

**Key Stage Assessments:
Levels of Progression 2017/18**

Methodology Paper

May 2019

Version 1.1

1. Background

This paper outlines the methodology applied by the Department of Education (DE) to 2017/18 Key Stage Assessment data in order to generate specific high-level NI averages which can be utilised by the Department and schools in their key policies and target setting.

Key Stage Levels of Progression (LoP) are used to measure Literacy and Numeracy targets set out in the Department of Education Strategy 'Count, Read: Succeed' which contains long-term targets by 2019/20. Since 2013/14, ongoing industrial action has heavily impacted on the number of schools submitting their KS data to CCEA (for moderation purposes) and DE. In turn, an exercise has been carried out to firstly determine how representative the 2017/18 returns are within the NI context and, accordingly, adjust the data for non-response within each cohort.

End of Key Stage Assessments (KSAs) are carried out in primary schools at the end of Year 4 (KS1) and Year 7 (KS2), as well as in post-primary schools at the end of Year 10 (KS3).

2. Representativeness of 2017/18 achieved returns

Due to industrial action, around a sixth of all primary schools (17%), and one-third of post-primary schools (37%) submitted 2017/18 KSA results. In turn, there is a strong likelihood of non-response bias in any subsequently produced average. Bias arises if the characteristics of non-responding schools (or pupils) differ significantly from those of responding schools (or pupils). The extent of such non-response bias can only be examined by comparing the characteristics of respondents with the distribution of the same characteristics in the entire school population.

To assess how accurately the sample of 2017/18 LoP data reflect the complete Year 4 (KS1), Year 7 (KS2) and Year 10 (KS3) school populations in Northern Ireland, the characteristics of each group have been compared with those collected through the 2017/18 School Census, an extract of which is presented in Table 2.1.

Table 2.1: Comparisons of the distribution of participating school pupils (KS1) with all Year 4 pupils in Northern Ireland, 2017/18

	KS1 Submissions (%)	2017/18 School Census (%)
Former ELB Area¹		
Belfast	15.6	15.4
Western	10.1	16.7
North Eastern	44.1	21.8
South Eastern	13.3	21.3
Southern	16.9	24.9
Gender		
Girl	49.6	49.4
Boy	50.4	50.6
FSME²		
Non-FSME	72.9	69.7
FSME	27.1	30.3

Notes:

1. The Education Authority came into existence on 1st April 2015 and assumed the responsibilities of the former Education and Library Boards (ELBs).
2. Free School Meal Entitled (FSME) status was unknown for 23 pupils with submitted KS1 results.

3. Weighting

In order to accurately reflect the composition of Northern Ireland's Years 4, 7 and 10 school populations, weights have been calculated and applied to the data to compensate and adjust for non-response bias in KSA data returns. Figures from the 2017/18 School Census were used to derive 3 individual sets of weights, one for each year group.

It was considered appropriate to consider school and pupil characteristics, as presented in Table 3.1, as each will, independently and collectively, influence the expected attainment levels at an individual pupil level.

Table 3.1: School and pupil characteristics used to construct weights accounting for non-response bias in KS1, KS2 and KS3 Levels of Progression submissions, 2017/18

			Primary		Post-Primary
			KS1	KS2	KS3
School	Former ELB Area ¹	Belfast	✓	✓	×
		Western	✓	✓	×
		North Eastern	✓	✓	×
		South Eastern	✓	✓	×
		Southern	✓	✓	×
	Management Type	Controlled	✓	✓	✓
		Catholic Maintained	✓	✓	✓
Other ²		✓	✓	✓	
School Type	Grammar	-	-	✓	
	Non-Grammar	-	-	✓	
Pupil	FSME	FSME	✓	✓	✓
		Non-FSME	✓	✓	✓
	Gender	Girl	✓	✓	✓
		Boy	✓	✓	✓

Notes:

1. The Education Authority came into existence on 1st April 2015 and assumed the responsibilities of the former Education and Library Boards (ELBs).
2. Includes schools within 'other maintained', 'controlled integrated', 'grant maintained integrated' and 'voluntary' sectors.

It should be noted that weighting cannot generate data for certain groups lost through non-response. In this particular exercise, all KS1 pupil groupings were represented while only one grouping in KS2 (ie pupils from 'other' management type schools in the former WELB) and four pupil groupings in KS3 were not represented (pupils from Controlled Grammar schools in the former BELB, pupils from Controlled non-Grammar schools in the former BELB, pupils from 'other' non-Grammar schools in the former BELB, pupils from Controlled Grammar schools in the former WELB). The small amount of KS3 data provided by BELB and WELB Grammar schools resulted in amendments being made to the weighting for the post-primary sector. Weighting for former ELB was removed from the calculation of KS3 weights to control for the impact of limited returns for some former ELB areas.

While multiple sets of individual weights can be derived based on school (ELB, Type, Management Type) or pupil (Gender, Free School Meal Entitled (FSME)) characteristics, this

methodology has focussed on the construction of a single set of pupil-level weights at each Key Stage combining these characteristics given that a pupil's expected attainment will be inter-reliant on a combination of these variables. The set of KS1 weights derived for Year 4 pupils is shown in Table 3.2.

Table 3.2: Details of weights to be applied to KS1 LoP data submitted in 2017/18

Former ELB Area ¹	Management Type	FSME	Gender	
			Girl	Boy
Belfast	Controlled	Non-FSME	0.43	0.45
		FSME	0.68	0.69
	Catholic Maintained	Non-FSME	11.42	6.60
		FSME	3.37	2.70
	Other	Non-FSME	0.86	0.44
		FSME	2.07	1.90
Western	Controlled	Non-FSME	0.98	1.00
		FSME	1.13	1.02
	Catholic Maintained	Non-FSME	1.76	1.83
		FSME	3.32	3.13
	Other	Non-FSME	1.92	2.30
		FSME	8.10	7.92
North Eastern	Controlled	Non-FSME	0.48	0.54
		FSME	0.45	0.48
	Catholic Maintained	Non-FSME	0.50	0.49
		FSME	0.51	0.55
	Other	Non-FSME	0.46	0.53
		FSME	0.42	0.40
South Eastern	Controlled	Non-FSME	1.66	1.96
		FSME	2.14	1.81
	Catholic Maintained	Non-FSME	1.21	1.13
		FSME	1.84	1.59
	Other	Non-FSME	1.46	1.45
		FSME	2.62	1.79
Southern	Controlled	Non-FSME	1.24	1.18
		FSME	1.02	1.31
	Catholic Maintained	Non-FSME	2.10	1.88
		FSME	1.73	1.89
	Other	Non-FSME	0.71	0.71
		FSME	0.81	1.69

Notes:

1. The Education Authority came into existence on 1st April 2015 and assumed the responsibilities of the former Education and Library Boards (ELBs).
2. Weights are rounded to 2 decimal places for presentational purposes.
3. While the data in this table illustrate the 30 separate weighted values derived for Primary School pupils (KS1 and KS2), the number of values doubles at KS3 to incorporate school type (i.e. Grammar and Non-Grammar).

The effect of applying the above weighting is depicted in Table 3.3 which shows the proportion of Year 4 pupils (KS1) achieving the expected level (Level 2 or above) before and after weighting.

Table 3.3: Effects of weighting on KS1 averages, by gender, 2017/18

% achieving level 2 or above		Unweighted %	Weighted %
Communication	Girls	91.6	90.7
	Boys	85.6	83.0
	All	88.5	86.8
Using Maths	Girls	91.3	89.0
	Boys	89.3	87.1
	All	90.2	88.0
Using ICT	Girls	93.1	91.3
	Boys	90.0	88.5
	All	91.5	89.9

This technique corrects for over- and under- representation in the various groups when compared with the entire population. Table 3.4 presents an updated version of Table 2.1 showing how weighting has adjusted the proportion of responding schools in line with school census data.

Table 3.4: Effects of weighting on the distribution of participating pupils (KS1) with all Year 4 pupils in Northern Ireland, 2017/18

	KS1 Submissions		2017/18 School Census (%)
	Unweighted %	Weighted %	
Former ELB Area¹			
Belfast	15.6	15.4	15.4
Western	10.1	16.7	16.7
North Eastern	44.1	21.8	21.8
South Eastern	13.3	21.2	21.3
Southern	16.9	24.9	24.9
Gender			
Girl	49.6	49.3	49.4
Boy	50.4	50.7	50.6
FSME²			
Non-FSME	72.9	69.7	69.7
FSME	27.1	30.3	30.3

Notes:

1. The Education Authority came into existence on 1st April 2015 and assumed the responsibilities of the former Education and Library Boards (ELBs).
2. Free School Meal Entitled (FSME) status was unknown for 23 pupils with submitted KS1 results.

4. Standard error and confidence intervals

Given that only a proportion of schools submitted KSA returns in 2017/18, any averages derived from these data may differ from those that would have been obtained if all schools had responded. The extent of this difference naturally depends on the level of non-response. It is, however, possible to calculate the range of values between which the (true) population figures are estimated to lie. This is known as the confidence interval, sometimes referred to as a margin of error.

Confidence intervals at the 95% confidence level have been stated alongside the various estimates produced for 2017/18. This means that, while the best estimate represents the weighted mean figure drawn from the data, there is 95% certainty that the true population mean lies between the lower and higher estimates. To put it another way, it is assumed (and accepted) that there is a one in 20 chance that the true population value will fall outside the 95 percent confidence interval calculated for the (best) estimate.

Confidence intervals have been calculated using the standard error of proportions, using the formula:

$$se(p) = \sqrt{\frac{p \times (1 - p)}{n}}$$

5. Statistical significance of change

Because these KSA estimates are subject to sampling error, differences between estimates from successive years or between population subgroups may occur by chance. It is possible to measure whether this is likely to be the case using standard statistical tests and conclude whether differences are likely to be due to chance or represent a real difference.

For the purposes of this exercise, where differences have emerged as being statistically significant, these have been reported at the 5% ($p < 0.05$) level of probability (two-tailed tests). This means that, for any observed result that is found to be statistically significant, one can be 95% confident that this has not happened by chance. Within Table 6.2, any increases or decreases that are statistically significant at the five per cent level ($p < 0.05$), and are therefore considered to be real, are indicated by a double asterisk (**).

6. Results - NI averages

Table 6.1 displays weighted headline results at the NI level for KS1, KS2 and KS3 pupils achieving the expected level in Communication (in English), Using Maths, and Using ICT together with confidence intervals.

Table 6.1: Levels of progression in Communication and Using Maths, NI averages with Confidence Intervals 2017/18^{1,2}

% pupils achieving the expected level			2017/18		
			Best Estimate ³	Lower Estimate ³	Higher Estimate ³
KS1	Level 2 or above	Communication (English)	86.8	85.7	87.9
		Using Maths	88.0	87.0	89.0
		Using ICT	89.9	89.0	90.8
KS2	Level 4 or above	Communication (English)	77.7	76.4	79.0
		Using Maths	78.6	77.3	79.9
		Using ICT	84.5	83.3	85.7
KS3 ⁴	Level 5 or above	Grammar and Non-Grammar:			
		Communication (English)	70.6	69.3	71.9
		Using Maths	73.3	72.0	74.6
		Using ICT	73.5	72.0	75.0
		Grammar:			
		Communication (English)	98.6	97.8	99.4
		Using Maths	99.3	98.8	99.8
		Using ICT	98.2	97.2	99.2
		Non-Grammar:			
Communication (English)	61.8	60.2	63.4		
Using Maths	63.3	61.7	64.9		
Using ICT	64.7	62.8	66.6		

Source: EA (DE)

Notes:

1. Excludes Special and Independent schools.
2. Data have been weighted to account for non-response bias.
3. The best estimate is the mean figure drawn from the sample. The lower and higher estimates are for the 95% confidence interval. There is 95% certainty that the true population value lies between the lower and higher estimates.
4. In 2017/18 weighting for former ELB area was removed from KS3 data to control for the impact of limited returns from some former ELB areas.

Results suggest that, in 2017/18, there is no significant difference in the overall percentage of KS1 pupils attaining the expected level in Communication, Using Maths or Using ICT from that in 2016/17. However, boys were significantly lower in Communication and those pupils with FSME were lower in both Communication and Using maths.

There is no significant difference in the percentage of pupils attaining the expected level in any subject overall at KS2 or between boys and girls and those with FSME and those without.

Overall, there has been a significant decrease in the percentage of post-primary school pupils achieving the expected level in Communication and Using Maths. There was,

however, a significant increase in the overall percentage of post-primary schools achieving the expected level in Using ICT. There was a rise in the percentage of Grammar school pupils assessed as achieving the expected level in all three subjects while Non-grammar school pupils showed a rise in Using ICT but no difference in the other 2 subjects. (Table 6.2).

Table 6.2: Levels of progression in Communication and Using Maths, NI averages 2012/13 to 2017/18¹

% pupils achieving the expected level			2012/13	2013/14 ²	2014/15 ²	2015/16 ²	2016/17 ²	2017/18 ²	Statistically significant change, 2016/17 to 2017/18 ³
KS1	<i>Level 2 or above</i>	Communication (English)	90.1	91.1	88.7	87.5	88.2	86.8	
		Using Maths	90.8	92.2	90.3	88.4	89.3	88.0	
		Using ICT	-	-	-	-	89.9	89.9	
KS2	<i>Level 4 or above</i>	Communication (English)	77.1	79.8	76.8	78.0	78.8	77.7	
		Using Maths	78.5	80.3	77.4	78.7	79.6	78.6	
		Using ICT	-	-	-	-	84.2	84.5	
KS3	<i>Level 5 or above</i>	Grammar & Non-Grammar:							
		Communication (English)	72.2	74.1	74.0	78.2	75.8	70.6	** ↓
		Using Maths	73.9	77.1	77.3	78.7	75.9	73.3	** ↓
		Using ICT	-	-	-	-	68.4	73.5	** ↑
		Grammar:							
		Communication (English)	96.8	98.6	98.4	97.6	96.5	98.6	** ↑
		Using Maths	98.8	99.4	99.7	98.0	96.0	99.3	** ↑
		Using ICT	-	-	-	-	93.7	98.2	** ↑
		Non-Grammar:							
Communication (English)	58.8	59.3	58.5	64.1	63.3	61.8			
Using Maths	59.8	62.1	63.5	63.6	64.2	63.3			
Using ICT	-	-	-	-	57.1	64.7	** ↑		

Source: EA (DE)

Notes:

1. Excludes Special and Independent schools.

2. From 2013/14 onwards data have been weighted to account for non-response bias. In 2017/18 weighting for former ELB area was removed from KS3 data to control for the impact of limited returns from some former ELB areas.

3. Statistical significance of change at the 5% level (two-tailed test) is indicated by a double asterisk (**) with the direction of change indicated by an arrow.