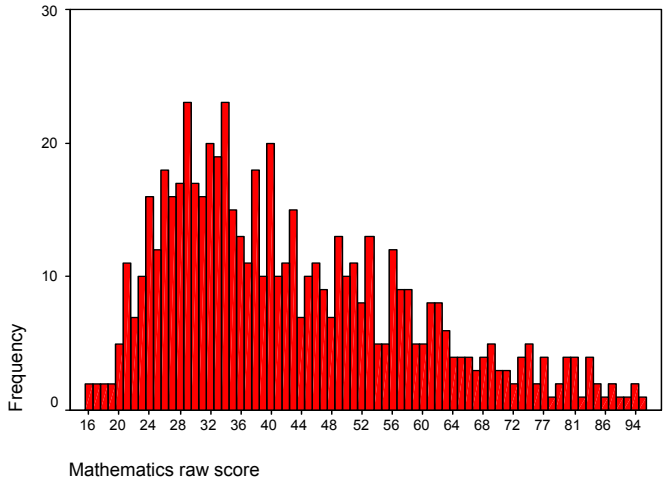


Figure 6. Distribution of Mathematics raw scores among 6th class *Breaking the Cycle* pupils in 2000.

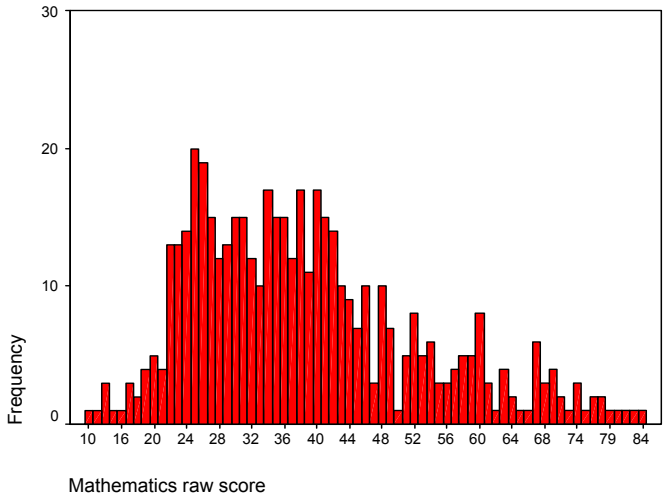
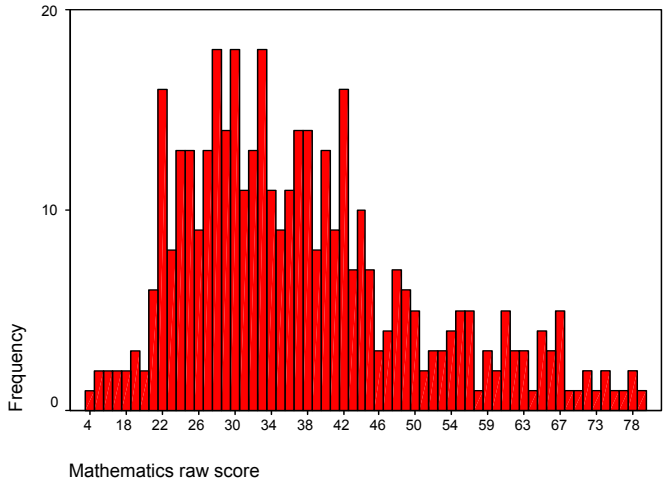


Figure 7. Distribution of Mathematics raw scores among 6th class *Breaking the Cycle* pupils in 2003.



The mean raw score of pupils in our sample in 2003 on the Mathematics test as a whole was 37.78, which compares with a mean of 58.72 for the norm group (Table 21). The corresponding percentile rank of the mean for pupils in *Breaking the Cycle* schools is 14, indicating that pupils performed as well or better than 14% of pupils nationally in 6th class. Overall, pupils in *Breaking the Cycle* schools achieved an average of 20% fewer Mathematics items correct than pupils at this level nationally. When described in terms of standard deviation units, the mean raw score achieved by pupils in 2003 is well over one standard deviation below the national mean. Furthermore, the mean achievement in Mathematics of pupils in 2003 was considerably poorer than it was in 1997 (t=5.2; df=1004; p<.001), although it did not differ significantly from that of pupils in 2000.

Table 21. Means and standard deviations (raw scores) of 6th class pupils in *Breaking the Cycle* schools in 1997, 2000, and 2003, and in a national sample on Level 6 of the Drumcondra Primary Mathematics Test.

Breaking the Cycle			
1997	2000	2003	National Sample
M = 42.90, SD = 16.45 (N = 605)	M =38.65, SD =14.17 (N =479)	M = 37.78, SD = 13.45 (N = 401)	M = 58.72, SD = 17.88

An examination of the number of high-scoring and low-scoring pupils reveals that the Mathematics scores of more than two-thirds (67.8%) of all 6th class pupils are one standard deviation or more below the national mean (Table 22). Only a very small percentage (0.7%) of pupils have scores that are one standard deviation or more above it (Table 23). This contrasts with the pattern of scores in the national sample, where 19% of scores are one or

more standard deviations below the mean and a similar percentage (18%) above it. Thus, the distribution of scores among pupils in *Breaking the Cycle* schools was far less symmetrical, and was characterised by a marked overrepresentation of low scores and an underrepresentation of high scores. Indeed, since 1997, the percentage of pupils who had scores that were one standard deviation below the mean increased by more than 14%.

Table 22. Percentages of 6th class pupils in *Breaking the Cycle* schools in 1997, 2000, and 2003, and in a national sample, scoring one standard deviation[1] or more below the national mean on the Drumcondra Primary Mathematics Test.

Breaking the Cycle			
1997	2000	2003	National sample
53.7%	65.8%	67.8%	19.0%

[1] Equivalent raw score: 41

Table 23. Percentage of 6th class pupils in *Breaking the Cycle* schools in 1997, 2000, and 2003, and in a national sample, scoring one standard deviation[1] or more above the national mean on the Drumcondra Primary Mathematics Test.

Breaking the Cycle			
1997	2000	2003	National sample
4.5%	1.5%	0.7%	18%

[1] Equivalent raw score: 77

An examination of the Mathematics achievement in 2003 of *Breaking the Cycle* pupils at the extreme ends of the distribution of scores (i.e., those with scores below the 10th percentile and above the 90th percentile), indicates that the total Mathematics score of almost half of all pupils (45.6%) lies below the 10th percentile (Table 24). Only one pupil in 2003 achieved a score above the 90th percentile, compared to 1.7% of pupils in 1997.

Table 24. Percentage of 6th class *Breaking the Cycle* pupils scoring below the 10th percentile[1] and above the 90th percentile[2] on the Drumcondra Primary Mathematics Test in 1997, 2000, and 2003.

	Percentile	
Year	<10th	>90th
1997	35.5%	1.7%
2000	40.9%	0.2%
2003	45.6%	0.2%

[1] Equivalent raw score: 33
[2] Equivalent raw score: 84

Finally, it is instructive to examine changes in the discrepancy between the Mathematics achievements of the three independent cohorts of 6th class pupils in the scheme and the norm group since the first occasion of testing. To do this, one needs to look at the relative achievement gaps that existed between 6th class pupils in 1997 and 2000 and the norm group, and the equivalent gaps in 2003. Mean Mathematics achievement at 6th class level dropped 6 percentile points between 1997 and 2000, but only decreased by one further percentile point between 2000 and 2003 (Table 25).

Table 25. Percentile ranks associated with mean reading raw scores of 6th class pupils in 1997, 2000, and 2003, and differences in percentile ranks of 6th class pupils in each year.

	Percentile rank associated with mean score			
	BTC pupils 1997	*BTC* pupils 2000	*BTC* pupils 2003	Norm group[1]
	21	15	14	47
Difference in percentile ranks from norm group	-26	-32	-33	

[1]The percentile rank that corresponds to the mean score of the norm group is 47 rather than 50, due to a slight skewing of the norm group achievement data.

4.4. PUPILS' ACHIEVEMENTS IN MATHEMATICAL COMPUTATION, CONCEPTS AND PROBLEMS

In 2003, pupils in *Breaking the Cycle* schools achieved between 19% and 24% fewer items correct in the three Mathematics content areas than pupils on whom the test was standardised (Table 26). It appears that the decline in Mathematics achievement has occurred across the three content areas, and is not attributable to a decline in a specific area. In each content area, 6th class pupils in 2003 answered 1-2% fewer items correctly than 6th class pupils in 2000, and 4-5% fewer items correctly than pupils in the 1997 cohort.

Table 26. Mean raw scores, and mean percentage of items correct, achieved by *Breaking the Cycle* pupils in 1997, 2000, and 2003, and by a national sample, by Mathematics content area.

	Mathematics content area			
Group / level	Computation (Number of items = 35)	Concepts (Number of items = 35)	Problems (Number of items = 30)	Total test (Number of items = 100)
6th class 1997 (*BTC*)	*M*=15.5 (*N*=726) (44%)	*M*=13.5 (*N*=731) (39%)	*M*=12.5 (*N*=735) (42%)	*M*=42.9 (*N*=605) (43%)
6th class 2000 (*BTC*)	*M*=13.8 (*N*=615) (40%)	*M*=12.5 (*N*=603) (36%)	*M*=11.4 (*N*=600) (38%)	*M*=38.6 (*N*=479) (39%)
6th class 2003 (*BTC*)	*M*=13.6 (*N*=511) (39%)	*M*=12.3 (*N*=527) (35%)	*M*=10.7 (*N*=502) (36%)	*M*=37.8 (*N*=401) (38%)
6th class (national)	*M*=21.9 (*SD*=7.0) (63%)	*M*=19.0 (*SD*=6.4) (54%)	*M*=17.7 (*SD*=6.0) (59%)	*M*=58.7 (*SD*=17.9) (59%)

4.5. THE ACHIEVEMENTS IN COMPUTATION, CONCEPTS, AND PROBLEMS OF PUPILS WHO SAT ONLY ONE SUBTEST

As in the case of reading achievement, the mean Mathematics scores of pupils who sat only one or two of the three subtests were computed separately. This was done to investigate if pupils who were absent for one or two of the subtests were characterised by poorer achievement levels than pupils who were present for all three subtests. The data in Table 27 support the hypothesis that the poorer attenders performed less well than pupils who were present for all three subtests. There are quite large differences favouring pupils who were present for all three subtests, which are significant for Computation (t=3.7; df=509; p<.001), Concepts (t= 3.55; df=525; p<.001), and Problems (t=2.5; df=500; p<.05). This finding suggests that the average level of Mathematics achievement in *Breaking the Cycle* schools may well be *lower* than that calculated from scores contributed by pupils who took all three subtests.

Table 27. Mean raw scores of 6th class pupils in *Breaking the Cycle* schools in 2003 on Computation, Concepts, and Problems subtests, according to whether they sat all three Mathematics subtests or were absent for one or two subtests.

	Number of pupils	Computation mean	Concepts mean	Problems mean
6th class pupils *present* for all three subtests	401	14.1	12.7	11.0
6th class pupils *absent* for one or two subtests	192	12.0	10.9	9.8
6th class pupils *absent* for all three subtests	51	-	-	-

4.6 COMPARISONS OF PUPILS' MATHEMATICS ACHIEVEMENTS USING DATA FROM 2000 AND 2003

The Mathematics achievements of pupils have been described, up to now, in terms of comparisons of the mean scores of independent groups of pupils, and within each cohort, the performance of *Breaking the Cycle* pupils has also been described with reference to that of the norm group on the appropriate level of the test. However, the fact that the majority of 3rd class pupils in 2000 were in 6th class in 2003 permits their relative achievement gains or losses over the three-year period to be examined. It should be noted, however, that due to the movement of pupils in and out of participating schools, as well as pupil absences during the administration of tests in both years, total Mathematics scores on both occasions exist for only 283 pupils (of a total of 760 in 3rd class in 2000). Standard scores are used in this comparison as different levels of the test were taken by 3rd and 6th class pupils, and it is not possible to compare mean raw scores on the tests (Table 28).

Table 28. Comparison of the Mathematics achievement (mean standard score) of 3rd class pupils in *Breaking the Cycle* schools in 2000 (Level 3) with their achievement in 6th class in 2003 (Level 6).

	Mathematics achievement (mean standard score on DPMT) (*N*=283)	Associated percentile rank
3rd class 2000	89.2	24
6th class 2003	83.1	13

As can be seen from Table 28, the performance of the core group of pupils for whom complete Mathematics achievement data exist in 2000 and 2003 was poorer in 2003 than in 2000 relative to the norm group (t=-10.3; df=282; p<.001). In 2000, the mean score of the *Breaking the Cycle* cohort corresponded to a percentile rank of 24, indicating that their Mathematics levels were as good as or better than 24% of the 3rd class standardisation sample. By 2003, their mean score had fallen to a level where it corresponded to a percentile rank of 13, meaning that they were performing as well as or better than only 13% of pupils nationally at 6th class level.

Due to the high attrition rate of pupils between 3rd class in 2000 and 6th class in 2003, mean 3rd class Mathematics test scores in 2000 of pupils who remained and those who did not were compared (Table 29). Mean scores were significantly higher for Computation, Concepts, Problems, as well as Mathematics overall, among pupils who were enrolled in 6th class three years later than among pupils who were not.

Table 29. Mean (and SD) Computation, Concepts, Problems, and overall Mathematics scores of 3rd class pupils in 2000 according to whether they were or were not later enrolled in 6th class in 2003.

	Group		
	In 6th class	Not in 6th class	Difference
Computation	14.78 (6.7) *N*=519	12.90 (6.0) *N*=92	*t*=-2.5; *df*=609; *p*<.05
Concepts	14.30 (5.5) *N*=523	12.93 (4.9) *N*=91	*t*=-2.2; *df*=612; *p*<.05
Problems	12.70 (5.7) *N*=522	10.99 (4.7) *N*=84	*t*=-2.6; *df*=604; *p*<.01
Total Mathematics	42.63 (16.2) *N*=453	38.00 (13.2) *N*=74	*t*=-2.7; *df*=525; *p*<.01

4.7. PUPIL GENDER AND MATHEMATICS ACHIEVEMENT

Approximately 53% of the 6th class pupils who were tested in 2003 were boys, while 47% were girls (see Table 13). The mean scores of boys and girls in 1997, 2000, and 2003 were compared using independent *t*-tests (Table 30). In 2003, girls performed at about the same level as boys on the Mathematics test overall, and on all subtests except Mathematical Computation, on which they outperformed boys (*t*=2.7; *df*=508; *p*<.01). This repeats the pattern of Mathematics achievement by gender observed in 2000, but contrasts with the data in 1997 which indicated that boys outperformed girls on Mathematics overall and all subtests except Computation.

Table 30. Mean Computation, Concepts, and Problems raw scores, and mean total Mathematics raw scores of pupils in urban *Breaking the Cycle* schools, by gender in 1997, 2000, and 2003.

	1997			2000			2003		
Mathematics Content Area	Girls	Boys	Boys vs girls	Girls	Boys	Boys vs girls	Girls	Boys	Boys vs girls
Computation	15.3 (*N*=352)	15.7 (*N*=374)	*ns*	14.1 (*N*=293)	13.6 (*N*=322)	<.01	14.3 (*N*=251)	13.0 (*N*=259)	<.01
Concepts	12.7 (*N*=355)	14.3 (*N*=376)	<.001	12.1 (*N*=286)	12.9 (*N*=317)	*ns*	12.1 (*N*=261)	12.5 (*N*=265)	*ns*
Problems	11.9 (*N*=351)	13.1 (*N*=384)	<.005	11.2 (*N*=269)	11.5 (*N*=330)	*ns*	10.7 (*N*=255)	10.7 (*N*=246)	*ns*
Total Mathematics	40.9 (*N*=283)	44.7 (*N*=322)	<.005	38.0 (*N*=228)	39.2 (*N*=251)	*ns*	38.0 (*N*=207)	37.6 (*N*=193)	*ns*

The mean scores of boys and girls in Mathematics in 1997, 2000, and 2003 were compared using independent *t*-tests to ascertain whether any changes had occurred over this period. As shown in Table 31, mean achievement in Mathematics of 6th class girls in 2003

did not differ significantly from that of girls in 2000. However, when compared with girls in the 1997 cohort, girls in 2003 had significantly lower mean scores on Computation (t=2.1; df=601; p<.05), Problems (t=3.1; df=604; p<.01), and Mathematics overall (t=2.2; df=488; p<.05).

Table 31. Mean Computation, Concepts, and Problems raw scores and mean total Mathematics raw scores of 6th class girls in *Breaking the Cycle* schools in 1997, 2000, and 2003.

	Girls 1997		Girls 2000		Girls 2003		2003 vs 1997	2003 vs 2000
Mathematics Content Area	Mean	*SD*	Mean	*SD*	Mean	*SD*	*p*	*p*
Computation	15.3	6.1	14.1	5.8	14.3	5.6	<.05	*ns*
Concepts	12.7	5.1	12.1	5.3	12.1	5.2	*ns*	*ns*
Problems	11.9	4.9	11.2	4.3	10.7	4.5	<.01	*ns*
Total Mathematics	40.9	14.6	38.1	13.8	38.0	14.2	<.05	*ns*

Table 32 shows that there were sizeable differences in the mean scores of boys in 2003 and 1997 on Computation (t=5.2; df=631; p<.001), Concepts (t=3.9; df=639; p<.0001), Problems (t=5.7; df=628; p<.001), and on Mathematics overall (t=4.8; df=513; p<.001). However, there was only one significant difference between the means in 2000 and 2003. In the Problems subtest (t=2.2; df=574; p<.05), boys in 2000 outperformed boys in 2003.

Table 32. Mean Computation, Concepts, and Problems raw scores and mean total Mathematics raw scores of 6th class boys in *Breaking the Cycle* schools in 1997, 2000, and 2003.

	Boys 1997		Boys 2000		Boys 2003		2003 vs 1997	2003 vs 2000
Mathematics Content Area	Mean	*SD*	Mean	*SD*	Mean	*SD*	*p*	*p*
Computation	15.6	6.9	13.6	5.7	13.0	5.1	<.001	*ns*
Concepts	14.3	6.4	12.9	5.6	12.5	4.8	<.001	*ns*
Problems	13.1	5.7	11.5	4.5	10.7	4.1	<.001	<.05
Total Mathematics	44.7	17.8	39.2	14.5	37.6	12.7	<.001	*ns*

The performance of boys and girls on Level 3 of the Mathematics test, which they had taken when they were in 3rd class in 2000, was compared (using paired t-tests) with their performance on Level 6 of the Mathematics test, which they took in 6th class in 2003 (Tables

33 and 34). Only pupils who had been tested in both years and who had test scores available for one or more of the subtests were included in the analysis. Girls' mean standard scores in 2003 on the Mathematics test overall (t=7.0; df=153; p<.001), and on the Computation (t=4.0; df=206; p<.001), Concepts (t=7.7; df=214; p<.001) and Problems (t=5.9; df=205; p<.001) subtests were significantly below those on Level 3 of the test in 2000. This pattern of achievement was similar for boys. Boys in 2003 achieved significantly lower mean standard scores on Level 6 of the test in Computation (t=6.4; df=191; p<.001), Concepts (t=5.6; df=201; p<.001), Problems (t=7.4; df=193; p<.001), and Mathematics overall (t=7.6; df=128; p<.001), than on Level 3 of the test in 2000.

Table 33. Achievements (mean standard scores) in Mathematics of 3rd class girls in *Breaking the Cycle* schools in 2000 (DMPT Level 3) and in 6th class in 2003 (DPMT Level 6).

	3rd Class (Level 3) Girls 2000		6th Class (Level 6) Girls 2003		2003 vs 2000
Mathematics Content Area	Mean	SD	Mean	SD	*p*
Computation (*n*=207)	87.7	14.6	84.6	12.0	<.001
Concepts (*n*=215)	90.8	14.7	83.9	13.0	<.001
Problems (*n*=206)	88.2	11.8	83.5	11.3	<.001
Total Mathematics score (*N*=154)	88.9	14.6	83.3	12.3	<.001

Table 34. Achievements (mean standard scores) in Mathematics of 3rd class boys in *Breaking the Cycle* schools in 2000 (DPMT Level 3) and in 6th class in 2003 (DPMT Level 6).

	3rd Class (Level 3) Boys 2000		6th Class (Level 6) Boys 2003		2003 vs 2000
Mathematics Content Area	Mean	SD	Mean	SD	*p*
Computation (*n*=192)	87.2	13.3	81.8	10.8	<.001
Concepts (*n*=202)	89.6	11.8	85.4	11.4	<.001
Problems (*n*=194)	90.4	14.5	83.5	10.3	<.001
Total Mathematics score (*N*=129)	89.6	13.4	82.9	11.2	<.001

5. CONCLUSION

A number of key findings emerge from a review of achievement data collected in *Breaking the Cycl*e schools in 2003. The principal finding is that the average reading and Mathematics levels of 6th class pupils are very low relative to those of pupils nationally, as evidenced by the extent of the differences between the mean scores of *Breaking the Cycle* pupils and those

of pupils in the relevant norm groups. Not only are the mean scores of the former significantly lower than those of pupils nationally, but there is a marked overrepresentation of low-scorers and a corresponding underrepresentation of high-scorers among *Breaking the Cycle* pupils. The small number of very high-achieving pupils should be acknowledged, however. In 2003, three pupils (0.6%) in 6th class achieved reading scores above the 90th percentile, while in Mathematics, one pupil did so. However, the generally low average score is disappointing, as the majority of the 2003 cohort of 6th class pupils would have experienced one of the major provisions of *Breaking the Cycle*, which was to receive their early education in classes in which the pupil-teacher ratio was about 15:1.

Reading levels have declined among 6th class pupils since baseline achievement data were collected in 1997. Not only have pupils' mean reading scores decreased significantly, but analysis of the 2003 data revealed proportionately greater numbers of low-scorers (pupils whose scores are one standard deviation below the mean), and extreme low-scorers (pupils with scores below the 10th percentile) than in 1997. Mean Mathematics achievement levels have also decreased among 6th class pupils since 1997, alongside an increase in the percentage of low-scorers. On a more positive note, the 2003 achievement data indicate that there were no significant decreases in overall mean scores in either subject area between 2000 and 2003. However, the fact that only minor differences were found between the achievements of the 2000 and 2003 cohorts indicates that those pupils who had the benefit of being taught in smaller classes did not outperform those in a comparison group that had not received such benefits.

Teachers excluded a greater percentage of pupils from testing in 2003 than they did in 2000 or 1997 (totals of 7.7%, 4.2%, and 0.9% of pupils respectively). However, the removal of greater percentages of the weakest pupils did not result in any improvement in average test scores in either subject area. Indeed, if excluded pupils are added to the numbers of pupils with scores below the 10th percentile (as it seems reasonable to do because teachers would have excluded pupils whom they considered to be the weakest in their class), then the percentage of pupils potentially scoring at this level increases from 37.6% to 44% in reading and from 45.6% to 56.3% in Mathematics. Furthermore, the finding that the pupils from the 3rd class cohort in 2000 who were no longer in 6th class in 2003[2] had poorer achievements

[2] Data were not collected on the destinations of the 110 pupils who were in 3rd class in 2000 but not in 6th class in 2003. It is, therefore, not possible to establish reasons for the high attrition rate (e.g., retention in an earlier grade level, moving to a different school).

than those who remained also indicates that achievement levels in participating schools are likely to be overestimated rather than underestimated.

Attendance rates on the days of testing in 2003 were relatively low. On average, only 83.9% of eligible pupils were present on the days of testing in reading. Attendance rates were even lower for Mathematics, where, on average, 79.7% of pupils were present. Attendance may have been lower in Mathematics because tests in Mathematics followed those in reading, and ennui with the testing process may have started to affect pupils. Further, because testing in Mathematics was slightly closer to the end of the school year (it ran into June in some schools), some pupils may have already left school and gone on holiday. Principals suggested that this happened in a number of schools, as did the practice of pupils leaving school as soon as they had made their Confirmation[3].

In analyses which examined the reading and Mathematics achievements on individual subtests of pupils grouped on the basis of whether they were present or not for all subtests, no significant differences were found between the test scores of the better attenders and those who missed one of the two subtests in reading. In Mathematics, however, those present for all three parts of the test achieved significantly higher scores on Computation, Concepts, and Problems than those missing for one or two subtests. The implication of this is that real achievement levels in Mathematics may well be *lower* than stated here, because only the better performing pupils are represented in the total scores (i.e., the scores most frequently used in this report to describe mean achievement). It also points to the urgent need for participating schools to address the issue of pupil absenteeism.

There are grounds for concern about the performance of boys. Teachers excluded a greater percentage of boys (8.5%) than of girls (6.9%) from all testing based on the expectation that they would be unable to attempt the test items. Furthermore, boys had lower rate of attendance than girls. A slightly smaller percentage of boys (74.6%) than of girls (78.5%) had test scores for both parts of the reading test (χ^2=0.8; *df*=1; *ns*), but, there was a substantial difference between the percentages of boys (56.4%) and girls (68.3%) present for the administration of all three Mathematics subtests (χ^2=5.5; *df*=1; p<.05). Furthermore, in comparison with girls, there was a marked decrease in the reading and Mathematics

[3] In one school, there were 10 pupils at 6th class level, three of whom were excluded from testing by their teacher. However, serious attendance problems among the remaining seven pupils in the week following their Confirmation forced the cancellation of testing in the school: On the day testing was due to begin, none of the pupils was present, and while one of the seven eligible pupils attended on the second day, he refused to sit the test.

achievements of boys in the 6th class cohorts between 1997 and 2003. The mean reading test scores of boys in 6th class decreased significantly between 1997 and 2003 in both reading Vocabulary and Comprehension, and there was also a significant decline in their total reading raw score over the same period (see Table 16). In contrast, the mean test scores of girls in the 2003 and 1997 cohorts did not differ significantly on either of the reading subtests or on reading overall (Table 15). The achievement pattern of boys over time in Mathematics was similar (Table 32), with the mean scores of boys in 1997 exceeding those in 2003 on Mathematical Computation, Concepts and Problems, as well as on Mathematics overall ($p<.001$ in all cases). However, unlike their performance in reading, girls' mean scores also decreased in Mathematics between 1997 and 2003 in two of the three Mathematics subtests and on Mathematics overall (Table 31). The decreases were, however, of a smaller magnitude than those observed among boys.

The decline in achievement levels since the start of the scheme has occurred in the context of an increase in resourcing (in terms of both staffing and funding) under the scheme. Over the same period, there was also an improvement in the economic circumstances of families served by the schools. When schools were selected for participation in the scheme in 1996, larger percentages of families were characterised by long-term unemployment, medical card possession, and residence in local authority housing than was the case when the second cohort of 6th class pupils were tested in 2000 (see Weir et al., 2002). This raises the question of why pupils' achievements have decreased, rather than increased, over the first six years of the scheme.

One possible reason for the decrease in achievement may be the decrease between 1997 and 2000 in the number of hours each week that teachers reported they spent teaching English (Weir et al., 2002). Since the amount of time that pupils receive instruction in a curriculum area is associated with achievement in the area (see, e.g., Teddlie, Kirby & Stringfield, 1989), the decrease in achievement would not be surprising. Although self-reports by both junior and senior class teachers also revealed a slight decrease between 1997 and 2000 in the time they spent teaching Mathematics, the decrease was not significant. It is, unlikely, therefore, that time spent teaching Mathematics explains the significant decrease in Mathematics scores.

It is, of course, possible that pupils' achievements increased in areas not measured by the tests administered as part of the evaluation of the scheme. Pupils were assessed only in the relatively narrow areas of reading and Mathematics, and it may be that they made greater progress in other areas of school life. However, the evaluation of the scheme prioritised

literacy and numeracy, as achievement in these areas is considered essential to pupils' general scholastic progress.

It is also possible that earlier gains were made by pupils in the cohort, but that these were lost as pupils progressed to senior classes (for example, if the 2003 cohort had been tested at the end of 1st class, they might have shown evidence of greater benefits from having been being taught in small classes). There is support for this idea from elsewhere. Slavin (1989) reported that reduced class size had a small positive effect on student achievement, but that the effect did not persist after the reduced class size experience. However, there is also evidence that the benefits of being taught in small classes persist (see Finn & Voelkl, 1994).

It may also be that teachers failed to change their classroom practices. Research has shown that reduced classes are only beneficial if teachers optimise the teaching opportunities provided by the smaller numbers. However, evidence elsewhere indicates that most teachers do not alter their teaching practices when they move to smaller classes (Hertling, Leonard, Lumsden, Smith, & Picus, 2000). Indeed, there is some self-report evidence from Junior class teachers in *Breaking the Cycle* schools that suggests that they spent less time on individual instruction in 2000 than in 1997. Before any firm conclusions could be drawn about the impact of teachers' instructional style on pupil achievement in *Breaking the Cycle* schools, further work – possibly involving a more intense examination of instructional practice in a sample of schools – is indicated.

Other factors which might have impacted on pupil achievement levels include teacher and pupil expectations. As pointed out in the final evaluation report, while teachers in the selected schools held very positive views of the scheme, and believed it had had greatly benefited pupils from disadvantaged backgrounds, they generally maintained low educational expectations for their pupils (Weir et al., 2002). Further evidence of low expectations among teachers came to light during the organisation of achievement testing in 2003, when almost 8% of the total cohort (almost double the percentage of three years earlier, and more than eight times that of six years earlier) was excluded by teachers on the grounds that the pupils involved were too weak to attempt the tests. Furthermore, the apparent discontinuity between the relatively high scholastic self-evaluations of participating pupils and their actual achievements has already been noted (Weir et al., 2002). If pupils have unrealistic views of their scholastic ability, it suggests that teachers may need to provide more challenges in the classroom, avoid giving praise that is non-contingent on effort or achievement, and increase their expectations of pupils. Targeted inservice training is one potential means of raising teachers' expectations. However, this approach would be hindered by the fact that schools in

Breaking the Cycle have a very high rate of staff turnover (65% of teachers in 1999/2000 had taken up their posts since the scheme began in 1996/1997) as well as significant numbers of unqualified teachers (72% of schools had at least one such teacher in 2001/2002, and across participating schools, an average of 12.6% of teachers were unqualified). Addressing these staffing problems might well have an eventual positive impact on pupil achievement.

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